IJIS Institute

New Horizons in Information Sharing

Cloud Computing: An Essential Overview

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Agenda

➢ **IJIS Overview**

➢ **Defining "Cloud Computing"**

➢ **Business Case for the Cloud**

➢ **Cloud Layers & Service Offerings**

➢ **Impacts & Considerations**
- **Security**
- **Standards & Best Practices**
- **Migration**

➢ **Use Cases**

The IJIS Institute

Information Sharing

is at the heart of everything we need to do to prevent terrorism, reduce crime and improve the quality of justice in America

We Have the Technology

Better

Faster

Cheaper

industry

government

ii

Who we are…

- A non-profit consortium consisting leading organizations that supply IT solutions and services to the justice, public safety and homeland security sectors.

- Funded by a combination of industry contributions and grants from multiple federal agencies

- Provide training, technology assistance and program management services to local, state, tribal and federal organizations to help them fully realize the power of information.

Our Mission

The IJIS Institute unites the private and public sectors to improve critical information sharing for those who provide public safety and administer justice in our communities.

Our Services

Helping Implement National Strategies

- **Technology Assistance**

- **Training**

- **NISS Help Desk and Knowledge Center**

- **Program Management**

- **National Scope Issue Management**

- **Communications and Outreach**

Our Member Companies

- **Provide solutions to some of the most important issues facing our communities today.**

- **Lead the way in the justice and public safety IT sector.**

- **Participate in an industry consortium dedicated to visionary thinking about cooperation and industry/government collaboration.**

IJIS Members

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esri ATHENA Advanced Networks "The Wise Choice" Marquis Software Development Law Enforcement Intelligence Group spillman technologies, inc. reliable innovation PDSG PATRIOT DATA SOLUTIONS GROUP TRITECH SOFTWARE SYSTEMS RADCA CO., LLC Phillip M. Winiarski President MTG Management Consultants DSG Development Services Group, Inc.
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TIBURON Be secure in your knowledge. Microsoft Hitech Systems PULSIAM InterAct PUBLIC SAFETY UNISYS imagine it. done. RAINER & Associates, Inc.
Appriss keeping communities safe and informed TrapWire INC CHERTOFF GROUP objectstream EXCELLENCE IN EVERYTHING WE DO NOWHERE TO HIDE Cisco Systems NICHE TECHNOLOGY Technica COPLINK Accelerating Law Enforcement TASER Protect Life PRESYNCT TECHNOLOGIES, INC. EJustice SOLUTIONS
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Our Sustaining Members

- **BAE Systems**
- **IBM**
- **Microsoft**
- **Raytheon**
- **ESRI**
- **VisionAIR**
- **Oracle**
- **SRA International**
- **Cisco Systems**
- **Appriss**
- **Alcatel Lucent**

A Partnership:
Government & Industry
Working Together

- **Engaging the Resources of Industry**

- **Providing Situation Responsive Services**

- **Delivering High Impact Programs**

- **Bringing the "Best Thinking" to National Issues**

- **Consensus Standards Cooperative - Springboard**

National Program Involvement

- **National Information Exchange Model (NIEM)**

- **FBI National Data Exchange (N-DEx)**

- **Fusion Center Deployment**

- **National SAR Initiative (NSI)**

- **Prescription Drug Monitoring (PDMP)**

- **Statewide Automated Victim Information & Notification (SAVIN)**

- **Global Reference Architecture (GRA)**

- **Public Safety Data Interoperability (PSDI)**

What is Cloud Computing?

What is Cloud Computing?

(Business definition)
A method to address scalability and availability
concerns for large scale applications

What is Cloud Computing?

(Engineering definition)

Providing convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.

What is Cloud Computing?

a) A way to access applications hosted on the web through your web browser

b) A pay-as-you-go model for IT resources accessed over the Internet

c) Use of computer resources, distributed throughout an internet, to perform parallel processing, distributed storage, indexing and mining of data

d) Gartner: "Cloud computing is a style of computing where massively scalable IT-related capabilities are provided "*as a service*" across the Internet to multiple external customers"

e) Commercial: An IT buzzword that assures potential clients that your product is on the cutting edge of technology

f) All of the above
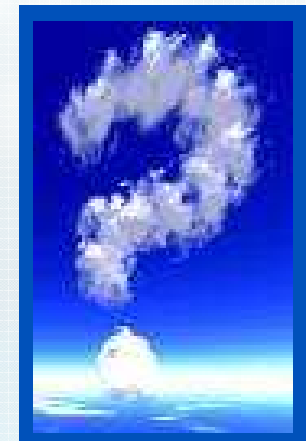
What is Cloud Computing?

- Internet is the democratization of information

- E-commerce is about the democratization of business

- Blogging is the democratization of news

- Cloud Computing is about the democratization of servers

Software as a Service

SaaS

A way to access applications hosted on the web through your web browser

Examples: A web application for hosting an RMS solution

Impacts: Your data may not be locally stored

Issues: Security and Availability, RaaS, Customization

Benefits: Cost, maintenance, upgrades, hardware

Platform as a Service

PaaS

The delivery of a computing platform and solution stack as a service. A pay-as-you-go model for IT resources accessed over the Internet

Examples: A hosted software solution stack (platform -specific) for deploying applications

Impacts: Your data is not locally stored, but scalability and flexibility is increased. Platform expertise.

Issues: Security and Availability

Benefits: Cost, expertise and specialized services

Infrastructure as a Service

IaaS

Use of computer resources, distributed throughout an internet, to perform parallel processing, distributed storage, indexing and mining of data

Examples: A hosted hardware environment (including servers, databases, applications)

Impacts: Your data is not locally stored, but scalability and flexibility is increased. Enterprise services for exchanges, workflows, indexing, searching on a single tier

Issues: Security and Availability

Benefits: Cost, enterprise services on a commodity basis

Why Move into the Cloud?

Big for Little -- The access to infinite computing resources available on demand, thereby eliminating the need for users to plan far ahead for provisioning. Small agencies, with big system resources.

Pay As You Go --The elimination of an up-front commitment by Cloud Users, thereby allowing agencies to start small and
increase hardware resources only when there is an increase in their needs

Elastic --The ability to pay for use of computing resources on a short-term basis as needed (e.g., processors by the hour and storage by the day) and release them as needed

Common Cloud Themes

- They're **BIG** – massively scalable
- **Elastic** - Use what you need – no upfront commitments, use on short-term basis
- **Ubiquitous** - Out there on the network somewhere – accessible via Internet, location independent
- **Transparent** – complexity concealed from users, virtualized, abstracted
- **Service-oriented** – easy to use, SLAs, accessible

Simple Metaphor:
Like Power Company

Better Metaphor:
Cooperatively Owned Semiconductor Lab

Commercial Cloud Formation

Cloud Deployment Models

▸ **Internal** *(private) cloud.* The cloud infrastructure is operated within the consumer's organization, or external but exclusively used.

▸ **Community** *cloud.* The cloud infrastructure is jointly owned by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations).

▸ **Public** *cloud.* The cloud infrastructure is owned by an organization selling cloud services to the general public or to a large industry group.

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

NIST working definitions

Software-as-a-Service

Applications

- *Rich Internet application web sites*
- *Application as Web Sites*
- *Collaboration and email*
- *Office Productivity*

- Flikr
- Facebook
- WebEx
- Gmail/Google Docs

Infrastructure-as-a-Service

Physical

- *Managed Hosting*
- *Collocation*
- *Internet Service Provider*
- *Unmanaged hosting*

- GoDaddy
- Rackspace
- Amazon EC2
- GoGrid

Service Types

Examples

Q: Where is The Justice Cloud Focus?
A: Infrastructure/Platform Capabilities

Customers

End users

Software-as-a-Service

Existing end user services market, delivered from/off the cloud

IT **Consumers**

Platform-as-a-Service

Three emerging cloud-infrastructure -as-a-service markets

Infrastructure-as-a-Service (*Virtual*)

Infrastructure-as-a-Service (*Physical*)

Traditional data center services market, such as co-location or managed hosting

Cloud Standards Customer Council

The goal of the council is to separate the hype from the reality on how to leverage what customers have today and how to use open, standards-based cloud computing to extend their organizations.

Key considerations outlined by the council:

▸ **Security**

▸ **Portability**

▸ **Interoperability**

Security in the Cloud

A cloud implementation introduces security risks and at the same time security advantages.

Selecting a migration path is a key strategy to reduce the risks and maximize the advantages

Security in the Cloud

▶ **Security Challenges**

– Moving **personally identifiable and sensitive data** to the cloud

– **Trusting** vendor's security model

– **Data ownership** issues and indirect administrator accountability

– **Proprietary** implementations cannot be examined

– Large clouds are attraction to **hackers**

– Possibility of **massive outages**

– Loss of **physical control**

Security in the Cloud

▶ **Security Advantages**

– Greater **investment** in security infrastructure

– Cloud **homogeneity** makes security **auditing/testing simpler**

– Clouds enable **automated security management**

– Simplification of **compliance analysis**

– Data held by an **unbiased party**

– **Dedicated** Security Team

– **Redundancy / Disaster Recovery**

Considerations on Migration

▸ **Balancing** Threat Exposure and Cost Effectiveness

- – Private clouds have less **threat exposure** while massive public clouds are **cost effective**

- – Leverage increasing amount of **knowledge** available from the Cloud Security Alliance (CSA) and the National Institute of Standards and Technology (NIST)

- – **Public data** can be moved to the cloud today while **higher sensitivity data** is likely to be processed on clouds where organizations have control over the security model

Portability in the Cloud

▸ The Open Virtualization Format (OVF) is an industry standard format for portable virtual machines.

▸ Virtual machines packaged in this format can be installed on any virtualization platform that supports the standard.

▸ The companies behind the collaboration on this specification include Dell, HP, IBM, Microsoft, VMware, and XenSource.

Interoperability in the Cloud

▸ Standards are Foundational Elements and Enablers of Cloud Computing Interoperability

- – Grid Computing and Server Virtualization
- – Web Services and Service Oriented Architecture
- – Federated Identity Management
- – Service Level Agreements

▸ Justice and Public Safety Standards

- – The National Information Exchange Model (NIEM)
- – The Global Reference Architecture (GRA)
- – The Global Federated Identity and Privilege Management (GFIPM)

▸ NIST has a dedicated research

Clouds and NIEM

– Cloud computing has the potential to further enable NIEM to become the basis upon which successful data sharing is achieved across federal, state, tribal and local government agencies.

– Incorporating clou`d concepts in NIEM and especially concepts on how multiple cloud infrastructures will work together to enable information sharing will evolve with experience

Clouds and the Global Reference Architecture

– Provides a model for using cloud services to compose complex, customizable, distributed applications

– A basis for interoperability and extensibility of cloud solutions

– GRA products with significant impact

- Service Specification Packages

- Service Interaction Profiles

- Service Level Agreements
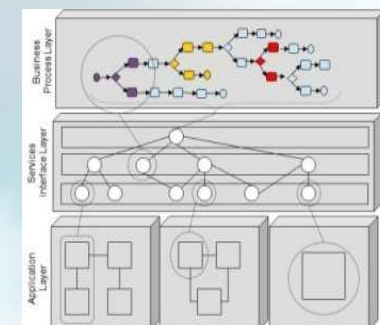
Clouds and Federated Identity (GFIPM)

– The Global Federated Identity and Privilege Management (GFIPM) standard provides governance mechanism to establish trust across security domains

– Federated identity is critical for cloud implementations. GFIPM can be used as enabler to security in the cloud

– Identity Provider services can be hosted cost effectively in the cloud

PASSPORT

United States of America

Cloud Statistics

▸ "If you move your data centre to a cloud provider, it will cost a tenth of the cost." – *Brian Gammage, Gartner Fellow*

▸ Use of cloud applications can reduce costs from 50% to 90% - *CTO of Washington D.C.*

▸ IT resource subscription pilot saw 28% cost savings - *Alchemy Plus cloud (backing from Microsoft)*

▸ Preferred Hotels
  – Traditional: $210k server refresh and $10k/month
  – Cloud: $10k implementation

▸ George Reese, *founder Valtira and enStratus*
  – Using cloud infrastructures saves 18% to 29% before considering that you no longer need to buy for peak capacity

A Strong Commitment to Cloud Computing

- The Obama administration has made cloud computing a high priority
  - Considered the "next generation of IT" in government
  - Supports the objective of creating a more agile federal enterprise, where services can be provisioned and reused on demand to meet business needs

- "The advantages of cloud computing are so compelling, I don't think there is any going back"

- The justice and public safety world is already developing capabilities to use this paradigm. Companies are offering Software as a Service using Nlets as the network cloud within which smaller police agencies can have systems without paying the cost of their own server and localized application software.

Source: "Federal government takes steps toward cloud computing environment", by Richard W. Walker
Source: The IJIS Factor: "When will cloud computing come of age?", by Paul Wormeli

The Evolution of Government Clouds

▸ Amazon Web Services GovCloud designed for sensitive workloads

- – Managed by US Personnel

- – Conformant with Government Specific Controls and Certifications

▸ Microsoft has announced a number of diverse offerings ranging from its Azure Appliance to a dedicated government cloud offering based on the Business Productivity Online Suite (BPOS)

▸ Google has announced completion of FISMA certification for a multi-tenant cloud application and GogleApps has received an authority to operate at the FISMA-Moderate level

Source: "Government Clouds", by Tom Kooy, September 12th, 2011

Cloud Case Studies

▸ **Selective Service Systems**

– The **goal** was to operate at maximum potential with reduced annual budget and at the same time achieve agility at a reduced total cost of ownership.

– Employed a phased **approach** migrating one system at a time and performed ongoing improvements of the cloud environment.

– Achieved the following key benefits

- Improved Database Analysis Performance

- Ease of Implementation

- Rapid System Deployment

Cloud Case Studies

▸ **City of Miami Cuts Costs with Cloud Services**

- – The **goal** was to develop an online application to record, track and report on nonemergency 3-1-1 incidents to better serve citizens.
- – The city was facing **constraints** such as tighter budget and fewer personnel
- – The **solution** is based on the Windows Azure Platform from Microsoft and implements an off-the-shelf product called MapDotNet UX which provides rich, interactive geospatial visualization and analysis.
- – The **benefits** were reduced cost, fast time-to-market, greater ability to offer new services to citizens and improved disaster recovery.

" With Windows Azure, we don't have to worry about managing a costly infrastructure and can focus on delivering new services that positively impact citizens and our organization. "

James Osteen, Assistant Director of Information Technology, City of Miami

Cloud Case Studies

▸ **Google Cloud User: City of Washington D.C.**

- – Migrating **38,000** employees to Google Apps
- – Replace office software
  - Gmail
  - Google Docs (word processing and spreadsheets)
  - Google video for business
  - Google sites (intranet sites and wikis)
- – **500,000+** organizations use Google Apps

" It's a fundamental change to the way our government operates by moving to the cloud. Rather than owning the infrastructure, we can save millions. "

Vivek Kundra, Federal CIO

Cloud Case Studies

▸ Salesforce.com in government

- President Obama's Citizen's Briefing Book Based on Salesforce.com Ideas Application
  - **Concept to Live in Three Weeks**
  - 134,077 Registered Users
  - **1.4 M Votes**
  - 52,015 Ideas
  - Peak traffic of **149 hits per second**

- **US Census Bureau Uses Salesforce.com Cloud Application**
  - Project implemented in **under 12 weeks**
  - **2,500+ partnership agents** use Salesforce.com for 2010 decennial census
  - Allows projects to **scale from 200 to 2,000 users** overnight to meet peak periods with no capital expenditure

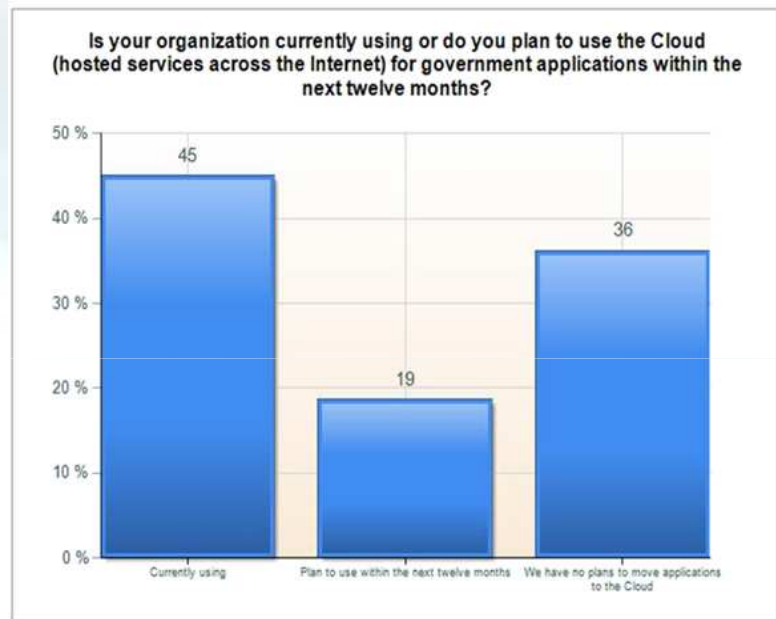# *Cloud Case Studies*

▸ **Town of East Hampton New York RMS/CAD**

– The **goal** was to leverage existing investments and at the same time to adopt an operating-expense centric strategy which provided more flexibility.

– Key **requirement** was to be able to rapidly react to increased service requirements.

– The **solution** was to use an enterprise level CAD/RMS system that dynamically interacts with the cloud platform and consist of large scale infrastructure, highly advanced replication, load balancing, resource allocation and much more.

– Key **benefits** are reduced hardware, software and maintenance cost, new functionality and improved productivity.

We ported our entire Total Enforcement 2 solution to the Microsoft Windows Azure Cloud-Computing platform. The solution offers uncompromised functionality, simplicity, enterprise scalability, and high automation."

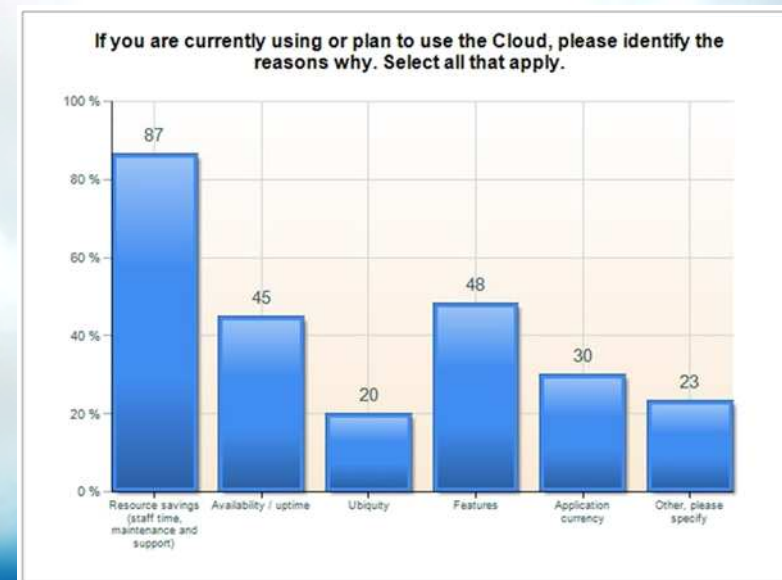Vincent Tedesco, President of Total Computer Group

Local Government and the Cloud

Is your organization currently using or do you plan to use the Cloud (hosted services across the Internet) for government applications within the next twelve months?

64 % of Government Agencies which Responded Use or Plan to Use Cloud Computing

If you are currently using or plan to use the Cloud, please identify the reasons why. Select all that apply.

Key Drivers are:

- Resource Saving
- Features
- Availability and Uptime

Source: PTI – "Local Government and the State of Cloud Computing"

Questions and Answers

Resources

▸ NIST: Effectively and Securely Using the Cloud Computing Paradigm, Peter Mell and Tim Grance
  http://csrc.nist.gov/groups/SNS/cloud-computing/index.html

▸ NIEM and the Cloud
  http://www.kms.ijis.org/traction/permalink/Public4049

▸ Above the Clouds: A Berkeley View of Cloud Computing
  Electrical Engineering and Computer Sciences
  University of California at Berkeley
  Technical Report No. UCB/EECS-2009-28
  http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.html

▸ Public Technology Institute: Local Government and the State of Cloud Computing
  http://www.pti.org/docs-cio/Local_Governments_and_State_of_Cloud_Computing.pdf

Increasing the Value of "our" Cloud
Clouds Exhibit Network Effect

• More participation increases value of the system to everyone

• More indexed data = greater opportunity to uncover patterns & make connections

• More participation in collaborative SW development = increased contributions of reusable code

• More design interactions = more seamless interfaces and lower friction processes

• More use = greater statistical multiplexing of loads = increased ability for surge computing

• More use = more machines = better economies of scale