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Racing to the Clouds: How Cloud Computing is Advancing Public Health

Plenary Session #3

Wednesday, May 20, 2015

APHL™

Speakers

Moderator: Patina Zarcone, MPH
Association of Public Health Laboratories

Panelists:
Eduardo Gonzalez Loumiet, MBA, PMP, CPHIMS
Uber Operations

Jeff Benning, MBA
Lab Interoperability Collaborative

Willis Gibson, PMP
Texas Dept of State Health Services

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What is Cloud Computing and What does it Mean for Public Health?

Eduardo Gonzalez Loumiet, MBA, PMP, CPHIMS
Uber Operations

What is Cloud Computing?

How is Public Health using the Cloud?

Who invented the Cloud?

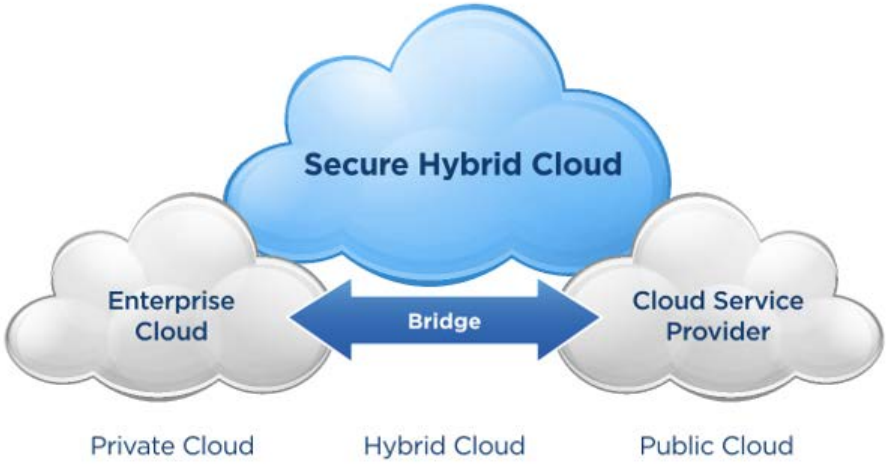

Cloud Computing?
Computers can fly now?
quickmeme.com


DELTA
N665US
gogo


There is no cloud
it's just someone else's computer

What is Cloud Computing?

- Internet-based computing composed of large groups of remote servers networked together to allow for shared data storage, processing tasks, and access to resources.
- Can be private, public, or a combination.



Evolution

Mainstream **Grid Computing**

- Collection of computing resources to complete a common goal

1990's **Utility Computing**

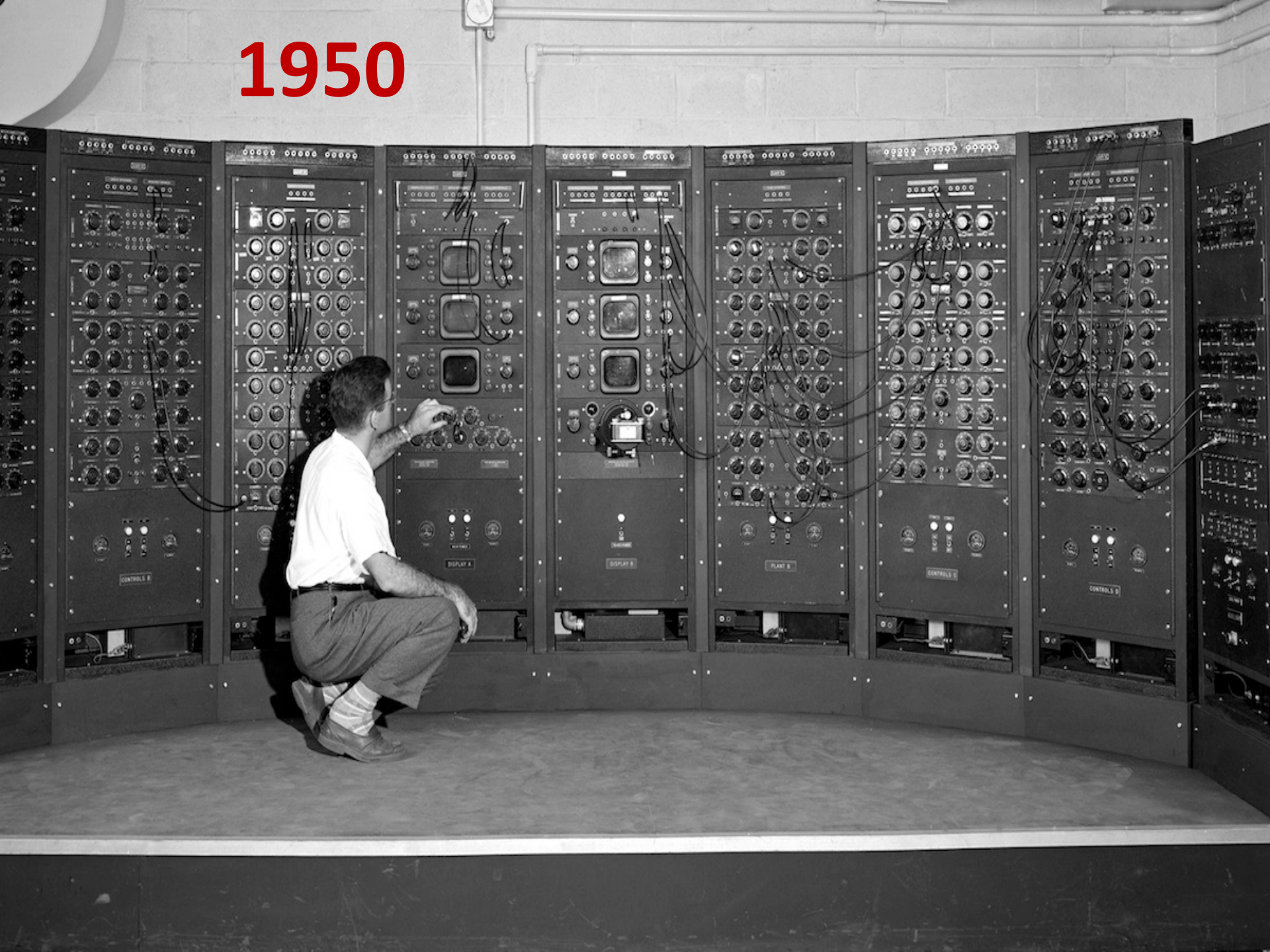
- Provisioned model of pay-for-service; the end of the flat rate

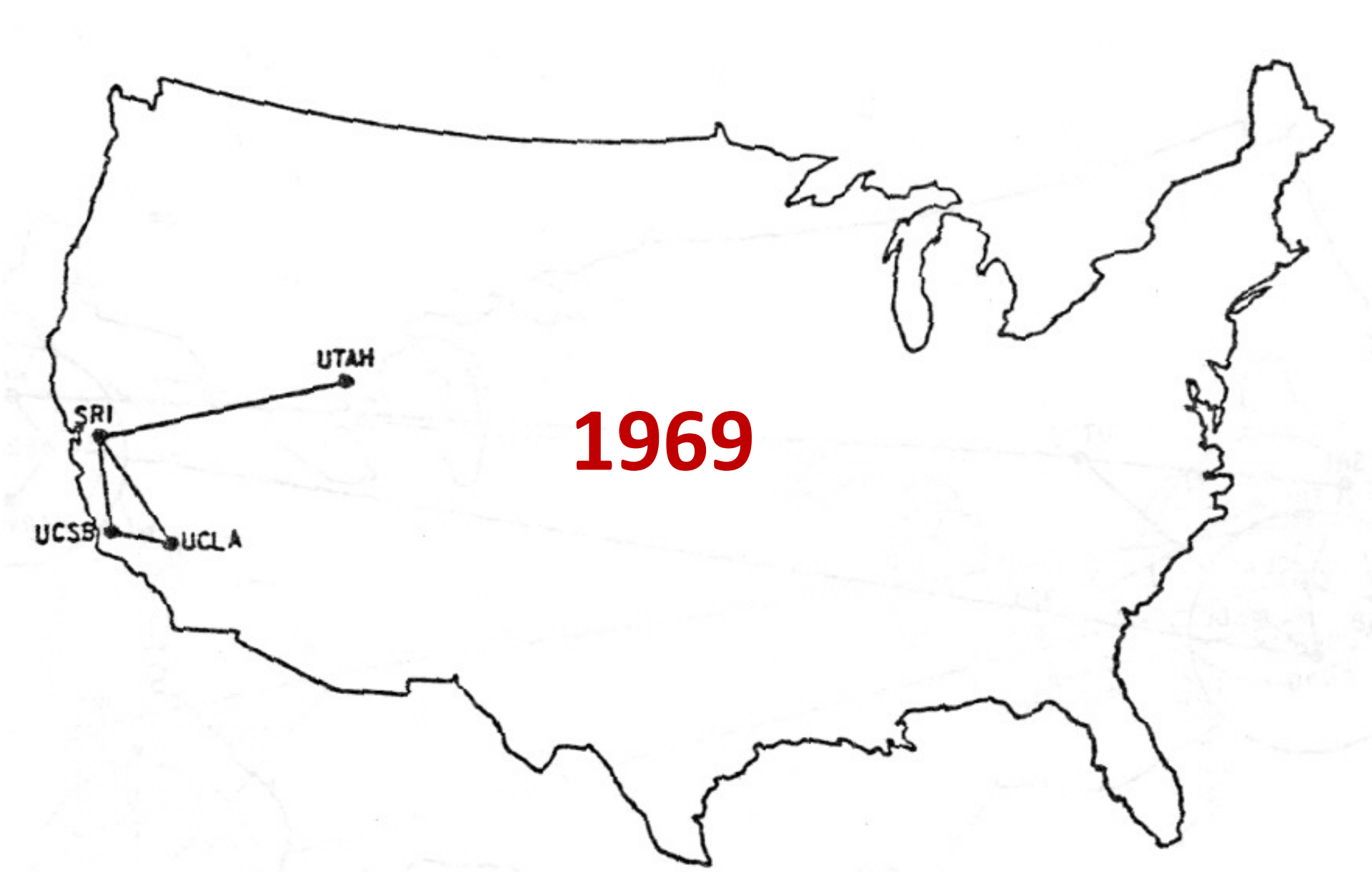
Early 2000's **Software as a Service**

- "on-demand"; subscription basis pay-for-service

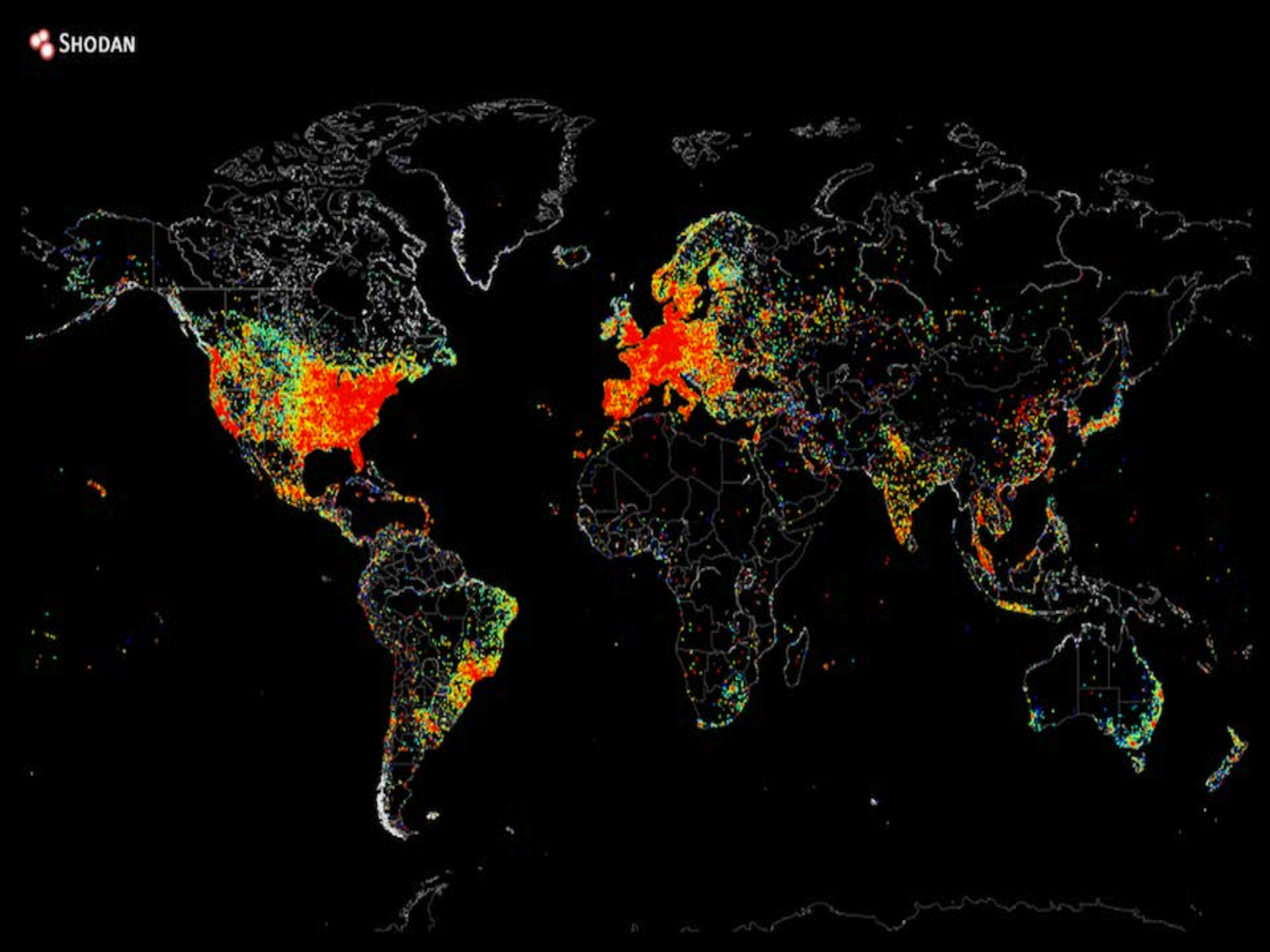
Modern-day **Cloud Computing**

- Next generation "data centers"; combination of the above three

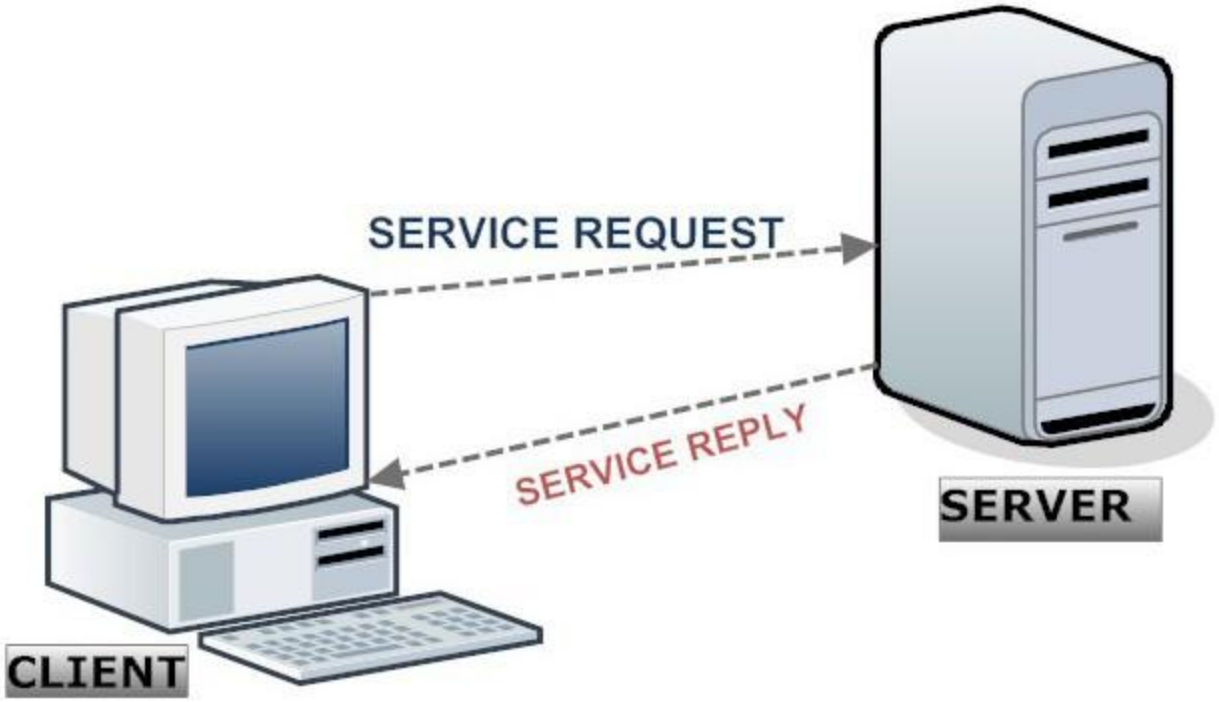

1950

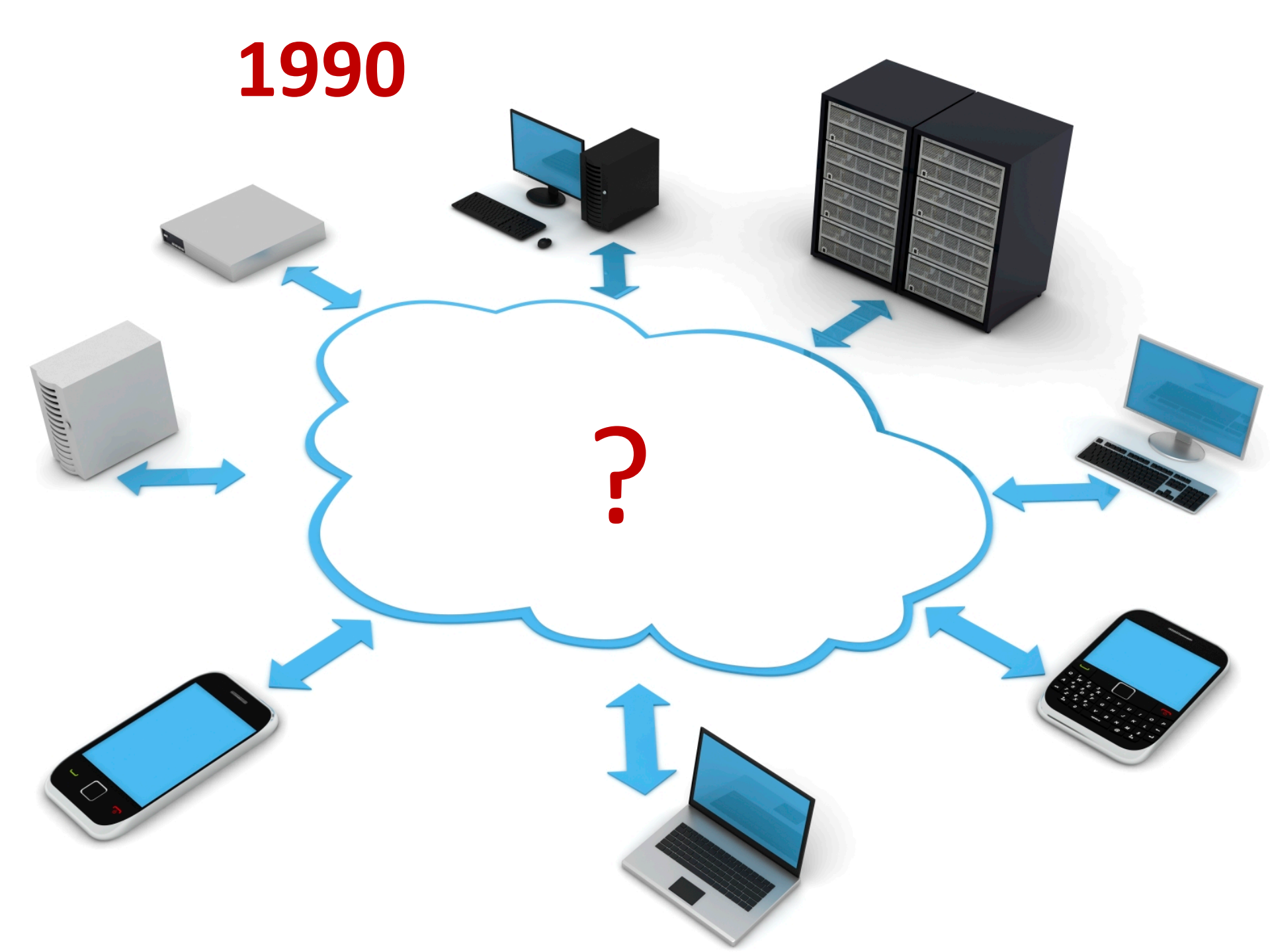


The ARPANET in December 1969


SHODAN

1970




1990
?

CONFIDENTIAL

1996

Internet Solutions Division Strategy for Cloud Computing

COMPAQ COMPUTER CORPORATION

CST presentation
November 14, 1996

1999

salesforce™

2002 and 2006

Microsoft®
SkyDrive®

iCloud

Google Drive

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Basecamp®

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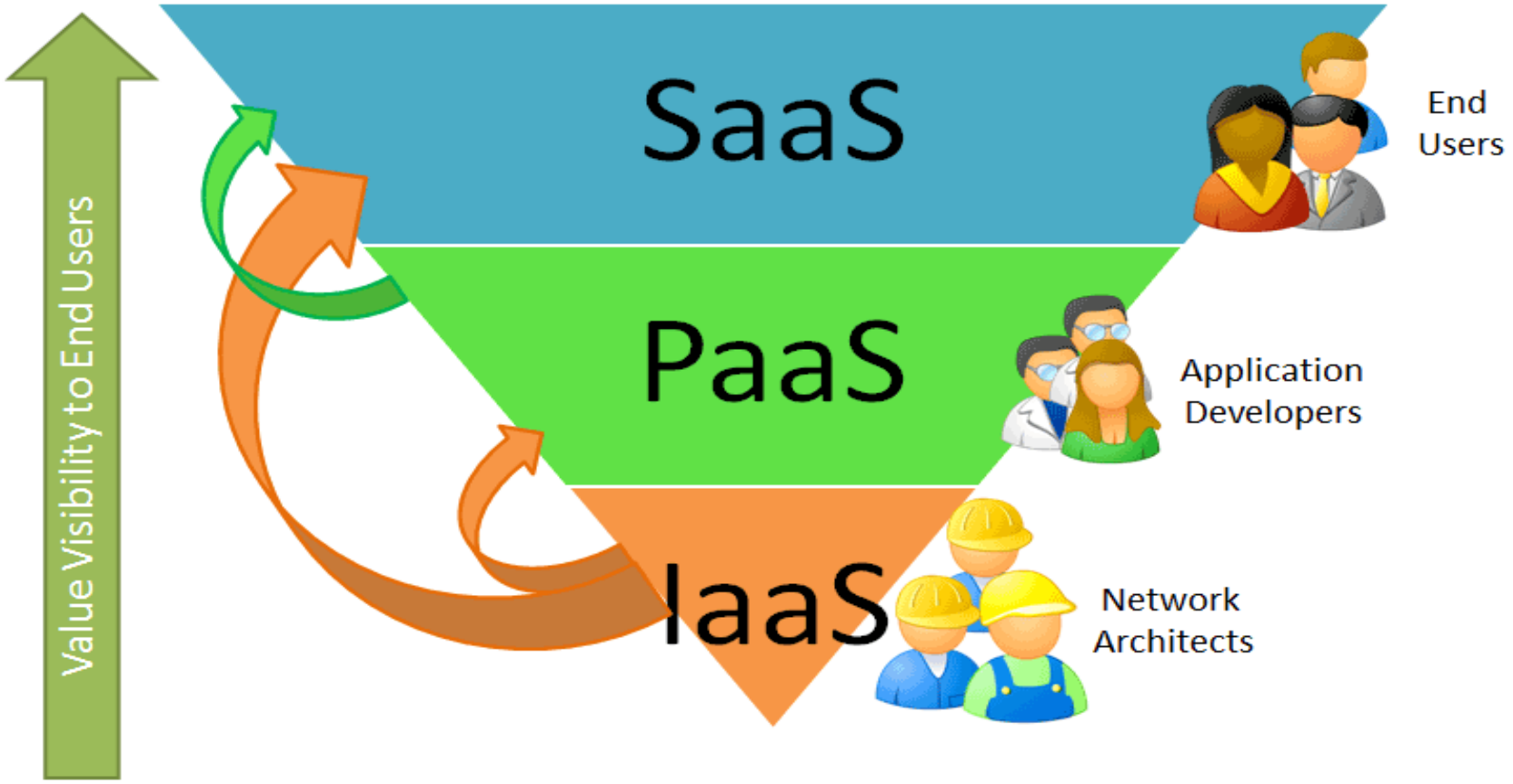
Models


Value Visibility to End Users
SaaS
PaaS
IaaS
End Users
Application Developers
Network Architects

“Cloud market is expected to grow to **$121 billion** dollars by 2015: a 26% compound annual growth rate from the **$37 billion** value in 2010.

Cloud Providers

Windows Azure

Google Cloud Platform

amazon web services™

rackspace the open cloud company

Magic Quadrant

Figure 1. Magic Quadrant for Public Cloud Storage Services

Source: Gartner (July 2014)

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Vs.


MASONSHOE

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“Cloud First”

Shift from Asset Ownership to Service Provisioning

- Default to cloud-based solutions whenever a secure, reliable, cost-effective cloud option exists
- Continually evaluate cloud solutions across IT portfolios, regardless of investment type or lifecycle stage
- Agnostic on deployment model or service delivery type
- Address how cloud drives business/mission needs first

amazon.com web services

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United States
Discovery


USDA

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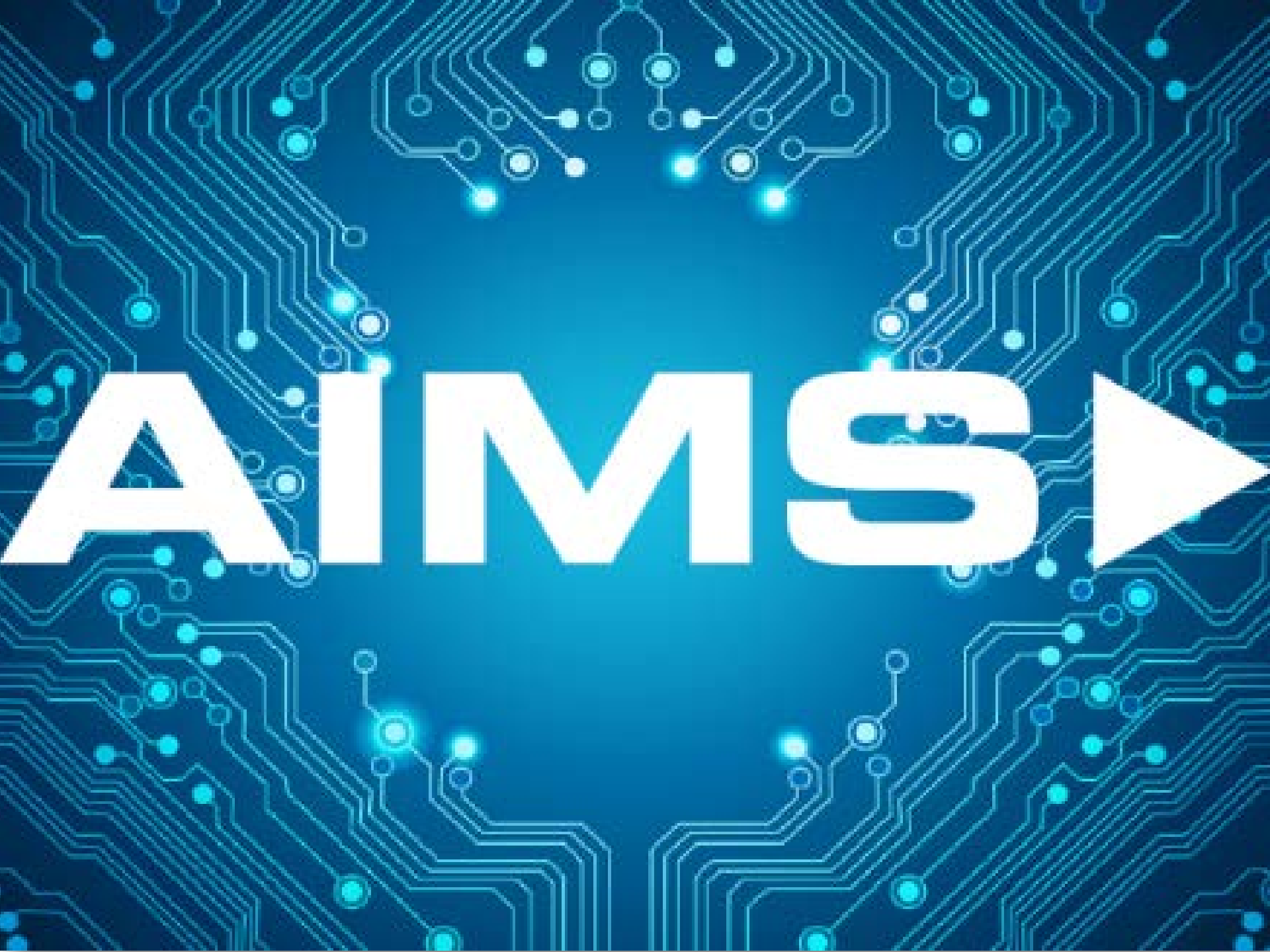
AIMS

Case Study: AIMS

- **AIMS**: The APHL Informatics Messaging Services (AIMS) platform is a secure, cloud based environment that accelerates the implementation of public health messaging solutions by providing shared services to aid in the transport, validation, translation and routing of electronic data.

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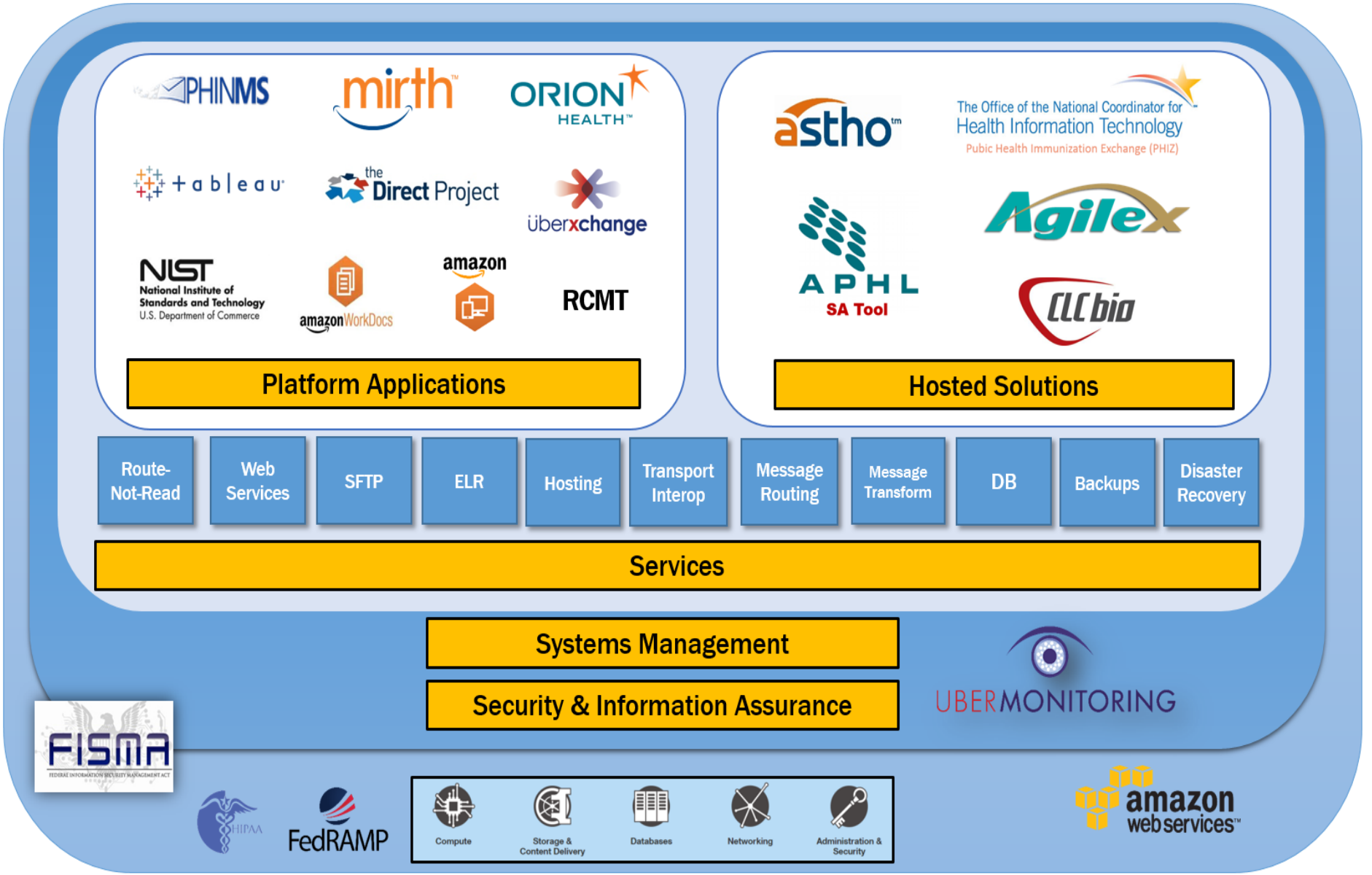
AIMS: Functional Architecture



Cyber Security and Compliance

- Approved for AWS GovCloud
- System Security Plan (SSP) in place
- Security Assessment (ST&E) and Audit conducted in 2013 by RTI International
- FISMA Moderate Compliance ATO granted in 2013
- FedRAMP certified environment
- Business Associate Agreement in place with AWS





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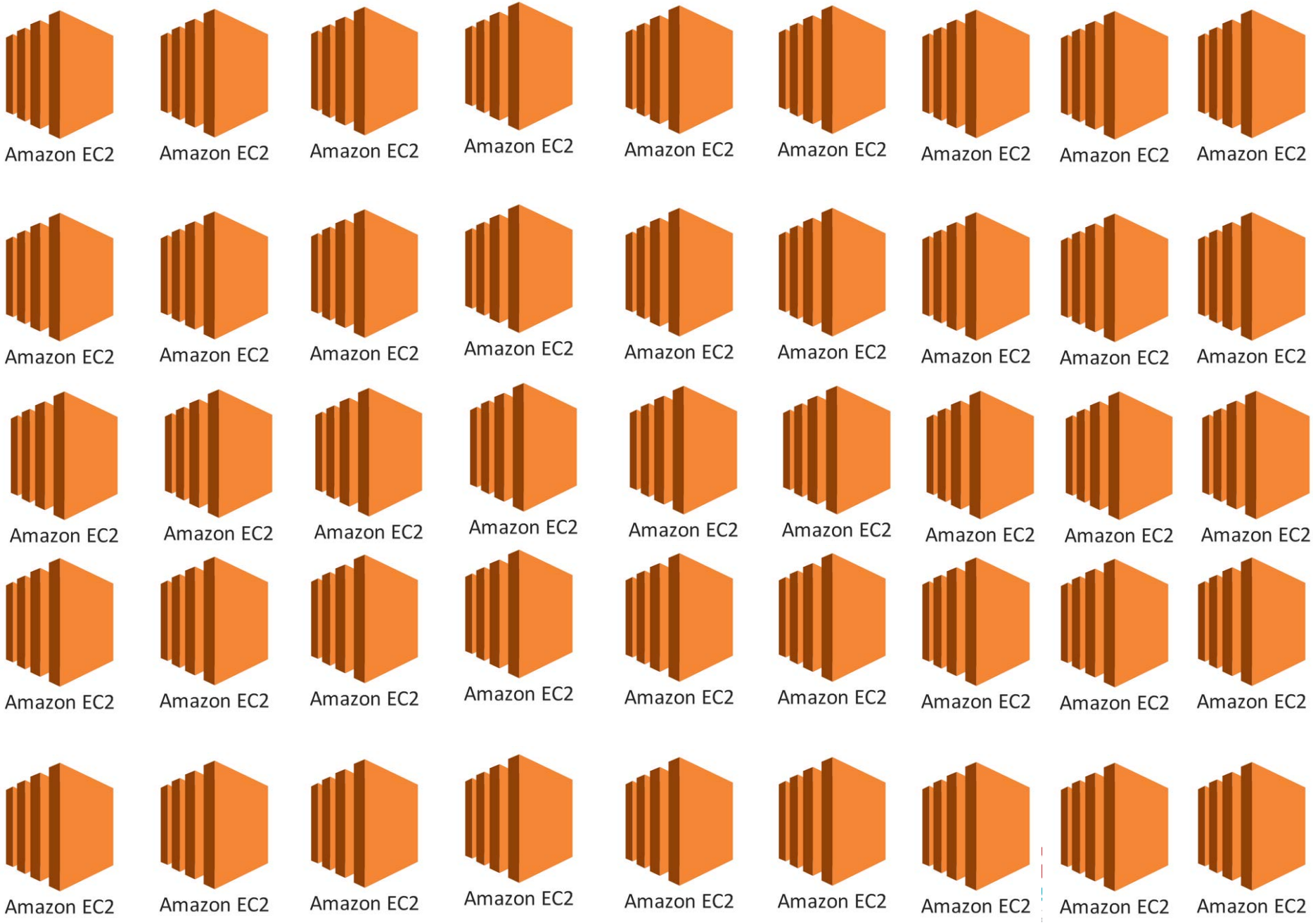

Amazon EC2


Amazon EC2
$2,000

Cyber Security

Automated continuous configuration and **monitoring** providing cybersecurity and information assurance capabilities to information technology environments on AIMS.

UBERMONITORING

System Management Tools

Cybersecurity

SOPHOS

amazon web services CloudWatch

UBERMONITORING

OSSEC

tripwire

ClamAV

Configuration Management

SOPHOS

amazon web services CloudWatch

puppet labs

Monitoring

SOPHOS

amazon web services CloudWatch

zendesk

elasticsearch.

UBERMONITORING

Nagios

secpod

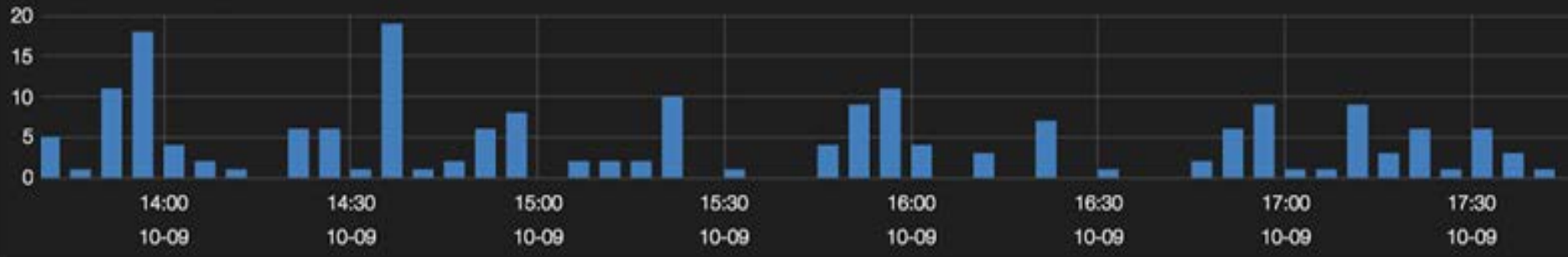
ÜBER MONITORING DASHBOARD

6 hours ago to a few seconds ago

QUERY FILTERING

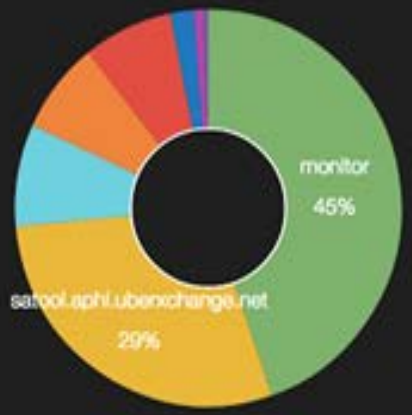
HISTOGRAM

View | Zoom Out | stream (253) count per **5m** | (**253** hits)

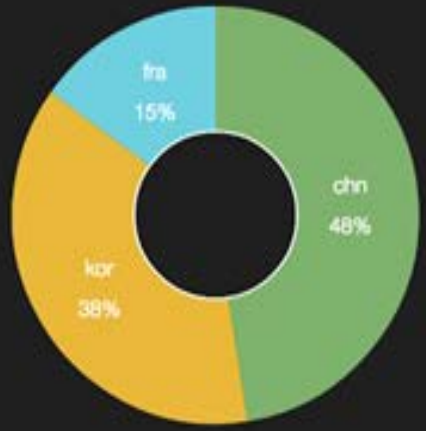


WORLD MAP

REPORTING SERVER



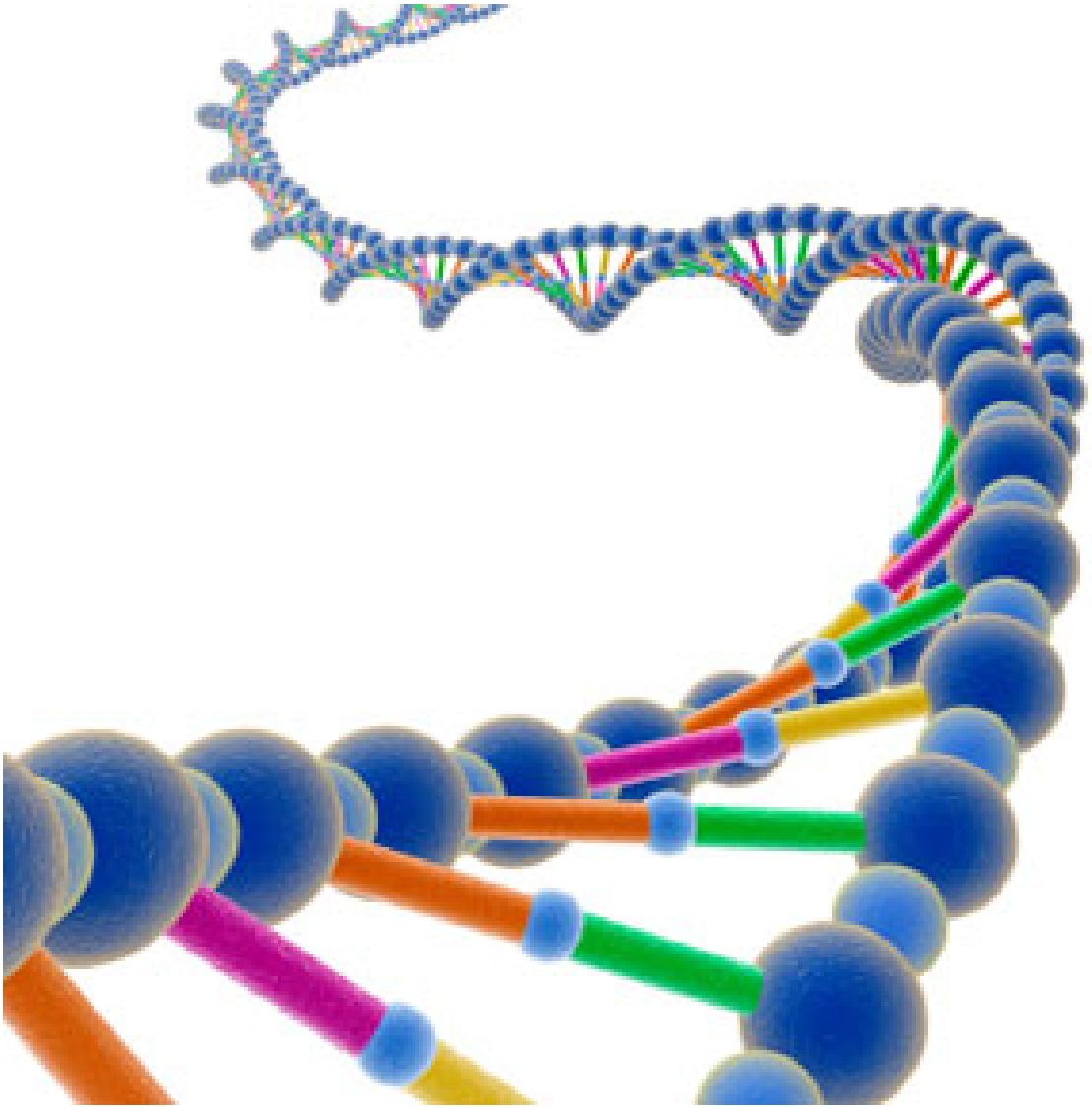
COUNTRY ECHO



RESULT

0 to **25** of 125 available for paging

Big Data



CENTERS FOR DISEASE CONTROL AND PREVENTION

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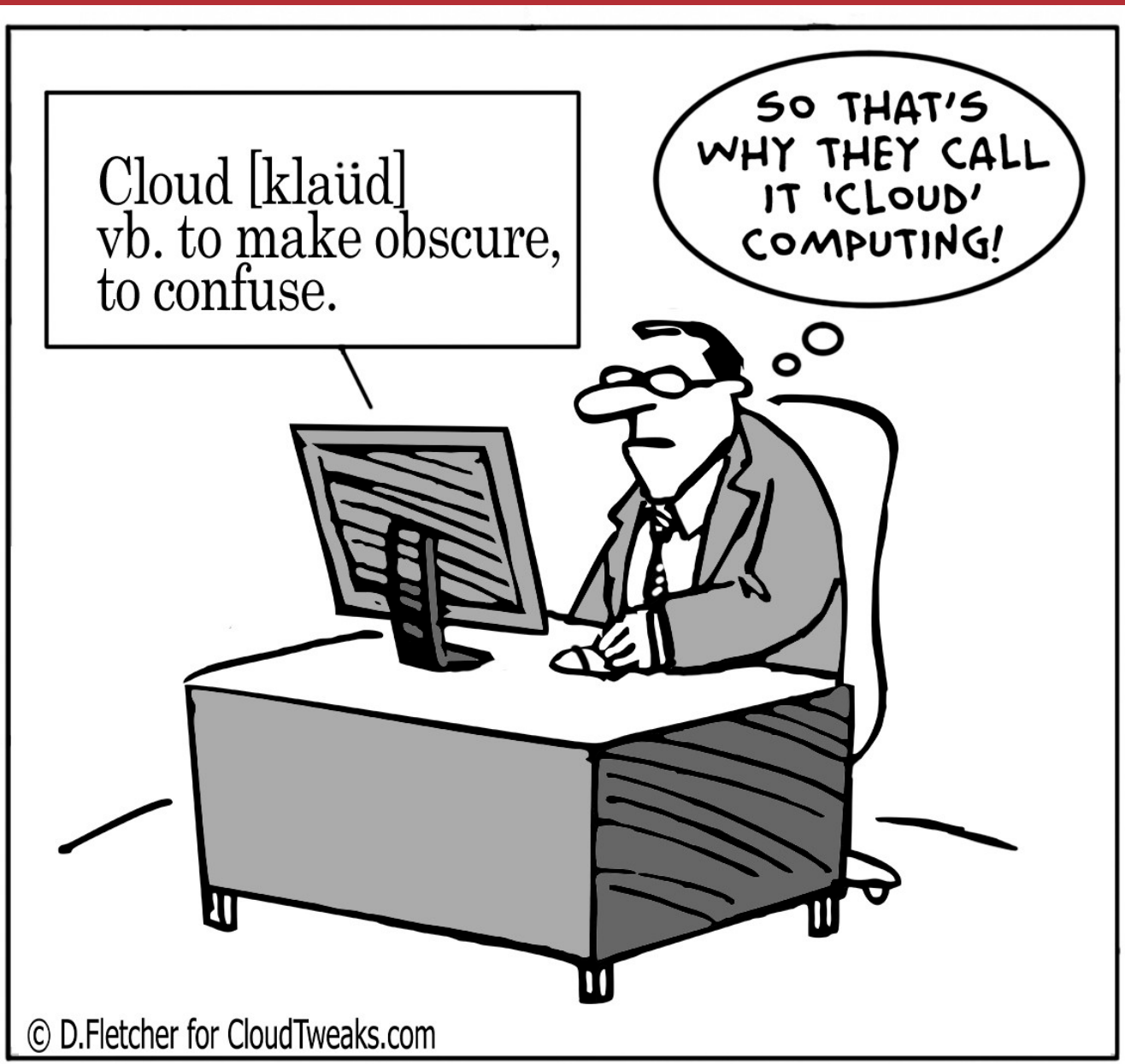
Challenges, Benefits and Perceptions(and misconceptions) of Cloud Computing

Jeff Benning, MBA

Lab Interoperability Collaborative

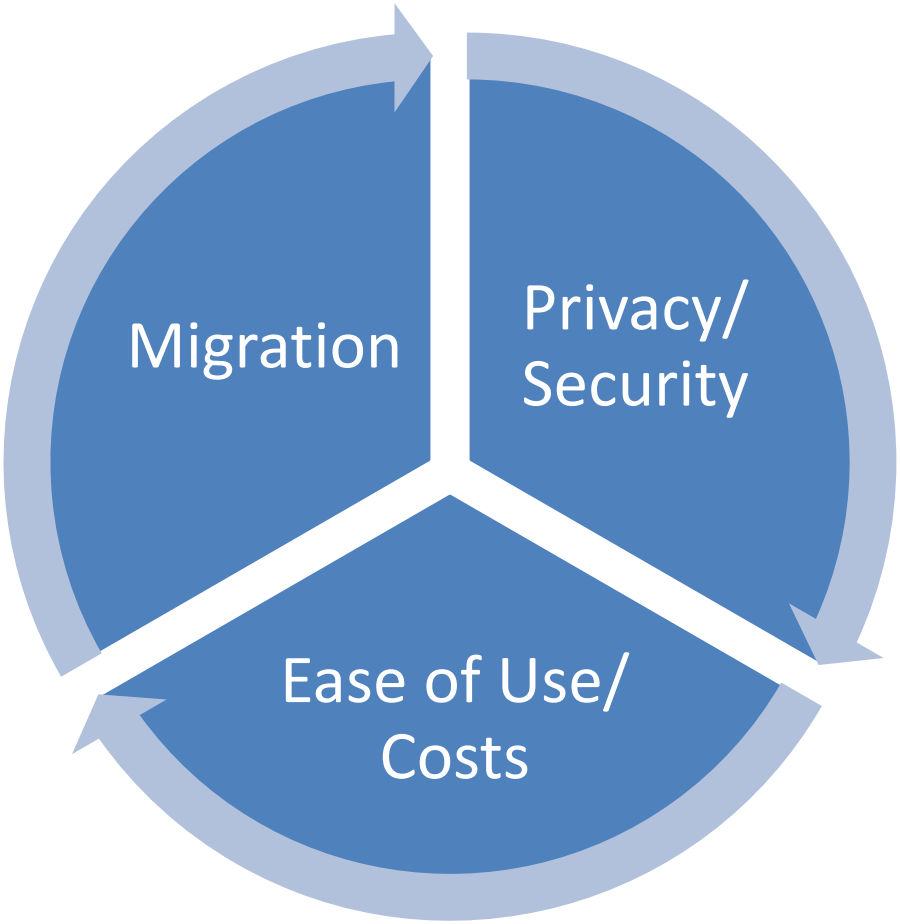

Cloud [klaüd]
vb. to make obscure,
to confuse.
SO THAT'S WHY THEY CALL IT 'CLOUD' COMPUTING!
© D.Fletcher for CloudTweaks.com

Perceptions & Misconceptions

- **Enterprises are still experimenting with cloud.**
  - **FALSE** - Enterprises are actually investing more than 10% of their annual IT budgets on cloud services
- **Security concerns restrict options for using the cloud.**
  - **FALSE** Public cloud providers are making considerable investments to strengthen security architecture
- **Cloud is relevant only for technology needs.**
  - **FALSE** - 56% of enterprises consider cloud to be a strategic business differentiator that enables operational excellence and accelerated innovation
- **Cloud consumption is simple.**
  - **FALSE** - 65% of enterprises believe they need help to deploy cloud solutions as most lack the internal IT skills and expertise needed

Source: Everest Group Cloud Connect Enterprise Cloud Adoption Survey 2014

Cloud Challenges



Privacy & Security Challenges

- Privacy & Security is and always will be top of mind.
  - However, the greater direct control cloud users have over hardware and software, the more control over management of privacy is attained
  - Establishing an effective and appropriate legal structure for regulating cloud computing services is imperative.
  - Internal and regulatory/legislative policy issues
  - Privacy issues arise from how data is managed and not where it's located

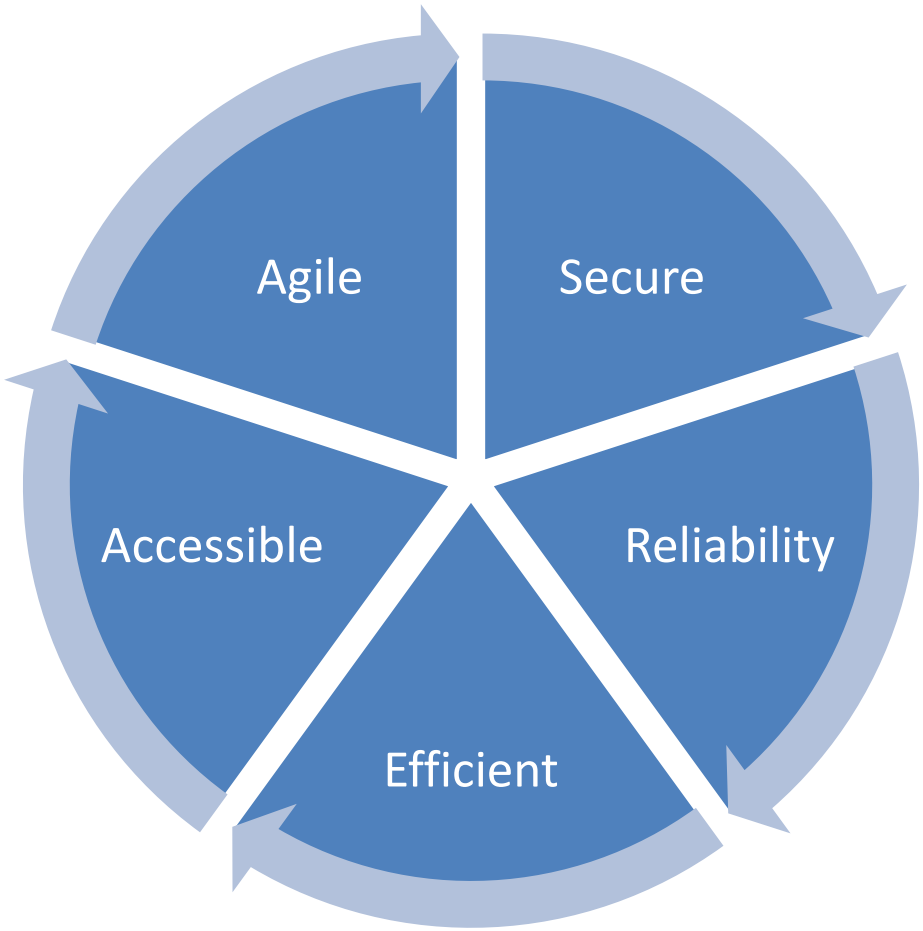
Ease of Use Challenges

- "Click to buy"' additional services
  - It is very easy to set up new servers and purchase additional services that increase costs. This benefit also creates a significant challenge
  - Internal process & controls
  - Admin rights
  - Monitor and manage utilization
  - Provider tools available

Migration Challenges

- Migration from legacy system(s) to cloud hosting is a major effort.
  - However, this effort can substantially reduce IT-related expenses by eliminating costs associated with repairs, software upgrades and license renewals as well as keeping up with latest privacy and security technologies and practices
  - Training, education and certification

Cloud Advantages & Benefits



Security Benefits

- More control over assets & data
- Reduced risk of hardware breach
- Virtualization layers
- All levels of infrastructure
- Physical security
- CSP Global Infrastructure

Reliability Benefits

- Redundancy and Disaster Recovery
  - Quickly and easily set up DR environment and then put “on the shelf”. Pay as you go
- SLA’s and up time
  - 99.95%?
  - However, providers have variety of contract commitments
  - Some negotiate, some don’t – do your research

Cost Benefits

- Provides far more efficient use of IT resources by reducing cost of hardware, maintenance and wasted server space
- Users pay only for the computing power they consume
- Allows on-demand scalability that meets a user's peak service requirements without having to invest in infrastructure

Efficiency Benefits

- “Green computing” makes heavy use of data centers which are designed for efficient power usage and cooling
- More computing power is available using fewer resources
- Users only consume and pay for what they need

Accessibility Benefits

- Users can access data and applications wherever they have Internet connection
- Flexible capacity and scalability reduces risk of downtime

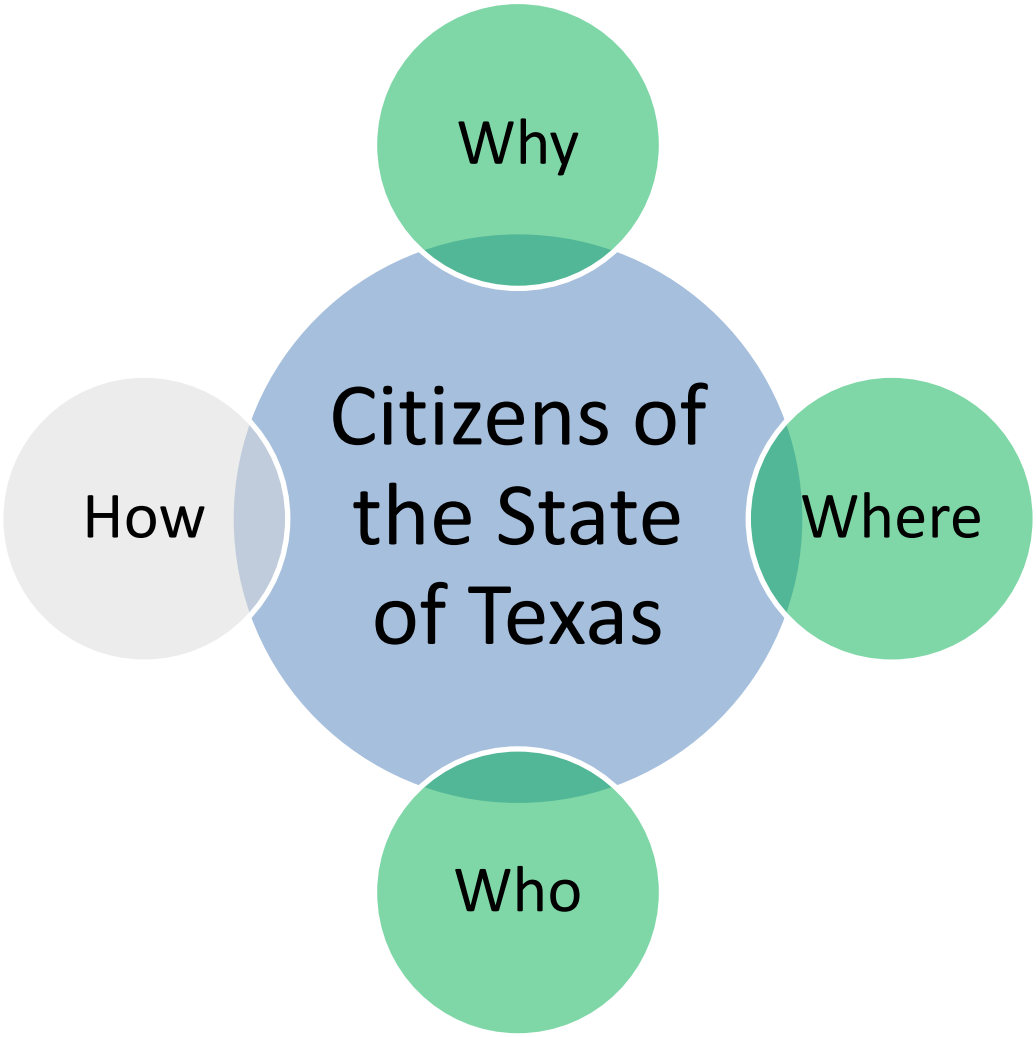
Agility Benefits

- Ability to rapidly scale infrastructure capacity and customize performance of hardware, networks and storage
- Permits faster and more efficient implementation of upgrades and technical advances
- Provides innovators with a broader range of scalable tools for research, development and testing

Cloud Computing in the Real World: Operational Examples and Where to Start

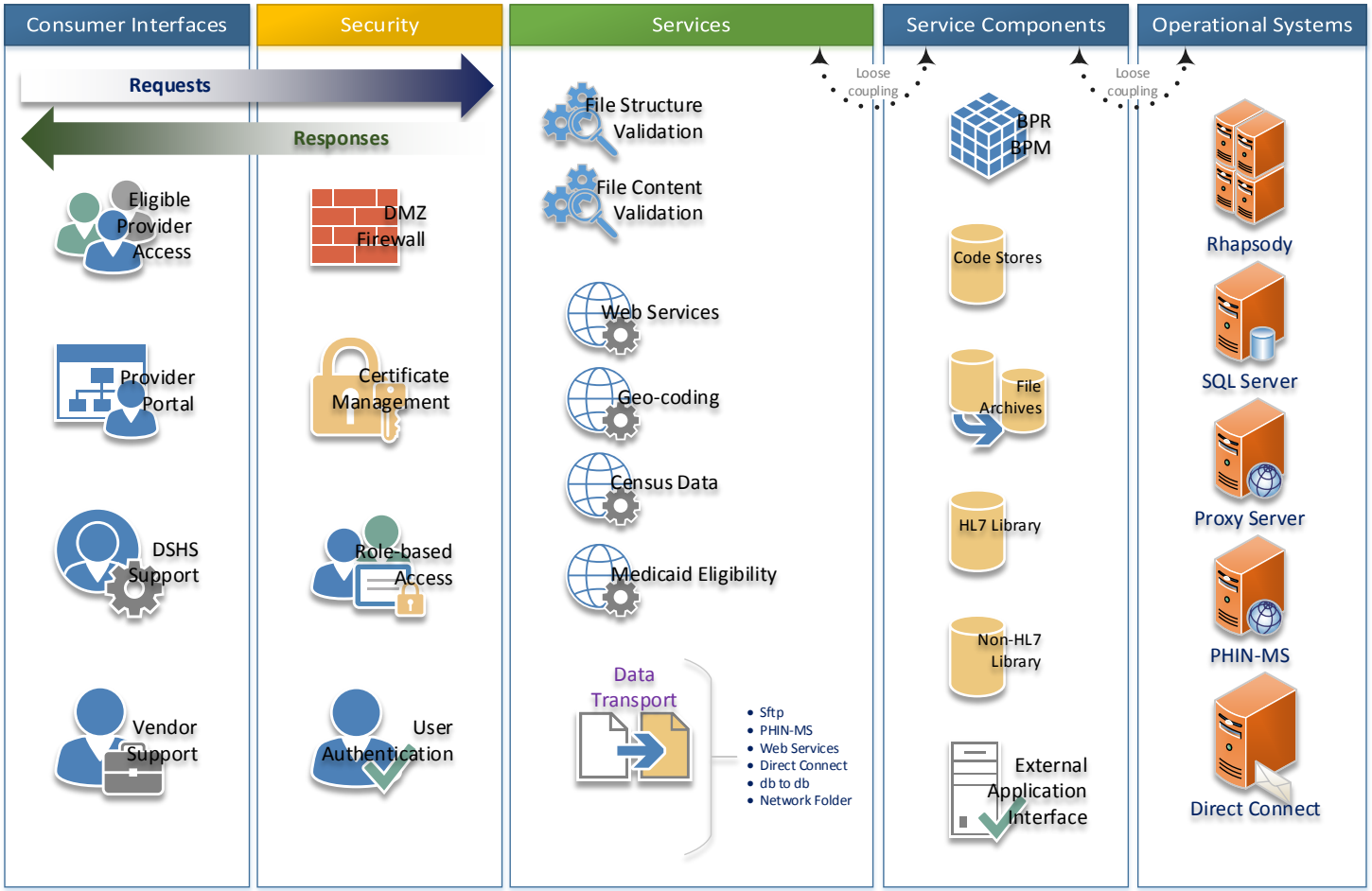
Willis H. Gibson, Jr., PMP
Texas Department of State Health Services

Enterprise Solution Decision Drivers



DSHS Health Services Gateway

Health Services Gateway Architecture

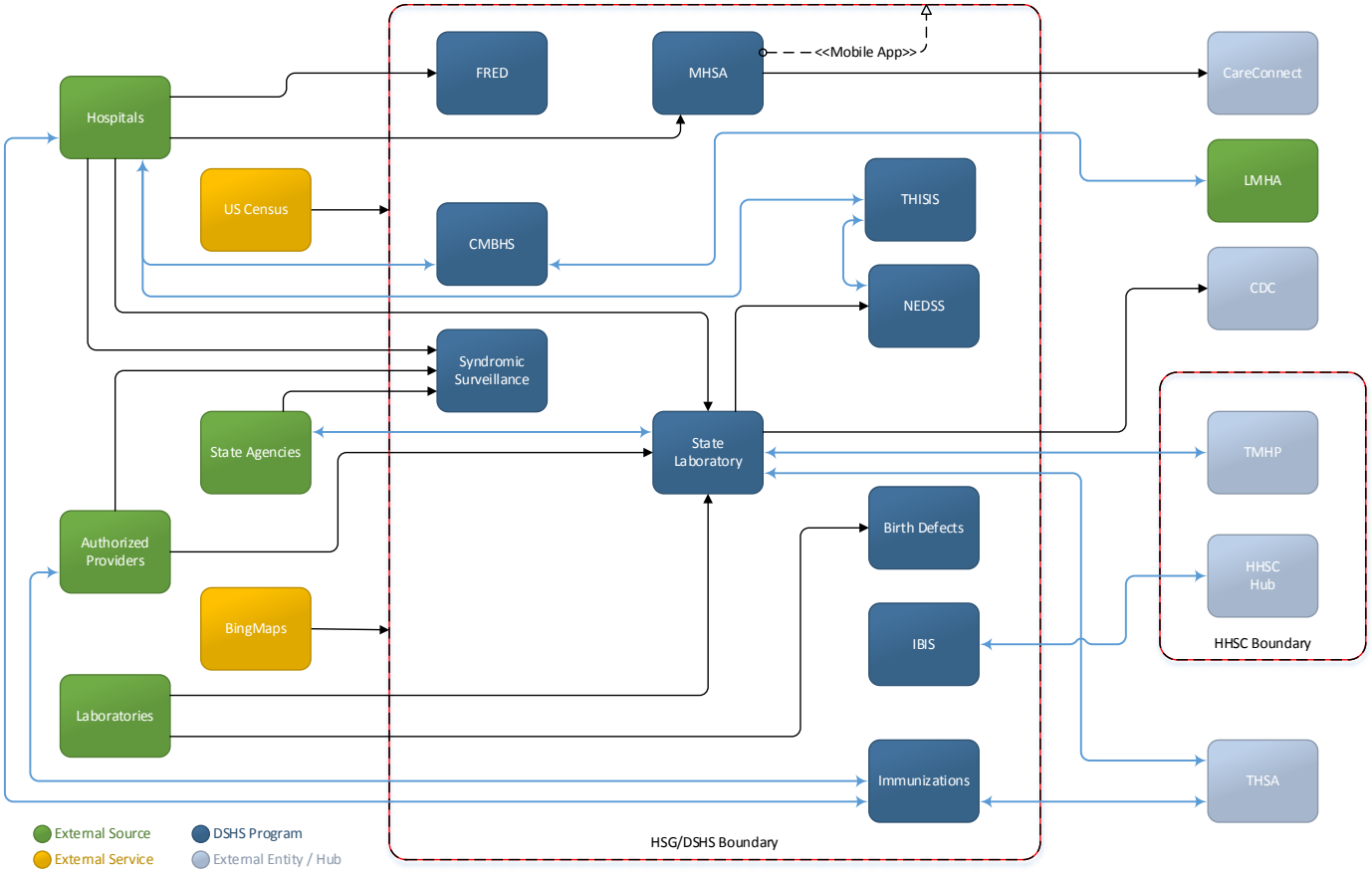


HSG Services

- Pass-through Transportation
- File Format Validation
- File Content Validation
- File Transformation / Formation
- Code Mapping
- Data Transport
- Web Services

DSHS Health Services Gateway

Gateway Current & In-flight Program/Entity Connections



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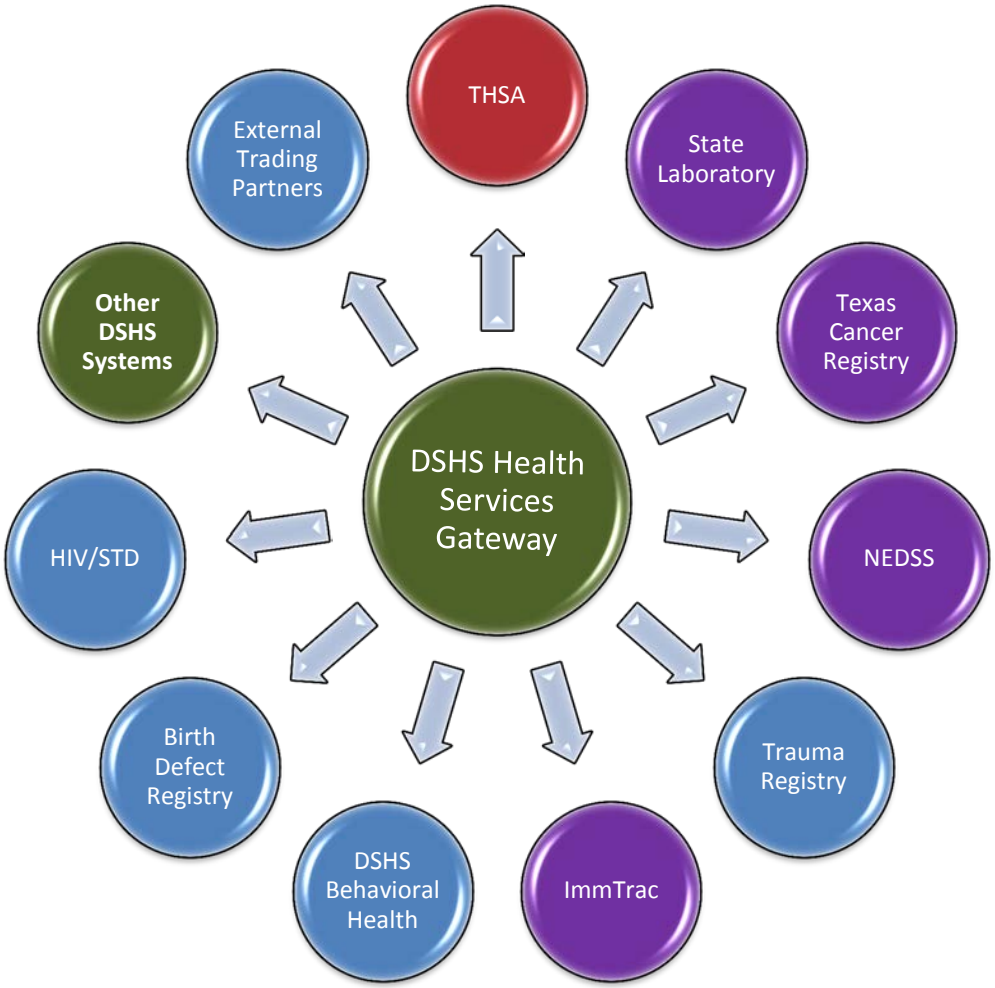
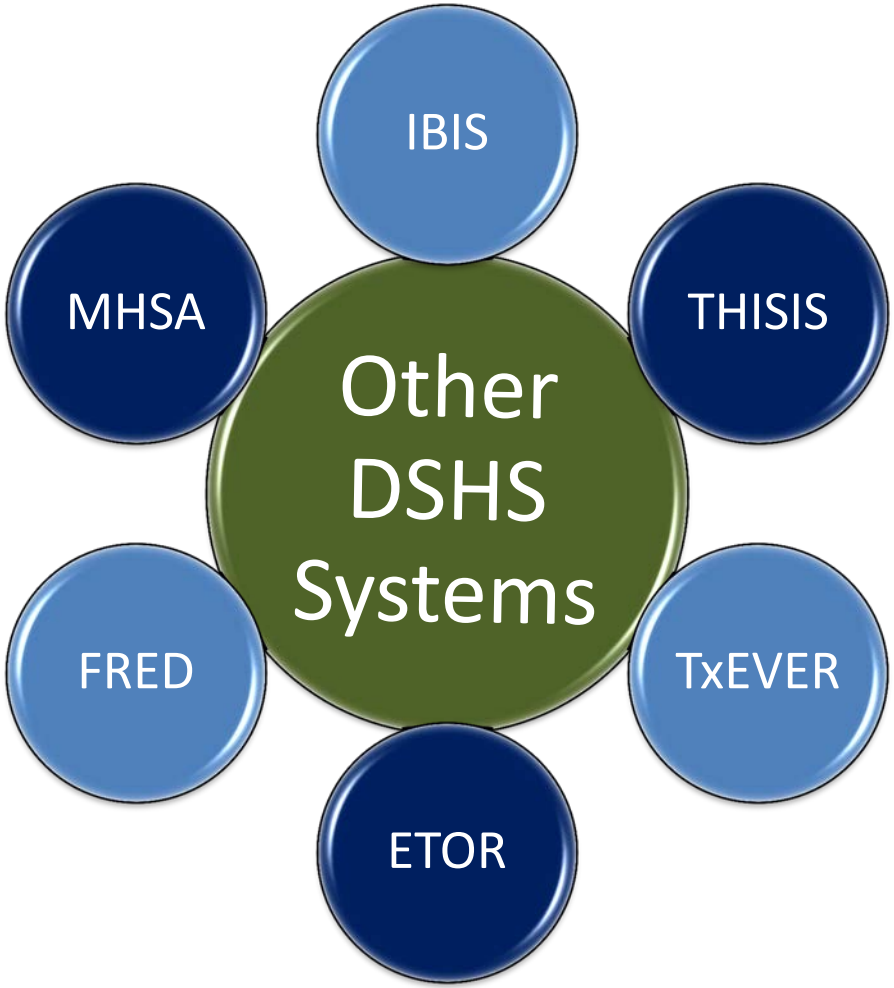
DSHS Health Services Gateway



DSHS Health Services Gateway



Challenges and Solutions

- Major Challenges:
  - Business/IT:
    - Legacy entrenchment vs Agility
    - Fear of the unknown
    - Lack of credibility
  - IT/Business
    - Security / Governance
    - Supportability
    - Accountability
    - Reliability
- What are the Missions of our Customers?
  - Lack of Communication between areas
- Customers Issues – esp., with Public Health Data
  - Usage of Shared Environments
  - Hosting in another state
  - What laws have jurisdiction?
  - Latency Issues – ex., lab instruments
- Solutions
  - Build Proof-of-Concept models
  - Develop Agency Wide Policies
  - SPARC

On Premise vs Cloud

KPI	On Premise	Cloud
Vertical Scaling Ability to dynamically add more resources to an existing application or more applications to a deployed instance. Would allow us to easily INCLUDE additional in-scope apps – without re-architecting a hardware HLA.	X	✓
Dynamic Expansion Automated expansion of CPU, Memory and Storage – without user intervention. Dynamic Monitoring Tools that provide insight into current usage.	X	✓
High Operational Cost The operational and over head cost can be lowered considerably because of the self-service infrastructure and other cloud based services. Redundant IT recourses like system admins/DBAs can be reduced. Apps can be developed better, faster and in scalable way which can reduce maintenance cost.	✓	X
High Availability Load balancing possible – without any additional infrastructure manual maintenance. Load balancing across GEOGRAPHICAL boundaries also possible (and easy). Cost savings in Load balancing software, additional firewalls etc.	X	✓
Disaster Recovery Master – Master Replicated Servers , with 'hot-swapping' (automatic failover) in case of Disaster. Replication across ZONES (geographical boundaries) possible.	X	✓
Turnaround time Short turnaround for provisioning new servers, for modifying existing servers. Often, a simple web based point and click to provision new instances.	X	✓
License optimization A best effort utilization of X licenses for Y cores – that would span across multiple Applications – providing cost savings.	X	✓

Hard Decisions & Realizations

- Realize the Cloud Architecture isn't the "End-All" solution
- Hybrid Architecture
  - Using some Private/Public Cloud and some on premise
  - We do have "on premise clouds"; ex., using 3rd party vendors to provide services - DCS
- Take baby-steps
- Communication!!
  - Understand the business requirements / mission statements

Benefits

Cloud Cost Comparison

Most recent invoices:

On premise cost...

$177,399.87 / month (variation between $83,255.90 and $264,741.30 per month)

Cloud Solution cost...

$780.93 per month

$30,000 per month support (**16%**!!)

Server Instances

Current server count...453 on premise servers

Cloud Solution...Average 59

Project Implementation Cost (2016 – 2023)

On premise estimate...

$7,000,000.00

Cloud Solution estimates...

$1,700,000.00...(~**25%**!)

Improved Development Lifecycle

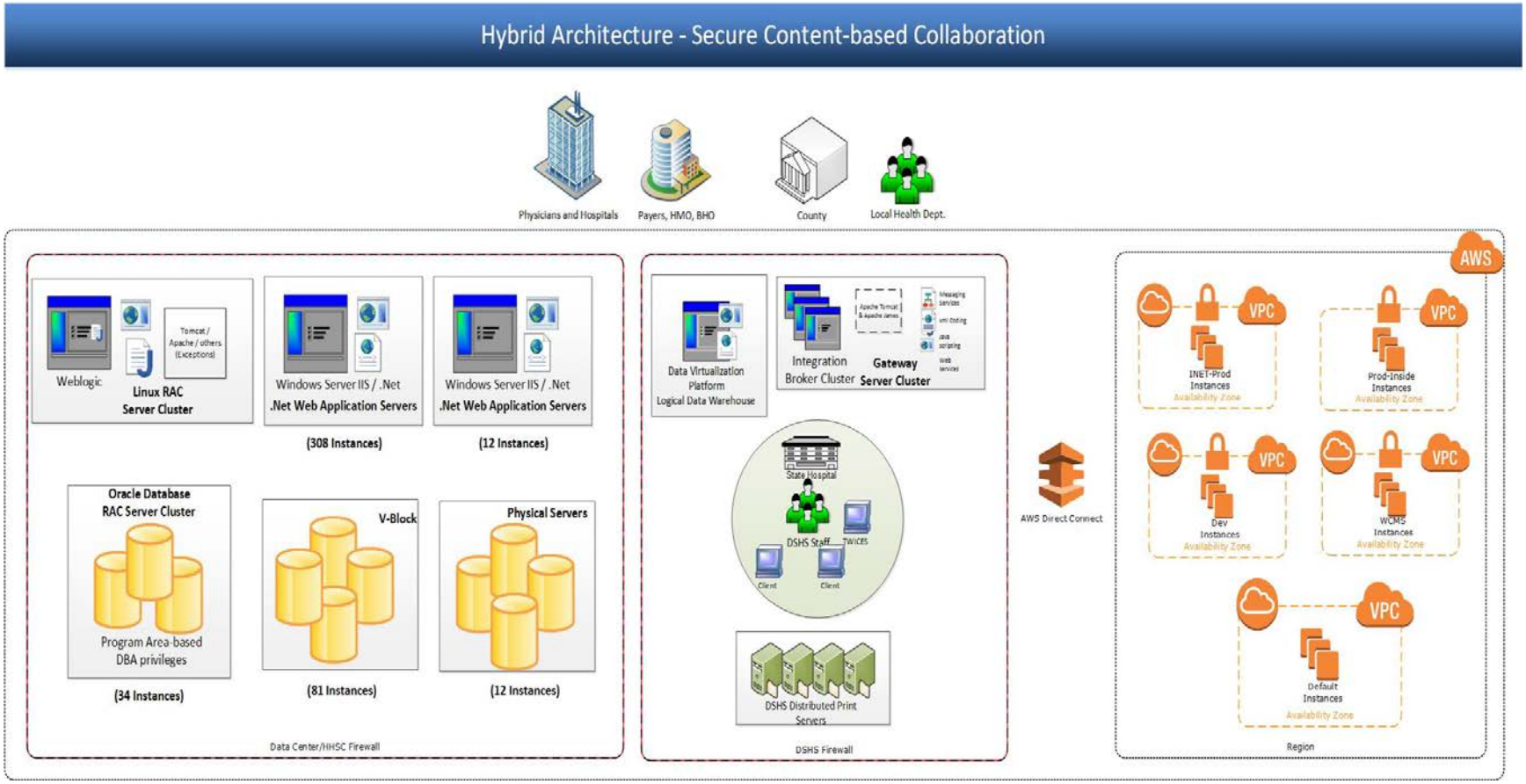
Implementation of Resources

Identity Management

Current Cloud Users

- FCHS & MHSA
- CHS Data
- WCMS tool
- DSHS Application Builder Framework
- SQL Server Consolidation
- Office 365
- *HEALTH SERVICES GATEWAY!*

Cloud Architecture



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