Deploying Apps to the Cloud

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Agenda

- Cloud Overview
- ArcGIS Cloud Deployment Models
- Patterns and Use Cases
- Options and Considerations
- Challenges and Lessons Learned

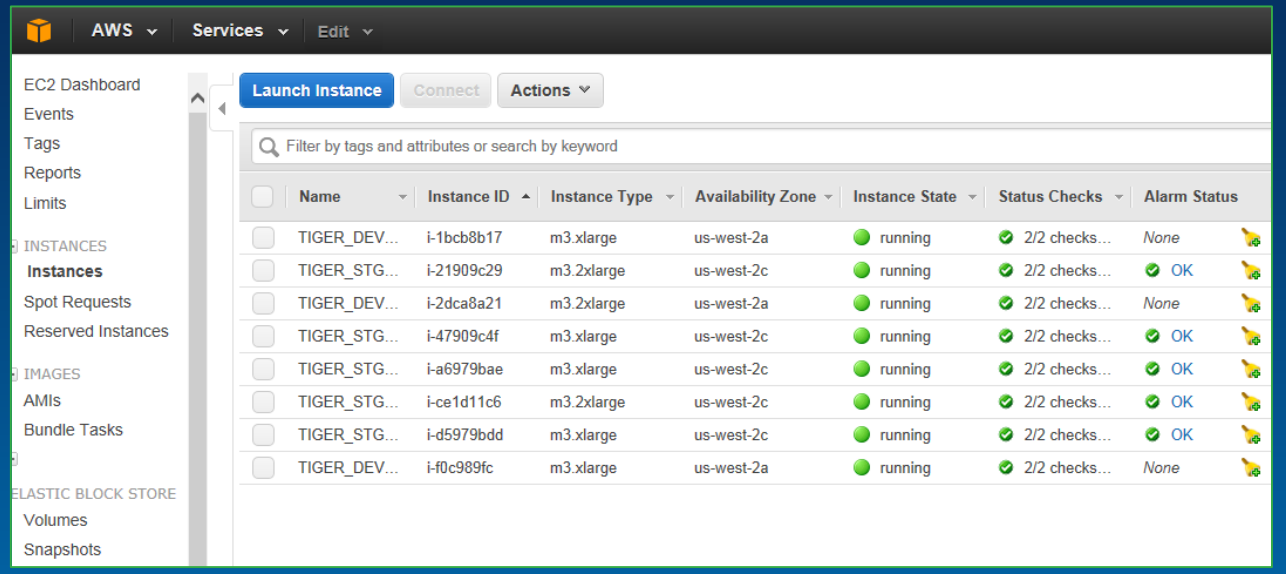
Cloud Overview

Cloud Service Models

Cloud Type	NIST Definition (summary)
Infrastructure as a Service (IaaS)	The capability provided to the consumer is to **provision processing, storage, networks, and other fundamental computing resources** where the consumer is able to deploy and **run arbitrary software**, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).
Platform as a Service (PaaS)	The **capability provided to the consumer is to deploy onto the cloud infrastructure** consumer-created or acquired applications created **using programming languages, libraries, services, and tools supported by the provider.** The consumer does not manage or control the underlying cloud infrastructure including network, consumer servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.
Software as a Service (SaaS)	The capability provided to the consumer is to **use the provider's applications running on a cloud infrastructure**. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

Infrastructure as a Service (IaaS)

- Managed infrastructure
  - Hardware
  - Storage
  - Load Balancing
  - Etc.
- Self-provisioning
  - Virtual Machines
  - Bare Metal
- Pay for what you use



amazon web services™

IBM

Windows Azure

CGI

verizon terremark

Platform as a Service (PaaS)

- Infrastructure + software / tools
- Developers create applications on the provider's platform over the Internet
- Pay for what you use

Software as a Service (SaaS)

- Infrastructure + platform + software / custom apps
- Examples
  - Salesforce.com
  - ArcGIS Online

Cloud Deployment Models

Cloud Type	NIST Definition(summary)
Public	Public cloud. The cloud infrastructure is provisioned for **open use by the general public**. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.
Private	The cloud infrastructure is provisioned for **exclusive use by a single organization** comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.
Community	Community cloud. The cloud infrastructure is provisioned for **exclusive use by a specific community of consumers** from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.
Hybrid	The cloud infrastructure is a **composition of two or more distinct cloud infrastructures** (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 for load balancing between clouds).

Benefits of Cloud Computing

– Increase efficiency and business focus –

– High availability, quality and performance –

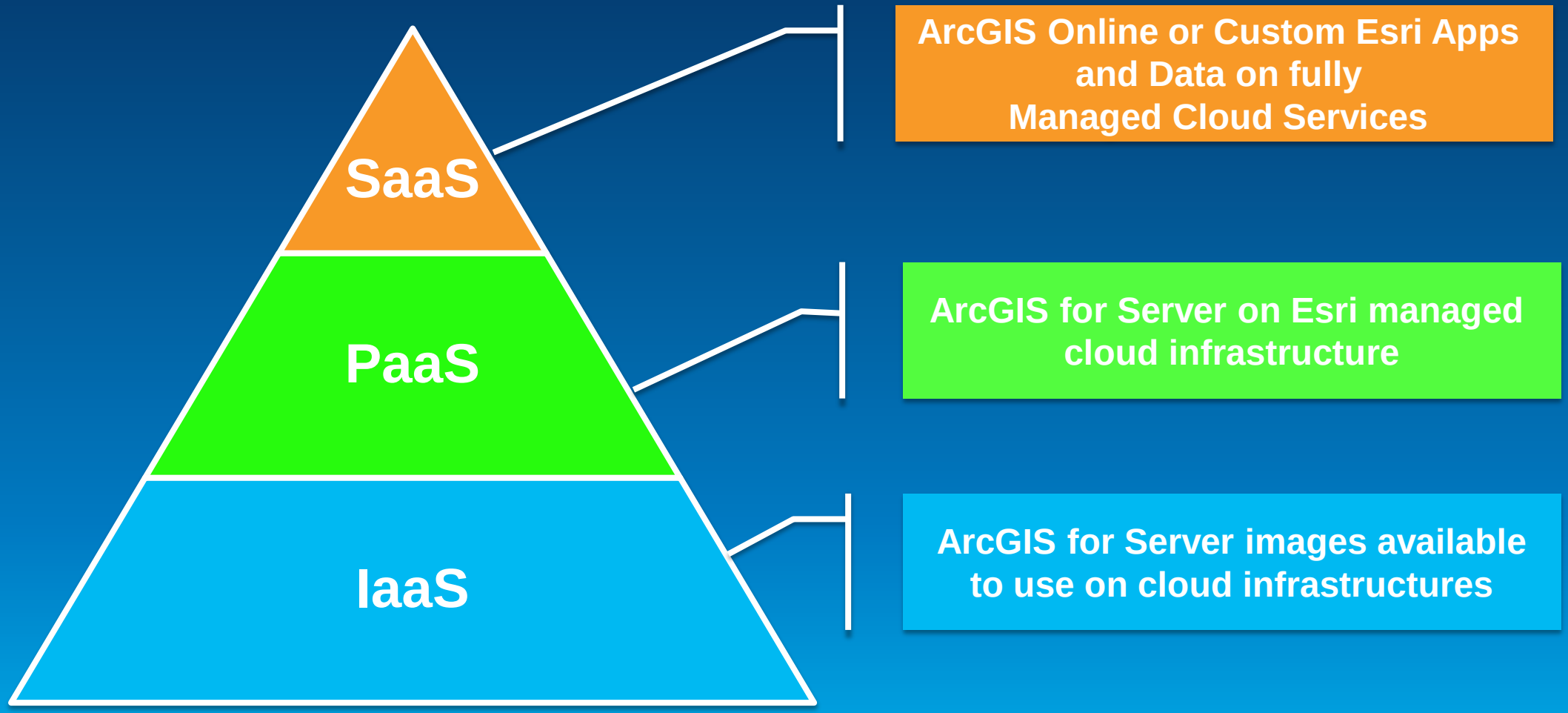
– Reduce internal costs –

– Preserves data integrity, privacy and availability–

– Increase usage and productivity –

ArcGIS Cloud Options

ArcGIS Cloud Options



ArcGIS for Server on [Fill in the Blank]

- Supported on multiple cloud platforms
  - Virtual or bare metal
- Full ArcGIS for Server capabilities
- User-provisioned cloud infrastructure resources
- Pay for what you use
- BYOL or ArcGIS term licensing available

ArcGIS Online

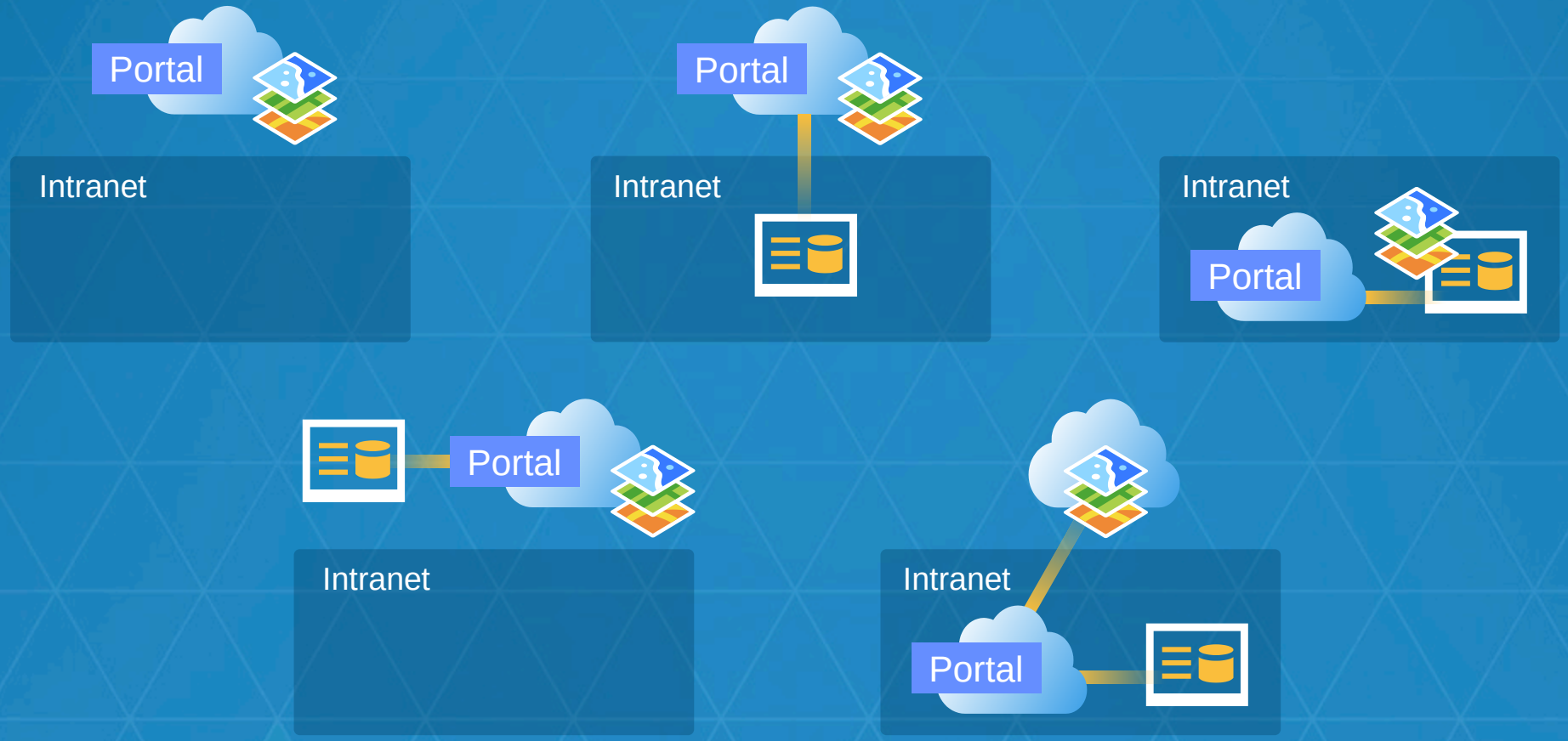
- Create, share, collaborate
- Subscription-based
  - Named User
  - Credits – pay as you go
- Updates and enhancements occur behind the scenes

Esri Managed Cloud Services

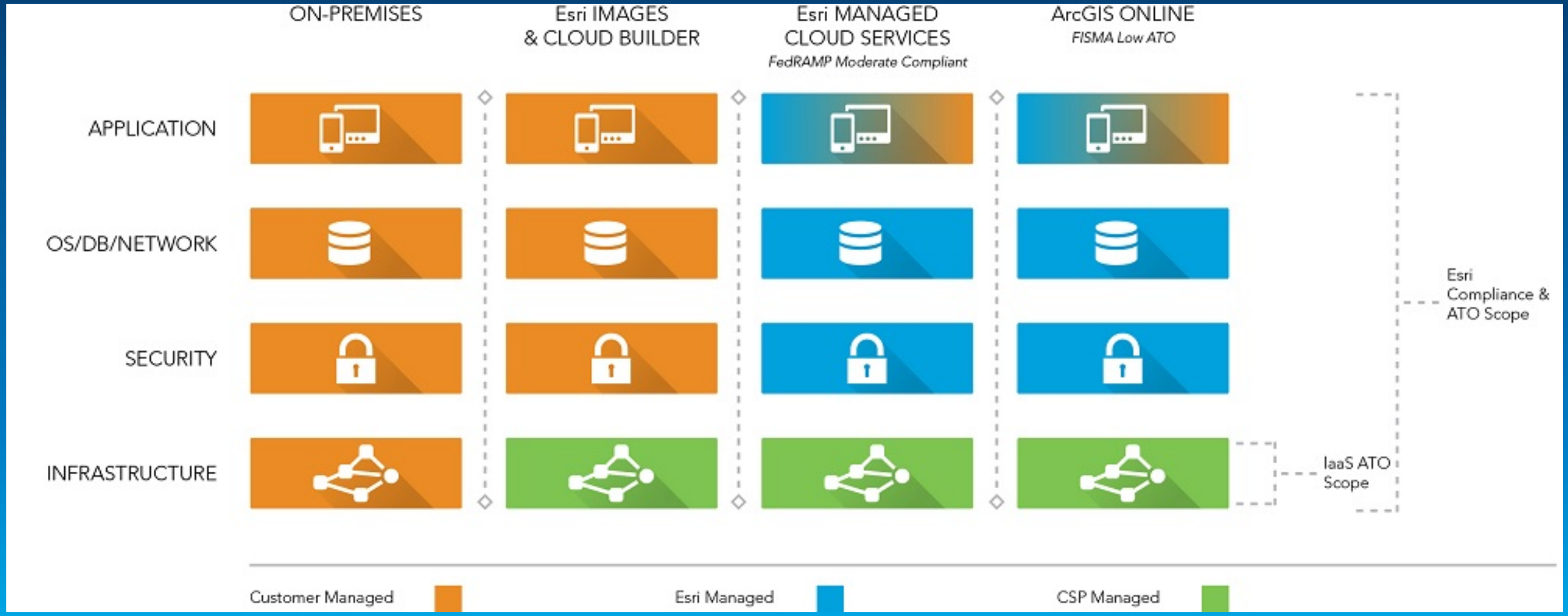
- **Cloud-based GIS infrastructure support, including:**
  - **Enterprise system design**
  - **Infrastructure management**
  - **Software (Esri & 3rd Party) Installation, updates and patching**
  - **Application deployment**
  - **Database management**
  - **24/7 support and monitoring**

ArcGIS Cloud Deployment Models

Web GIS Deployment Patterns | Core Deployment Patterns

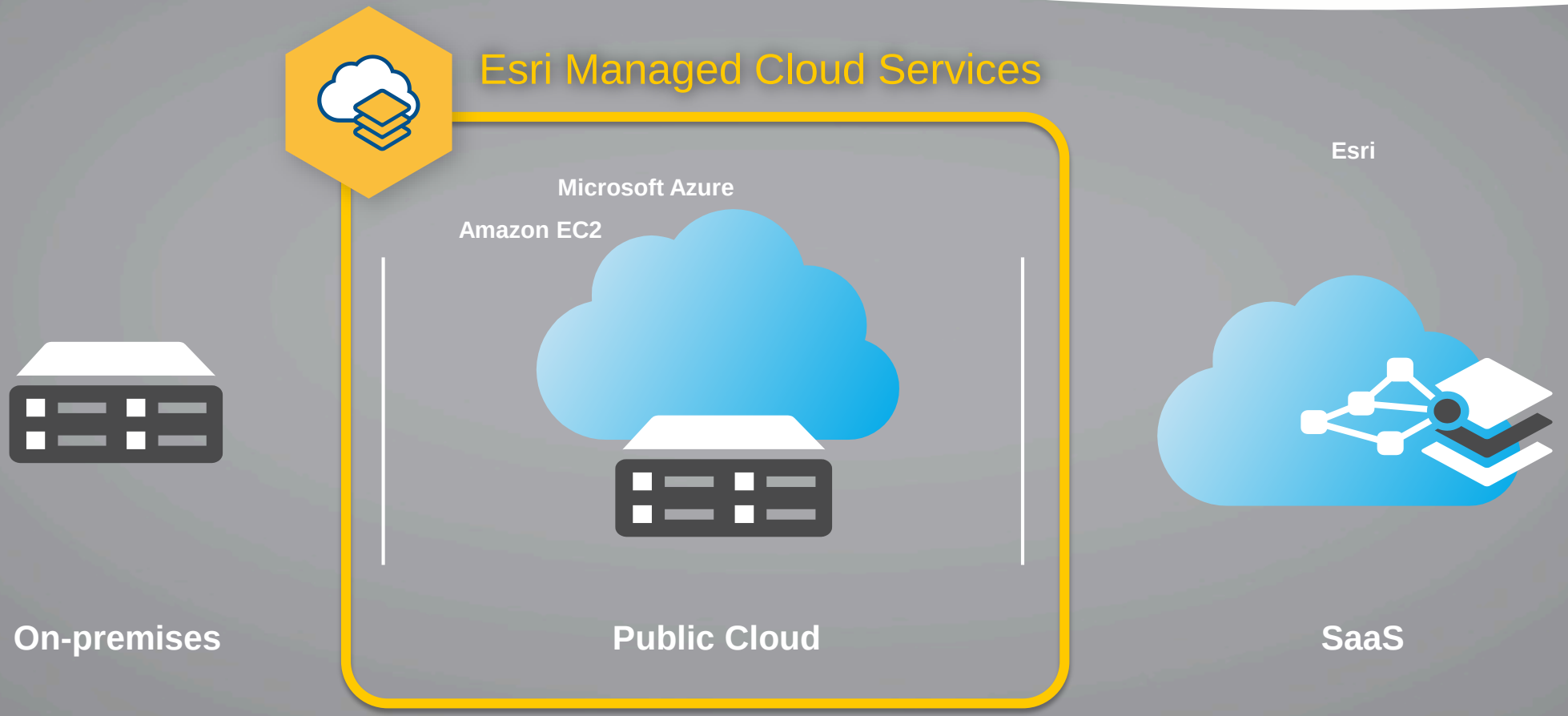


Deployment Models



Flexibility

Deploy ArcGIS on-premises, in public clouds (PaaS), and/or use Esri's cloud (SaaS)

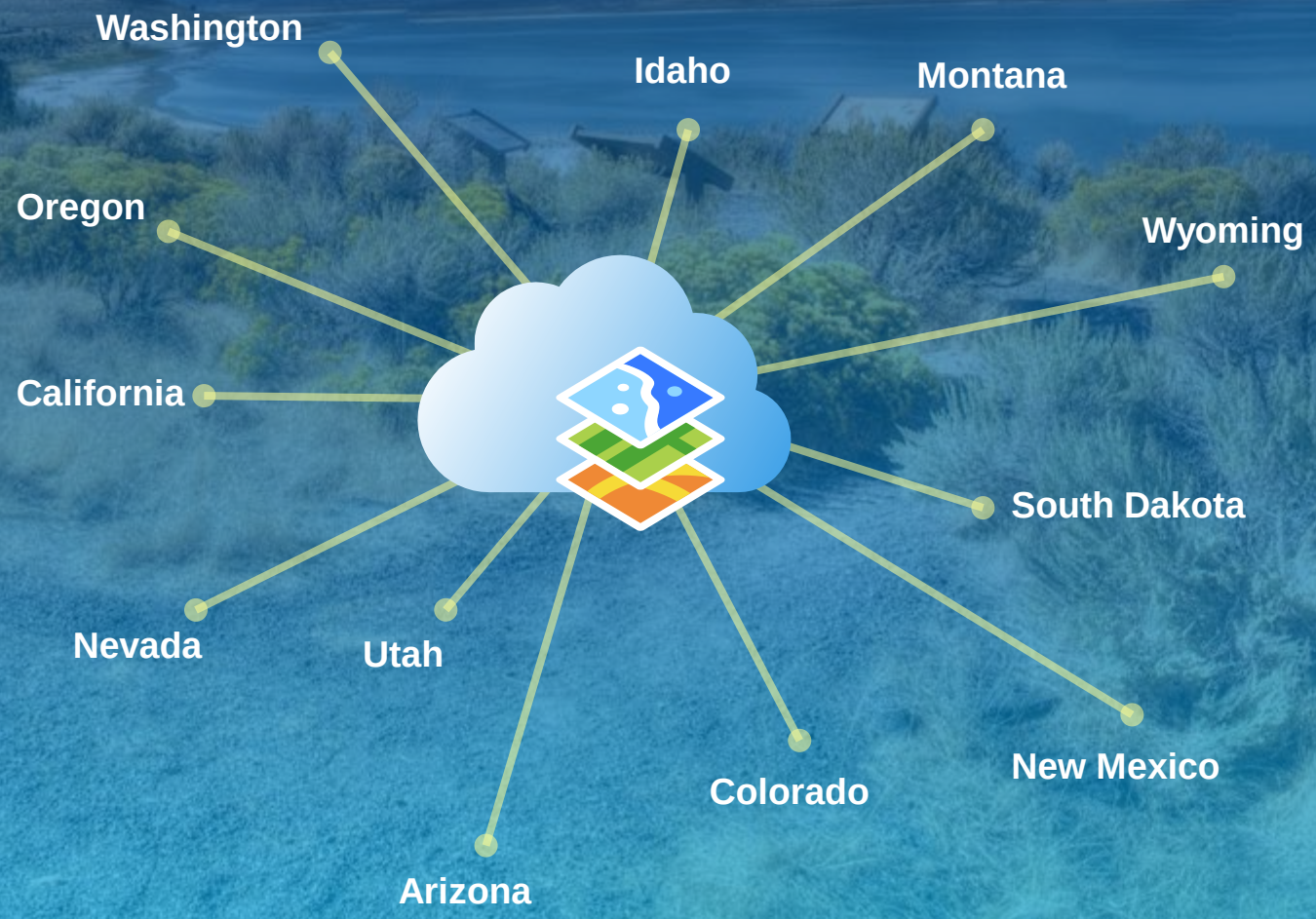


Patterns and Use Cases

Sandbox in the Cloud

Data Center Consolidation Initiative

Reducing costs and improving GIS operations



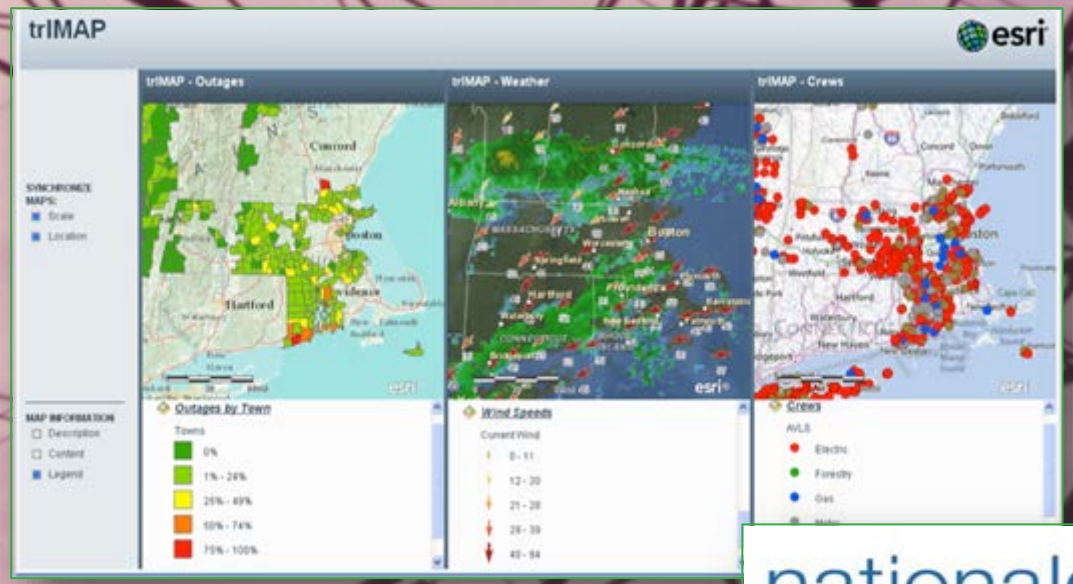
- 3 month proof of concept
- Testing day to day editing workflows
- Evaluating ArcGIS for Desktop in the cloud

Prototyping and Testing New Technology

Evaluate Prior to Making Significant Investments

Short-Term Engagements

Gain Management Buy-In and Adoption

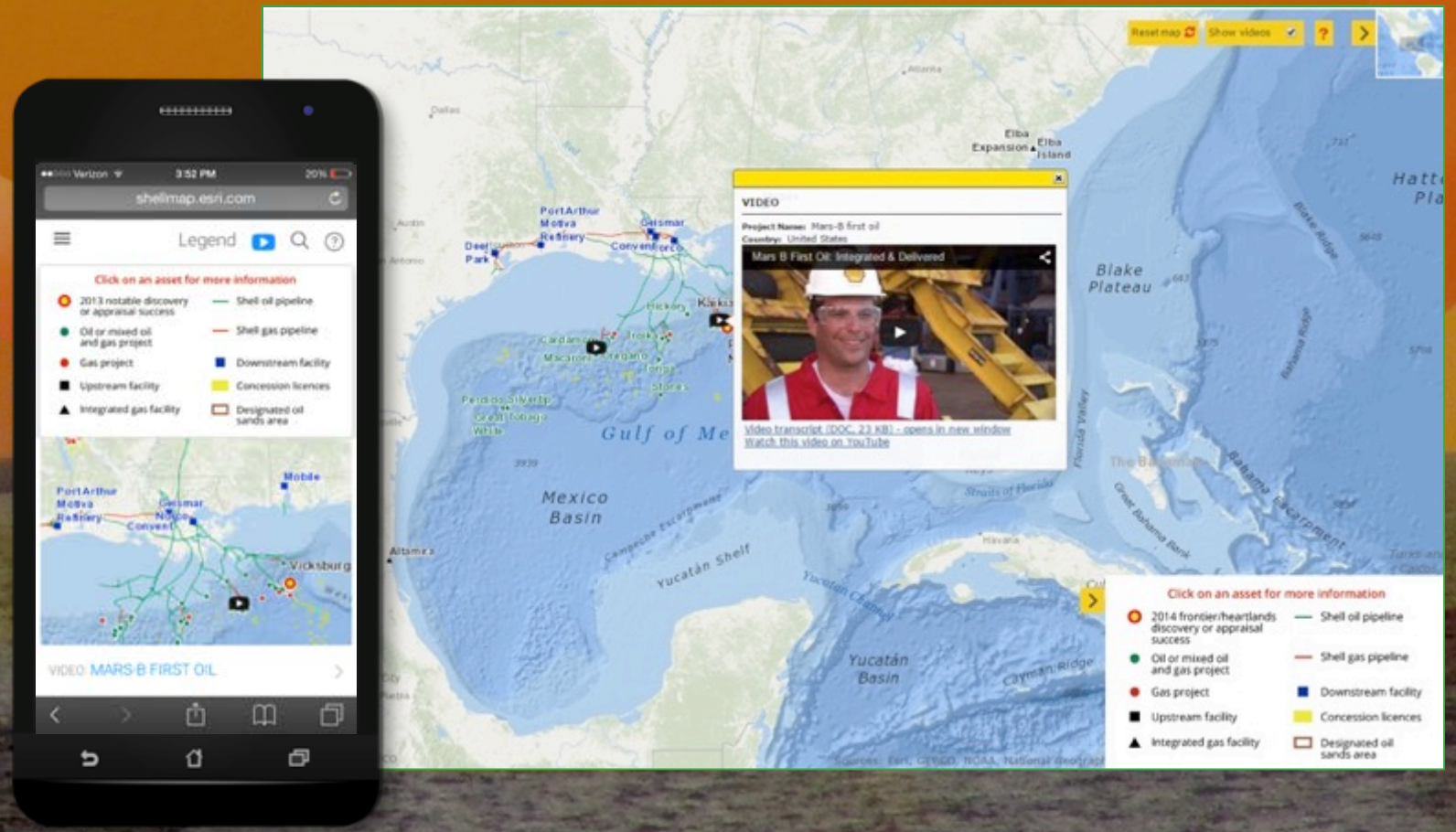


nationalgrid

Public Facing Apps

Interactive Investor Handbook Map

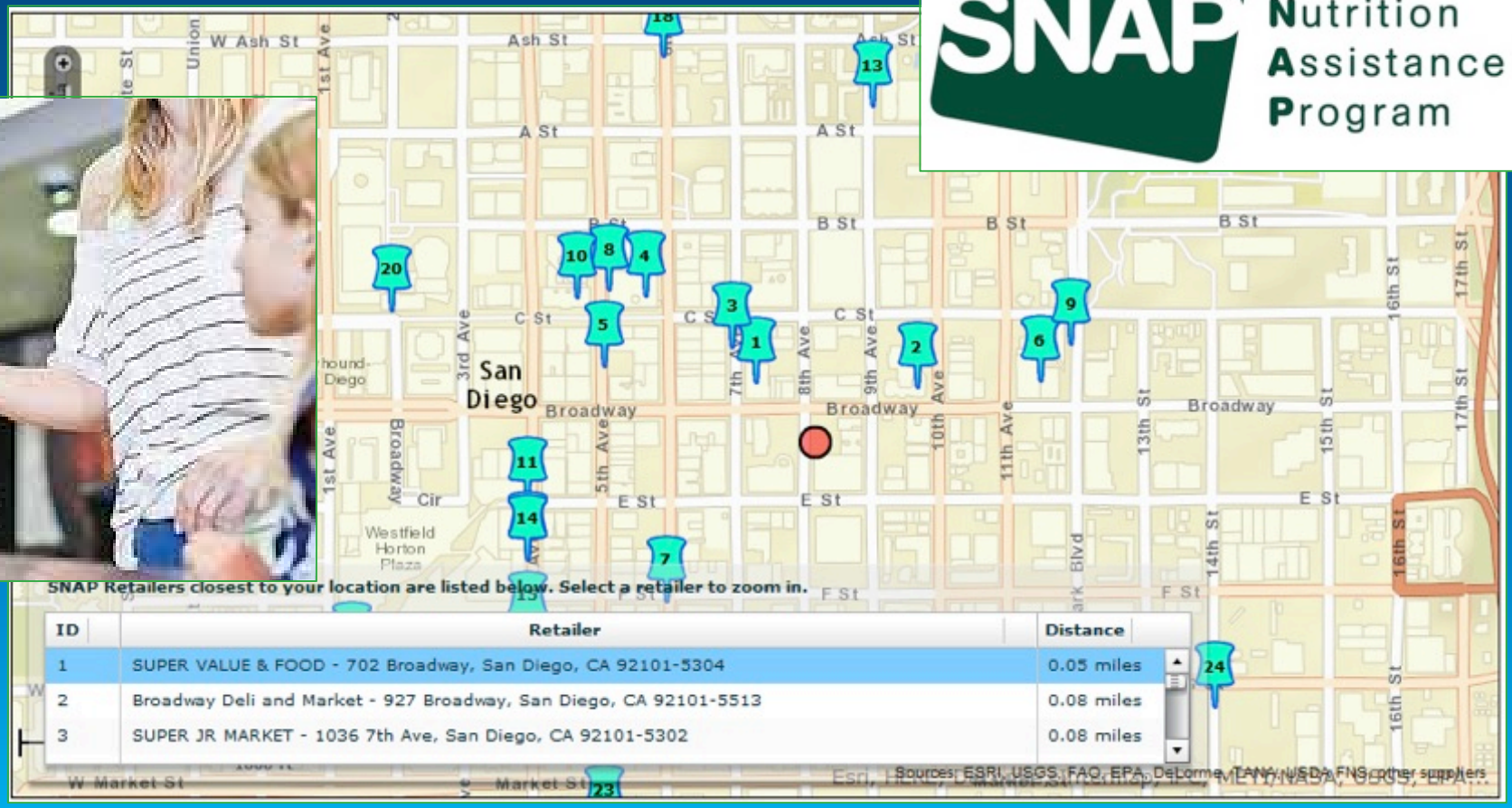
Sharing select information with stakeholders



Accessible Food Assistance Information

Easy access to nutrition assistance resources

SM SNAP Supplemental Nutrition Assistance Program



Business Critical Apps

Improved Sales Execution in the Field

Rapid enablement with ArcGIS Server in the cloud

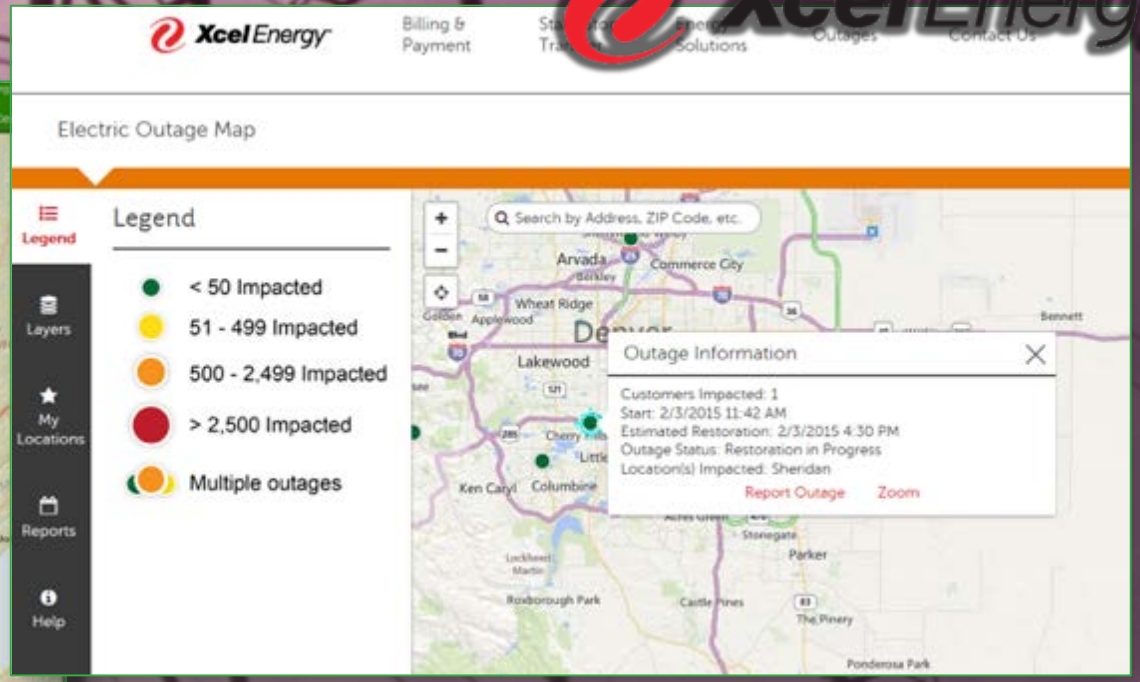
Constellation Brands

- Esri-managed cloud environment
- 2.7 million records processed daily
- Automated processing and updates

Apps with Fluctuating Usage

Enterprise System & Outage Viewer

Bringing critical outage information to the general public



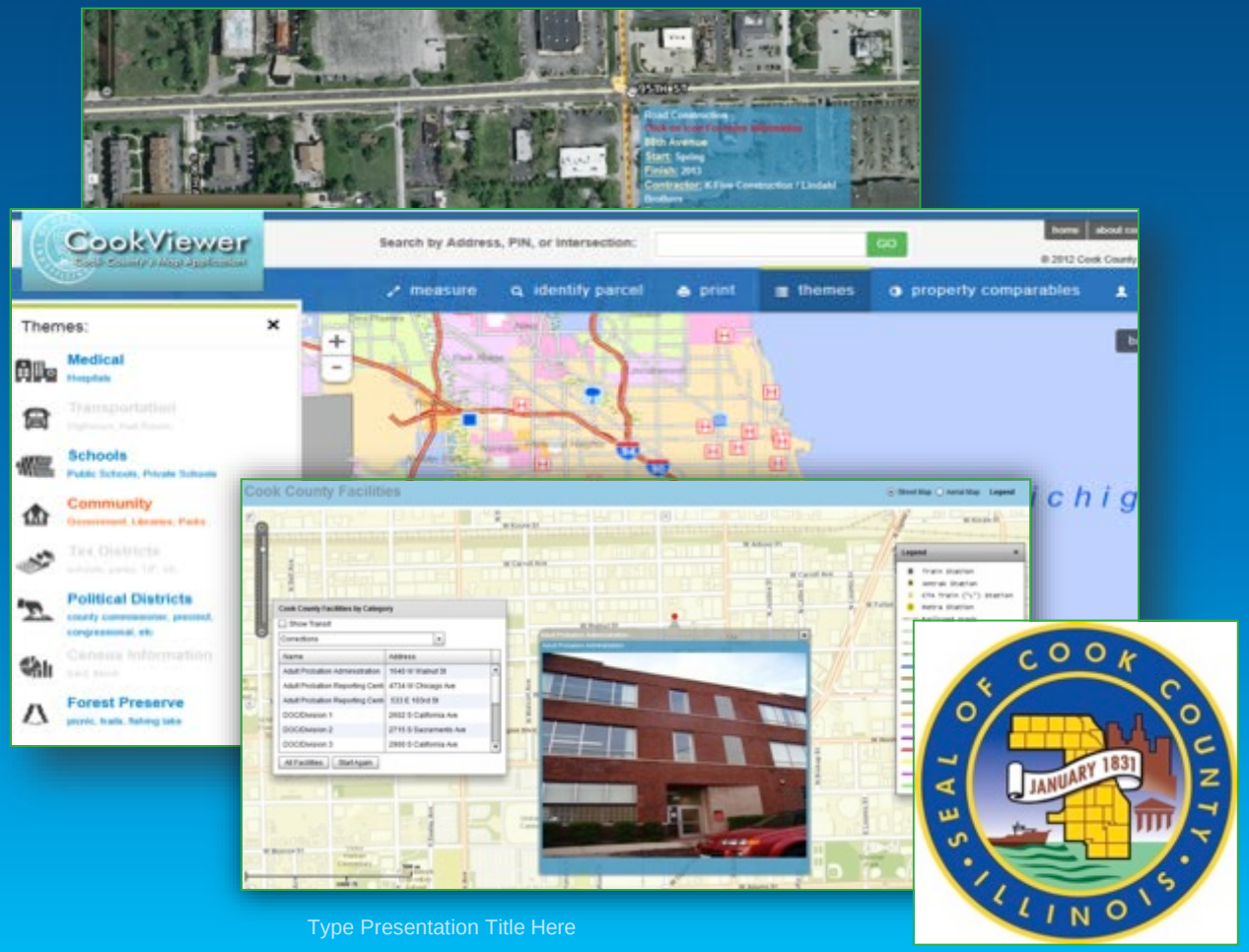
Highly available, scalable systems ready to perform during major events

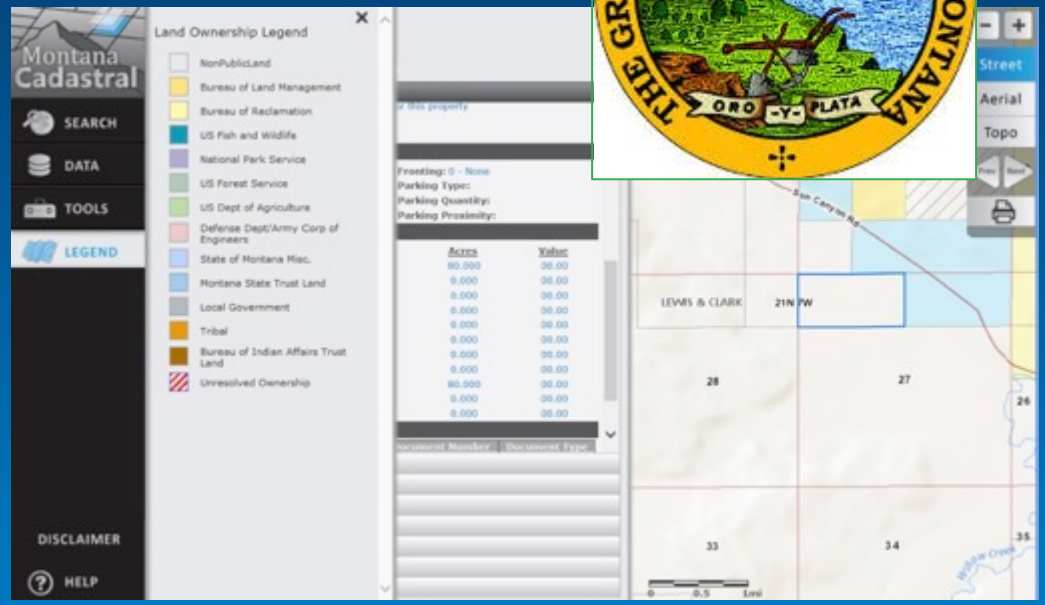
Frequent, automated data updates

State and Local Govt Apps

Large Cloud Migration Initiatives

Push to move State & Local Govt resources to the cloud





Streamline Environment Review Process

Web based decision support tools available in the cloud

NatureServe

Managing partner apps in the cloud

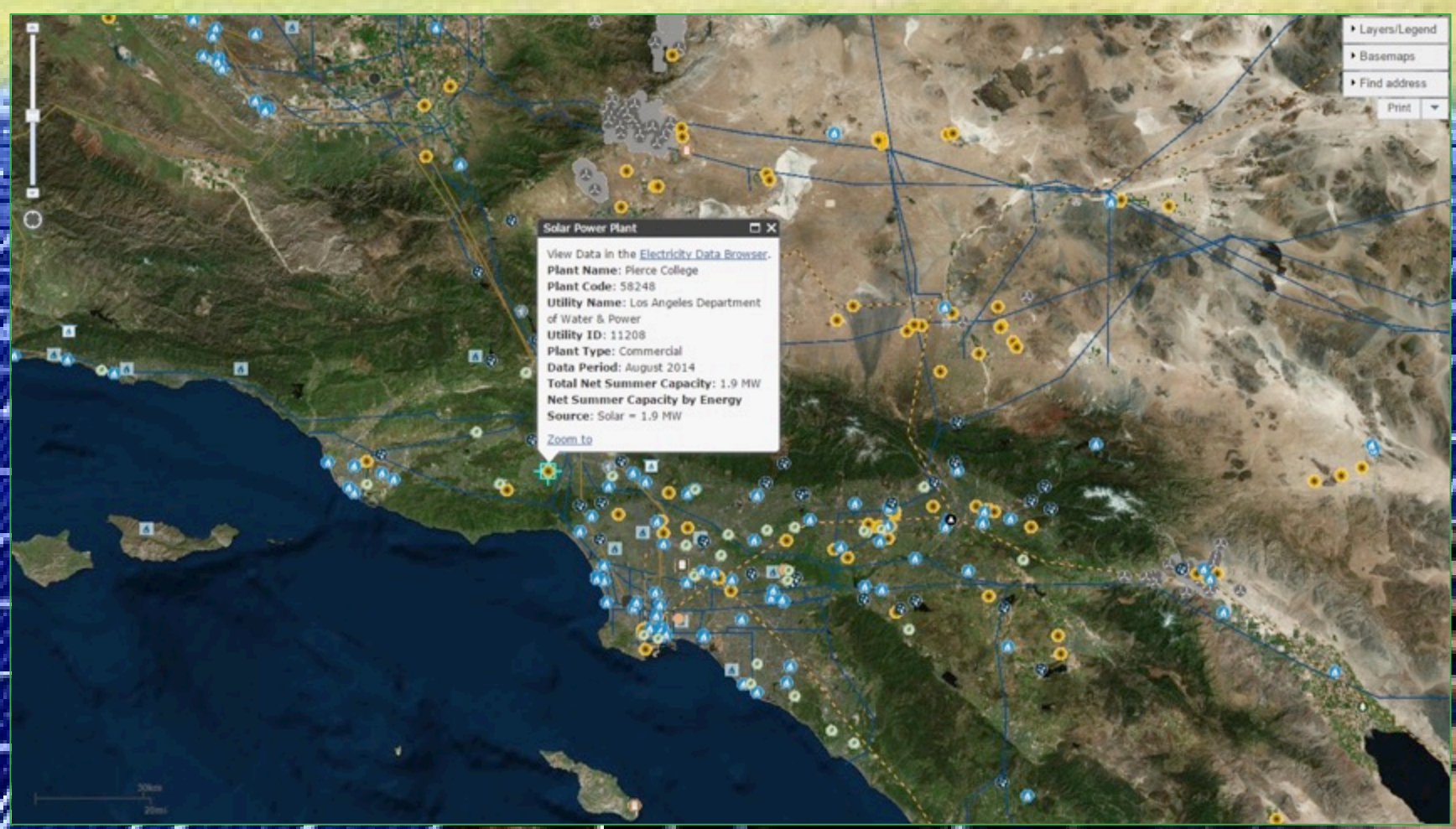
Migration from on-premises deployment

Upgrade from legacy ArcIMS systems

Federal Apps

Providing State Profile Data to the Public

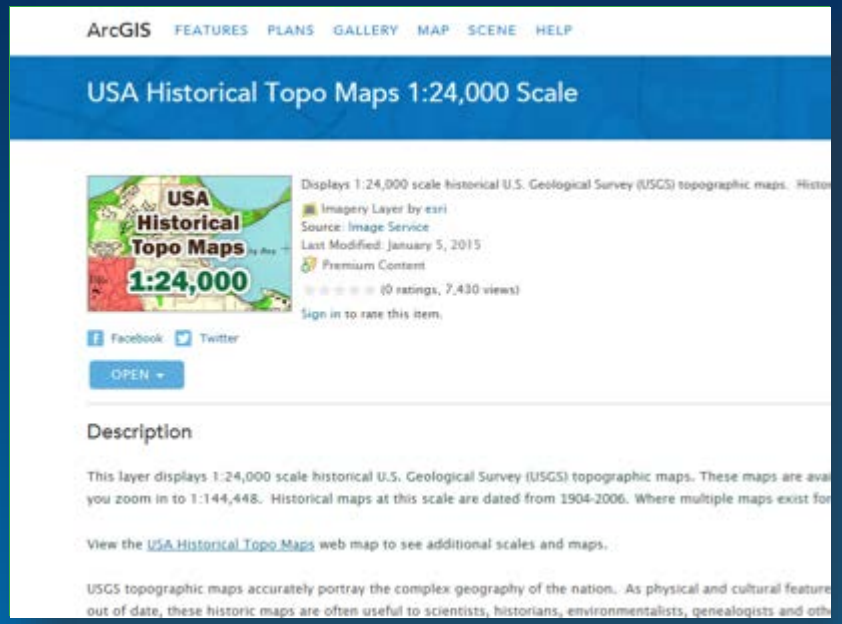
Dynamic Services Provide Up to Date Energy Information

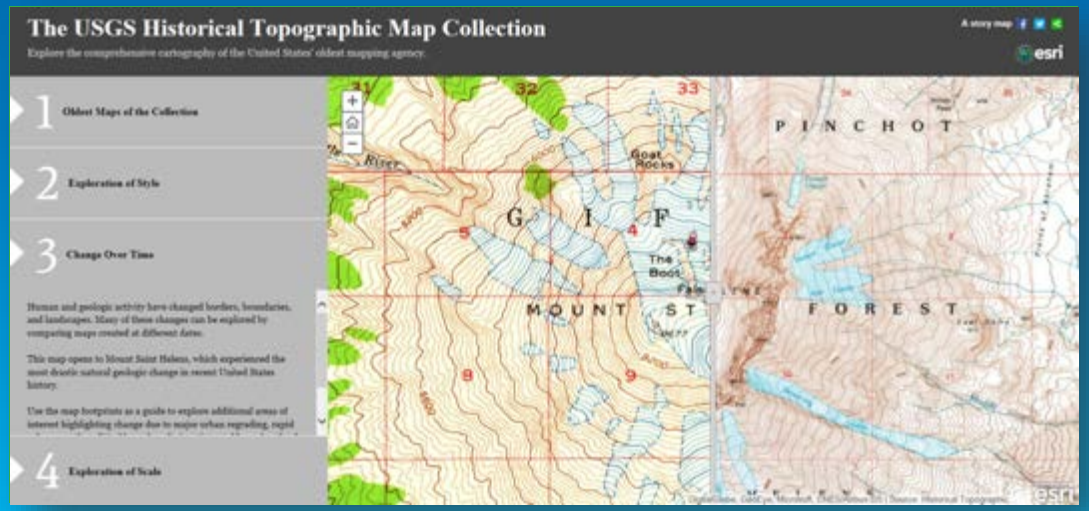


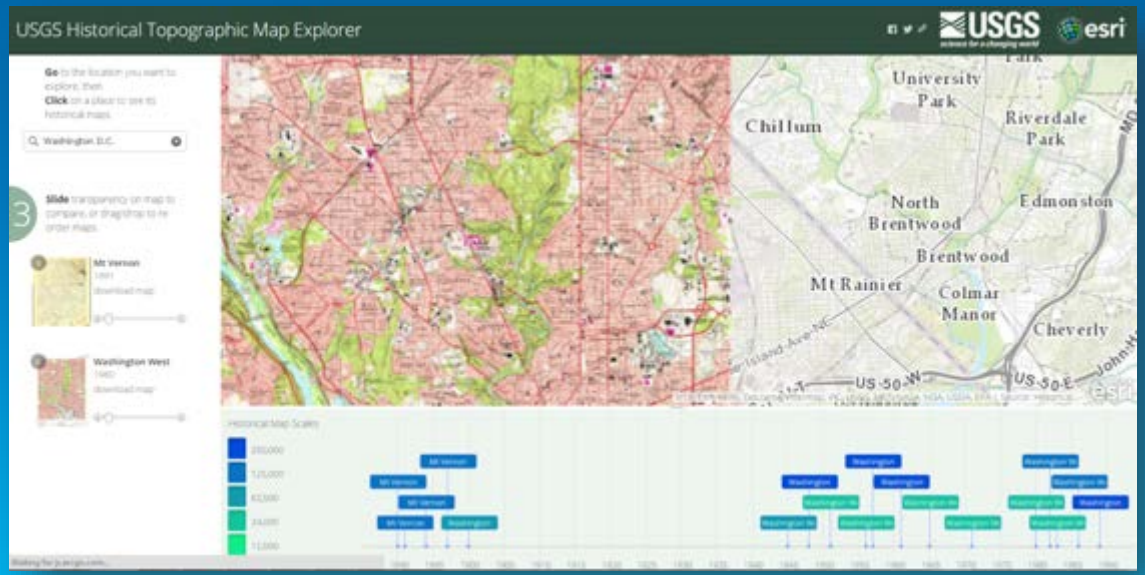
USGS Topo Maps Publicly Available

Large image services available in the cloud

- **More than 175,000 topographic maps published by the USGS since 1884**
- **22 TB data x 2 for redundancy**
- **1.6 million hits during Esri User Conference**
- **Consumed by several apps; premium service available in ArcGIS Online**





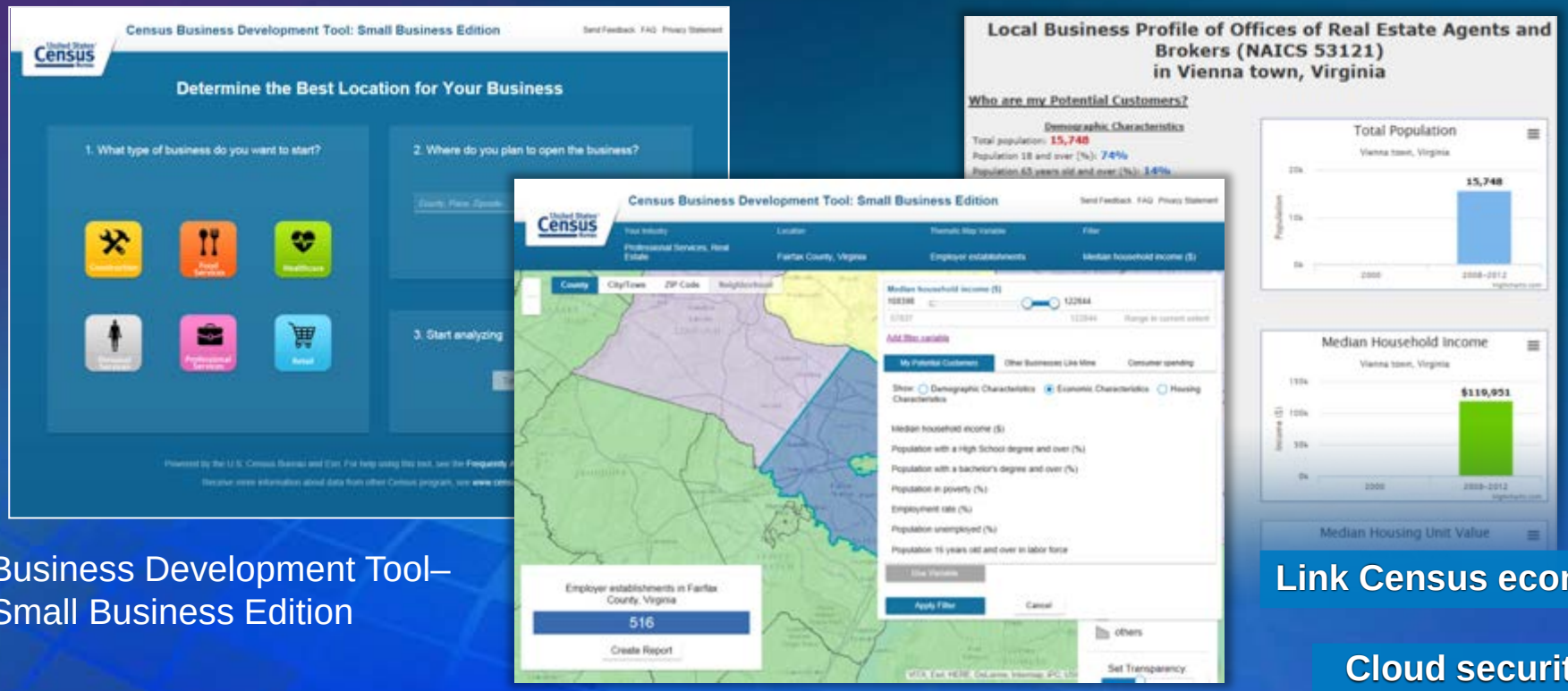


Apps with Elevated Security Requirements

Cloud Security and Compliance

Supporting Small Business Development

Simple-to-use application for siting new businesses



Business Development Tool–
Small Business Edition

Link Census economic and demographic data

Cloud security controls meet federal standards

Options and Considerations

Understand what makes sense for the business… how do you know cloud is the way to go?

Why aren’t organizations moving to the cloud?

- Meeting Organizational Security Requirements
- Overcoming IT Cultural Barriers
- Network Infrastructure Requirements
- Expertise for Acquisition Process
- Funding for Implementation

Should I be using the cloud or not?

When should I use the cloud?

- Lack of experience and people
- Cost to maintain in house is unsustainable
- I want to focus on new projects but managing my server is taking up too much time
- I want to quickly prototype and test out new capabilities
- I need an environment that scales

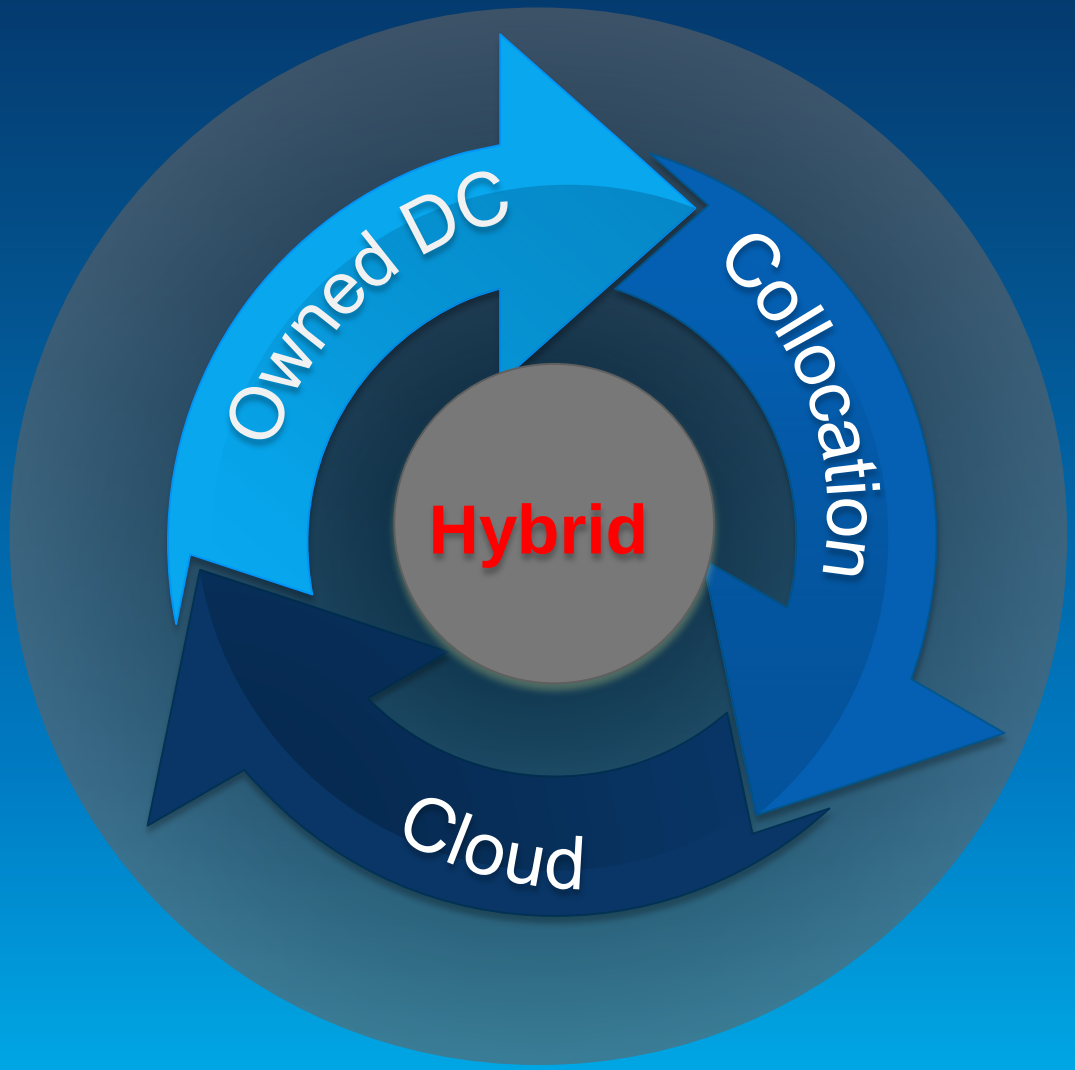
When shouldn't I use the cloud?

- Heavy data editing workflows
- "If it ain't broke, don't fix it!"
- Experienced IT resources readily available
- Strict security policies not allowing data off premises

What are the pricing options and considerations?

Private Clouds need to live somewhere

- When to use a cloud, a colocation data center, or an owned data center
- Apples-to-apples comparison for each to show how to avoid hidden costs and gotchas



Over 60% of organizations engage in colocation, but 70% maintain their own –Info Tech Resource Group

Key Points-Organization owned data center

Key Points-Collo & Cloud data center

Of course, What a Data Centers “is” varies…

I have witnessed it all with small and fortune 100 companies

When to use your data center

- It all depends on the conditions of your existing legacy data center
  - Age of infrastructure
  - Power, space available
  - Meets reliability requirements
- It all depends on the business requirements
  - SLA's and availability requirements
  - Planned and unplanned growth
  - Audit Requirements
  - Future personnel resource requirements

When to use a Collocation provider data center

- When you are low or running out of power and space
- When business requirements are unknown
- Unqualified or lack of personnel
- Inter-site connectivity
- Budget constraints
- When your data center cannot meet requirements for:
  - SLA’s
  - Audits
  - Future growth
  - Support activities

When to use a Cloud provider

- Infrastructure sizing
  - SaaS, IaaS, PaaS
- Auto scaling for unknown number of users/hits
- Lack of personnel
- Budget constraints and Pay-as-you-go
- Time to market critical
- In-house network constraints
- Hardware architectural size unknown

Comparisons and Gotchas

- Create a template for apples to apples for comparisons
- Determine costs for your own IT & data center cost and limitations
- Determine Costs from the different cloud and colocation providers

Pricing Collocation Considerations

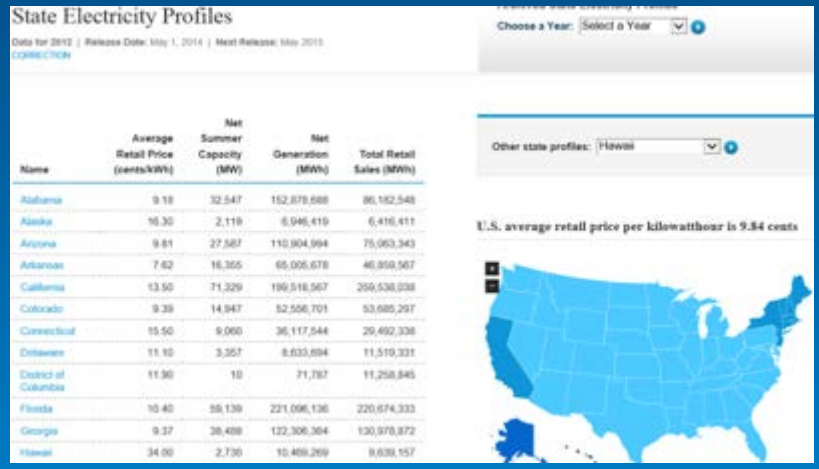
- Future site locations
- ROFR (Right Of First Refusal)
- Multiple RFP’s
- Network costs
- Contract ending clauses
- Limited growth

1,3,5 Year Term – ? kW	Price
Capex Power	$$$$
Capex Space	$$$$
Capex Internet	$$$$
Capex Burstable Internet	$$$$
Capex Cross Connect	$$$$
Capex Totals	$$$$
Monthly Power	$$$$
Monthly Space	$$$$
Monthly Internet Access (1Gb)	$$$$
Monthly Burstable Internet	$$$$
Monthly Cross Connect	$$$$
Inter-Site Connectivity	$$$$
Monthly Totals	$$$$$

Power is a game changer

In general every 1.8F that you raise the temperature in your data center, you save 2-4% of your total energy bill

- 91 watts vs 70 watts processors = 21 watts / processor
- 21 watts x 2 processors = 42 watts savings
- 42 watts x 8760hrs / 1000 = 368 kwh
- 368kwh x $0.07/kwh = $25.75 per server



- 140 racks / 5000sqft DC 13 servers / rack
- 140 racks x 13 servers / rack = 1680 servers
- 1680 x $25.75 x 2 $86,520

http://www.eia.gov/electricity/state

Power is a huge factor by location

Pricing Cloud Considerations

- Compare the like features
- Ensure they have the features you need
  - Shared storage, monitoring, etc.
- Reduced saving for long term commitments
- Contract ending clauses
- Ability to automate
- Unlimited growth

Cloud (Acme)	QTY	unit cost	NRC	MRC	Annual Costs
Acme CloudFront					
Acme Dynamo DB					
Acme Elastic Compute Cloud					
Acme Elastic MapReduce					
Acme ElastiCache					
Acme Glacier					
Acme RDS Service					
Acme Redshift					
Acme Route Yy					
Acme Simple Email Service					
Acme Simple Notification Service					
Acme Simple Queue Service					
Acme Simple Storage Service					
Acme Simple Workflow Service					
Acme SimpleDB					
Acme Virtual Private Cloud					
Acme Data Pipeline					
Acme Data Transfer					
Acme Direct Connect					
Acme Import/Export					
Acme Storage Gateway					
AcmeSupportBusiness					
AcmeSupportDeveloper					
Sub-total					

Owned Data Center considerations

- Capitol expenditures
- Preventative maintenance cost for UPS, generators, HVAC
- Generator fuel cost
- Miscellaneous maintenance cost for prior years
- Anticipated maintenance cost, batteries capacitor replacement, etc.
- Personnel costs
- Testing

Collocation Gotchas

- Future site locations (national/global)
- ROFR (Right Of First Refusal)
- Multiple RFP’s
- Network costs
- Contract ending clauses
- Limited growth

Cloud Gotchas

- More expensive in the long run?
- Very easy to overspend
- Lack of standard processes for allocating cloud resources
- Lack of reviewing and monitoring expenses
- Shutting down of unused resources
- Experience and training using Cloud

Challenges and Lessons Learned

What to keep in mind…technical

- Take snapshots frequently!
- Be up to date on cloud certifications and compliance
- Don’t assume your apps will just work – be prepared to test
- Utilizing the cloud is a shared responsibility
- Automate whenever possible
- Use monitoring tools and be proactive
- Continuously maintain, patch and update

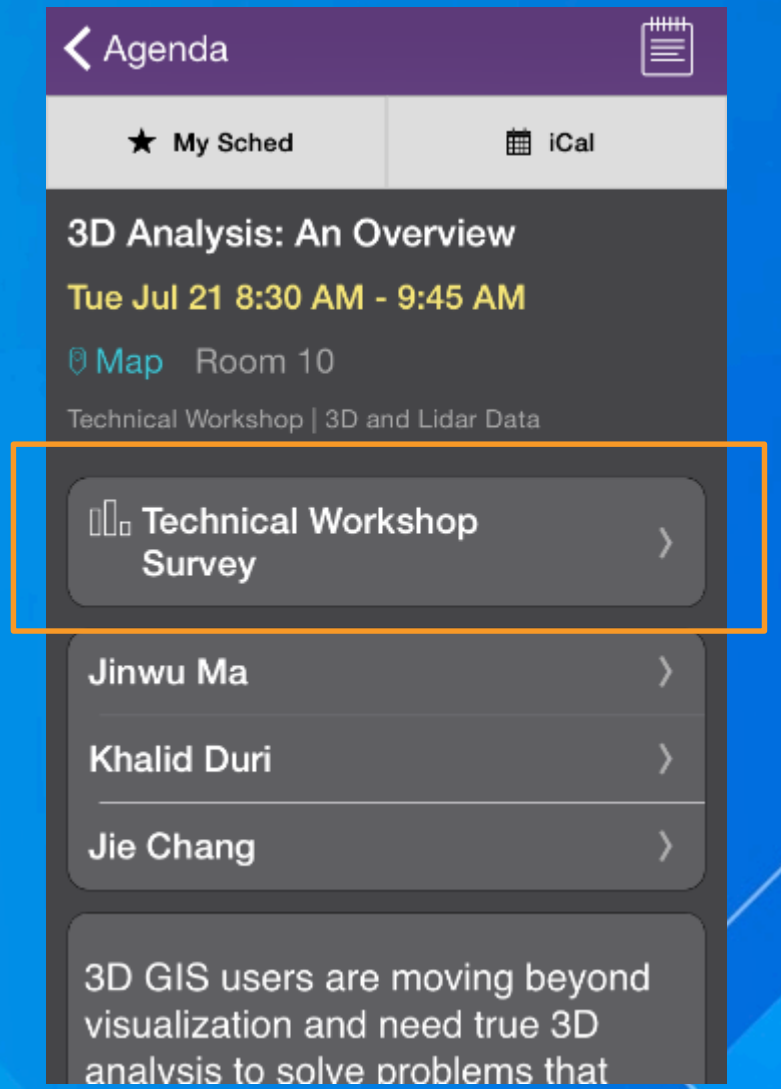
What to keep in mind…business

- Assess ROI for moving to the cloud
- Longer term commitments can offer significant discounts
- Frequently monitor your accounts, turn things off that are not being used
- If you have multiple accounts, separate them by business unit or function
- Analyze multiple cloud vendors and weigh pros and cons
- Consider using more than one cloud vendor

Questions

Thank you…

- Please fill out the session survey in your mobile app
- Select Deploying Apps to the Cloud in the Mobile App
  - Use the Search Feature to quickly find this title
- Click “Technical Workshop Survey”
- Answer a few short questions and enter any comments



Understanding our world.