

Best Practices for Federal Agency Adoption of Commercial Cloud Solutions



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The Professional Services Council (PSC) is the voice of the government technology and professional services industry, representing the full range and diversity of the government services sector. PSC is the most respected industry leader on legislative and regulatory issues related to government acquisition, business and technology. PSC helps shape public policy, leads strategic coalitions, and works to build consensus between government and industry. PSC's nearly 400 member companies represent small, medium, and large businesses that provide federal agencies with services of all kinds, including information technology, engineering, logistics, facilities management, operations and maintenance, consulting, international development, scientific, social, environmental services, and more. Together, the trade association's members employ hundreds of thousands of Americans in all 50 states.

INTRODUCTION

The pace of technology change is ever increasing. New opportunities and approaches are constantly emerging that promise better results and the more effective delivery of information technology (IT) solutions. The convergence of technology and services work into integrated solutions that can be acquired through outcome-based contracting approaches is but one example of the changing dynamics in the federal IT marketplace. Taking a “managed services” approach enables government buyers to strategically partner with industry and gain the value of industry best practices, ongoing research and development and a sharing of risks/rewards.

The migration to a “consumption-based model” of acquisition for cloud computing provides a powerful opportunity for federal agencies. Buying capabilities “as a service” helps government to avoid large up-front capital expenditures and depreciation, increase the speed of implementation, and rapidly adjust to changes in demand. Managed services approaches also focus on delivering outcomes rather than just delivering systems.

While the value proposition of migrating to cloud-based solutions is generally understood, four years after the OMB “Cloud First” policy was issued, some agencies still lag in their cloud implementations. As noted in the Professional Services Council’s (PSC’s) 2015 survey of federal chief information officers (CIOs), only 8 percent of federal CIOs surveyed said they had progressed as far as they wanted to in implementing cloud-based solutions.

In today’s challenging financial times, senior government leaders demand both greater innovation and reduced costs from their IT staffs. Yet, if we don’t take advantage of the contracting flexibilities provided in the Federal Acquisition Regulation (FAR), we will not derive the full value of new approaches and technology.

The good news is that a number of federal agencies are making progress in moving to the cloud through effective partnerships with government contractors. This report identifies a number of proven best practices that can help government agencies successfully migrate to commercial cloud solutions. Bringing together the best ideas from a number of leading commercial cloud providers, the report also presents the compelling value proposition for cloud adoption and highlights success stories to help agencies adopt consumption-based buying as a tool to deliver more effective mission results.

Envisioning the Future —Taking Comfort in the Cloud

The basic premise of cloud computing has been with us for years—all of your computing infrastructure and systems don’t have to reside in the same physical location as the end-point devices used to access information. There are a number of trends that have changed the nature of technology solutions. In years past, hardware, software and services were often procured separately. More often today, customers buy converged solutions that bring together these component parts. Widespread access to Internet-based capabilities, faster network connectivity and the proliferation of more mobile devices (laptops, tablets and smart phones) have fostered an era where workers can be connected anywhere, anytime. With the recognition that all data didn’t need to be stored locally, the door was opened for greater efficiencies and economies of scale by bringing together computing infrastructure, data and software into consolidated locations and solutions.

Bringing together the necessary hardware (servers, storage, etc.) and software into highly efficient computing centers provided the opportunity to create a business model where customers could move away from having to buy and deploy all of the component parts of a computing center, and instead, only buy the capacity and capabilities needed at any given time. This shift to a buying model similar to how consumers buy utilities like electricity is referred to as consumption-based buying, and brings with it the ability to leverage the computing services provider to rapidly scale to meet changing consumption patterns and emerging requirements.

Cloud is just a euphemism for the technology services you need being “somewhere out there” in an aggregation of components where you worry less about the individual pieces and more about the quality of service provided. Similar to the electricity analogy, as a consumer you should care less about the brand of generator on the other end of the transmission lines and more about the

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power being available when and where you need it. But the word cloud doesn't begin to describe the power of leveraging a commercial provider of technology solutions to deliver an organization's computing capabilities in an on-demand model. This is a significant shift in how technology is deployed and used.

Envision for a moment being an IT program manager and all of the headaches, costs, delays and inefficiencies that are avoided by moving to the cloud. Underutilized data centers and server farms (some with utilization rates of less than 10 percent) incur huge costs for equipment, cooling, facility space, labor, etc., for capabilities never used. Buying and owning hardware requires access to capital budgets and enough financial certainty to plan for equipment replacement and modernization. All too often though, equipment is kept far beyond its useful life and is no longer supported by the original manufacturer. Likewise, buying and maintaining software carries a similar heavy recurring obligation, and if licenses and software versions aren't kept current, then the perfect storm for hackers emerges as patches and security upgrades are no longer available.

Then, as new technologies and approaches emerge, the organization is ill-positioned to incorporate these improvements into their IT operations. Tragically, while the world of technology offers a dizzying array of new capabilities and ever increasing capacities, customers are left behind, weighed down by the anchors of their legacy IT investments. And, those anchors can be heavy. Out of concern that demand will exceed capacity, organizations get captured in the death spiral of overspending to be prepared for surges and new requirements.

The smart migration to the cloud can free up substantial resources and bring speed and agility to your organization. That is, if you can navigate how to buy and deploy in this changing market and are willing to forego the personal control of owning hardware and software in exchange for an outcome-based partnership with a commercial provider.

VALUE PROPOSITION

There are a number of compelling reasons to adopt commercial cloud solutions, including significant efficiencies/cost reductions, improving operational effectiveness, and fostering speed, agility and innovation in IT services delivery.

Reducing Costs

In times of financial uncertainty and ever increasing budget scrutiny, cloud adoption can significantly **reduce up-front costs** by switching from a capital expenditure (CAPEX)

approach to an operational expenditure (OPEX) model.

Government organizations can **avoid significant up-front procurement of hardware and software**, as well as resulting equipment depreciation, by moving to a "pay for what you use" approach. Cloud solutions can also be of great benefit to agencies lacking the appropriated funds required to do new system development and modernization by **re-purposing operations and maintenance funding** from legacy operations to pay for a consumption-based managed service.

In addition to reducing up-front investment costs, cloud adoption can also **reduce operational costs**. By being able to rapidly scale to meet existing demands and future budget changes, funding is only needed to pay for what an agency consumes rather than having to pay to maintain excess capacity.

An agency's **IT footprint** can be **reduced** through consumption-based buying—not only reducing hardware and software costs, but also providing significant labor savings and the ability to re-purpose government personnel for mission critical tasks.

A number of additional **IT costs** can also be reduced through migration to a commercial cloud provider. **Asset management** responsibilities and their associated costs become the responsibility of the commercial provider. In addition, both fixed infrastructure and labor costs associated with **managing data centers** and other computing infrastructure are replaced by on-demand buying of cloud services.

"Friends don't let friends build data centers."

Charles Phillips, CEO,
Infor, 2014

Federal agencies will continue to face financial uncertainty in the years ahead. Smart consumption-based buying allows an agency to scale up to meet new demands and reduce consumption, if necessary, to address changes in budgets and programs.

Increasing Effectiveness

In today's environment, merely reducing IT costs isn't enough, the prize for federal agencies is to deliver more effective mission results. In addition to the powerful business case associated with cloud computing, commercial cloud solutions are providing a number of significant improvements in mission effectiveness, to include:

- Increasing the speed with which an agency can implement a new capability or scale to meet increased requirements.
- Providing agility to respond to emerging needs or changes in the scope of a project.
- Providing technology refresh and replacing aging infrastructure and legacy systems.
- Optimizing performance of computing services.
- Rapidly migrating applications.
- Improving data analytics and business intelligence.
- Increasing reliability and better performance through modern infrastructure, commercial best practices and security enhancements.
- Providing greater access to information—enhancing information sharing and collaboration.
- Improving security.
- Increasing control through enhanced real-time visibility and audit of applications and infrastructure.
- Supporting business process optimization by breaking down barriers to information sharing, eliminating stovepipes and repurposing federal employees to mission critical work.

Enabling Innovation

A key concern of federal leaders is bringing more innovation to their agencies. However, innovation is either fostered or discouraged by how the government asks for and obtains work from the private sector. One of the key benefits of consumption-based buying for cloud computing is the **continuing access to commercial best practices** and **new capabilities**. Rather than having to bear the burden of research and development, piloting and implementing new capabilities on their own, federal agencies that have moved to a commercial cloud provider can take advantage of the continuing work of the cloud provider. In addition, migration to the cloud significantly improves the ability to use **new applications, expand engagements or launch new initiatives** while avoiding technology lock-in by deploying on a standardized architecture. Application development and use is facilitated and can be **tailored for multiple channels of delivery**—from the desktop to the mobile device.

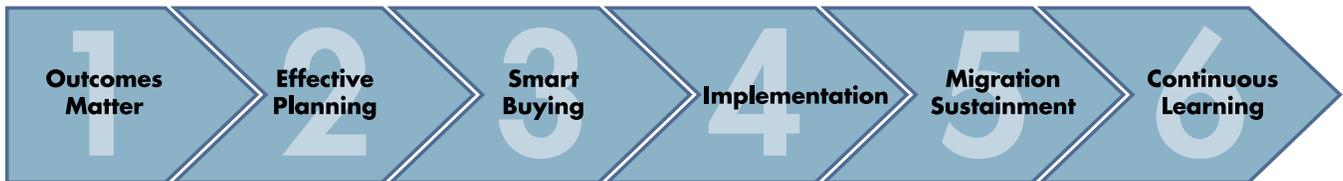
“Use the cloud to bring speed to the game... accelerating the pace of change in government.”

Tony Scott, U.S. CIO, 2015

In the long-term, the value of migration to a commercial cloud provider will expand far beyond the initial business case and prove to be a launching pad for future innovation and improvements.

CLOUD COMPUTING BEST PRACTICES:

A guide to getting it right in transitioning to a commercial cloud provider



1. Starting with “Why”

Any journey of IT transformation has to start with an understanding of the outcome you want to achieve. As they say, without a strategy as to where you want to go, any road will do. Successful implementation of a cloud solution is no exception. As an agency considers migration to the cloud, a broad variety of options and migration paths are available, so it’s important to start with the end in mind. A comprehensive agency IT Strategy is a good place to start. By understanding how your cloud computing plans fit into the broader agency mission, priorities and architecture, you’ll be on your first step to choosing the right path to the cloud. That said though, don’t fall victim to the trap of never starting your journey because your plan isn’t perfect. Many organizations have failed to take advantage of new technologies by spending too much time documenting their “as is” architecture and not enough time moving towards a “to be” state. Similarly, your strategy should be at a high-level, focusing on key objectives and outcomes. Trying to create too detailed a roadmap at the very start will be both time consuming and subject to change as you work with your commercial provider.

2. Developing Your Cloud Strategy

As you transition from the broader strategy to your cloud computing implementation plan, focus first on an assessment of your **requirements**. Think about things like the level of security required, the need to collaborate and share information with people from outside of your organization, etc., all of which will shape your path to the cloud. From there, you’ll be able to make better choices as to the right cloud delivery platform—which could be public, community, private or a hybrid environment—your network connectivity approach and the extent of your initial implementation. As noted above, don’t fall victim to meeting all possible requirements in one fell swoop. By focusing on key requirements and objectives, you build in flexibility and

Service Categories

Infrastructure-as-a-Service (IaaS)

IaaS providers supply a virtual server instance and storage, as well as application program interfaces (APIs) that let users migrate workloads to a virtual machine (VM). Users have an allocated storage capacity and start, stop, access and configure the VM and storage as desired. IaaS providers offer small, medium, large, extra-large, and memory- or compute-optimized instances, in addition to customized instances, for various workload needs.

Platform-as-a-Service (PaaS)

PaaS providers host development tools on their infrastructure. Users access those tools over the Internet using APIs, web portals or gateway software. PaaS is used for general software development and many PaaS providers will host the software after it’s developed.

Software-as-a-Service (SaaS)

SaaS is a distribution model that delivers software applications over the Internet; these are often called Web services. Users can access SaaS applications and services from any location using a computer or mobile device that has Internet access.

help unleash the creativity of the government-industry team to find new and better ways of delivering outcomes.

It's important to think differently when transitioning to the cloud. The key is in changing from an “infrastructure-centric” view of IT to a “**service-centric**” view. Rather than managing the delivery of discrete service, storage, networking and application resources that must be assembled by department IT staff, a service-centric approach focuses on user workflows and then deploys integrated offerings that can be accessed directly by the agency. Organizations that are too rigidly bound by their legacy infrastructure sometimes underestimate the advances that can be achieved by moving to a service-centric view.

Agencies must explore a range of options that fall under the banner of cloud computing. No one-size-fits-all approach exists, and many agencies will use more than one cloud solution. It is important to think through a carefully balanced portfolio of existing, emerging and future technology solutions. A well thought out cloud strategy will ensure that your agency adopts the right cloud for the right workloads. On the most basic level, understand the differences between the **service categories** of infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) and software-as-a-service (SaaS). Consider your options—public/community/private/hybrid and IaaS/PaaS/SaaS—so that you can best meet the requirements of your agency.

Pick the right **cloud deployment model** for your mission need. No two cloud solutions are completely identical, and organizations have varying business needs, comfort levels and governance by which to manage cloud-based capabilities. For some, a public cloud provides the desired agility, for others, a private cloud better fits the organization's business needs. In assessing market offerings, think through which model will work best for your needs. In the case studies included in this report, you'll find examples of private, community, public and hybrid solutions working well for different workloads.

It's important to assess the specific security, performance and control needs of each different service requirement early on, as security and network standards will often set a baseline for the type of cloud environment that can be used. Defining how data moves to and from the cloud may guide decisions on security controls and network access mechanisms such as virtual private networks (VPNs) or Trusted Internet Connections (TIC).

In assessing which type of cloud environment is appropriate, you will also need to consider that not all legacy environments can be moved to a cloud. For example, some

Deployment Models

Private cloud

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 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.

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.

Hybrid cloud

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).



existing software packages or applications cannot be virtualized, etc. In a sense, your cloud migration can be used as a way to force the retirement and migration from some of your outdated legacy solutions.

Think big, but start with a manageable scope. The appropriate scope will vary based upon your current IT environment and priorities.

As with all successful IT projects, it's crucial to have a focus on people, process, and technology, and this is an area where commercial cloud providers and/or systems integrators can help an agency navigate to the best cloud solution to meet their needs. There are a number of **non-technical issues** that have to be considered. Aligning the line of business and IT support teams early on in the project is crucial. A broad range of stakeholders should be involved in the planning process. Start discussions regarding the broader lifecycle of projects early, and consider the full lifecycle of the project—not just the initial steps. Cloud allows a not-so subtle shift in planning details, including peak demand needs and how to better understand, model and manage to seasonal or event based demand fluctuations. As adoption of cloud services progresses, defining and refining the business processes with stakeholders upfront can pave the way for a repeatable and predictable methodology for multiple programs to use.

Learn from what others have delivered to harness the power of cloud. Not only can security and acquisition experience be reused and shared, but the delivered services may be reused and provide innovation by being reapplied to new mission opportunities. Initial cloud successes help build credibility and confidence within the organization for the expanded use of cloud computing and the creation of additional capabilities.

Having an integrated cloud strategy will also help avoid the pitfalls of “cloud sprawl,” where disparate cloud environments are deployed by different stakeholders within the organization with no common guidance and framework. Develop a balanced portfolio of cloud services and avoid cloud sprawl by defining a comprehensive cloud strategy to govern acquisition of both current and potential application requirements.

Cloud initiatives are new for many organizations, and focusing on the right path for your agency needs will both help set expectations and deliver on the promise of cloud.

3. Being a Smart Cloud Buyer

To fully achieve the value of cloud computing, you'll need to think through your procurement strategy to ensure that you maximize the value of consumption-based buying. Here are some smart buying ideas to help ensure success in moving to the cloud.

Use of Statement of Objectives (SOOs)

The use of SOOs is a compelling alternative to rigid statements of work. With a focus on outcomes, companies are able to propose their best solution to achieve the desired goal. As the government is a consumer rather than creator in an “on-demand” model, SOOs allow an agency to state its needs, streamline the acquisition process, shorten acquisition lead time and provide greater flexibility in selecting the most advantageous solution. Using a SOO allows offerors the opportunity to propose market-based solutions and to describe how they would modify their offering to meet the government's goals. The use of SOOs gives the government the greatest latitude in evaluating proposals to determine which offeror best understands the government's requirements as articulated in their proposal; and which offeror's solution is most advantageous to the government in terms of price, efficiency, ease-of-use, or other criteria.

Managed Services/Service Level Agreements (SLAs)

A managed service, performance-based contract is the way to go. By contracting for an outcome, based on measurable SLAs, with incentives where appropriate, you'll ensure that your industry partner is able to rapidly bring to bear new technologies, tools and ideas as they become available. You'll also build confidence with your customers through well understood and articulated outcome measures. And, as noted elsewhere in this report, focus on a select set of measures that matter, rather than creating too many SLAs and wasting time and money counting things that don't make a material difference.

Multi-year Contract with Options

Your cloud provider will be making investments in hardware, software, and services and will recover these investments by charging service fees over a period of time. The shorter the period of time the offeror has to recover the investment, the higher the price per unit of IT capacity could become. A shorter base period of performance means the offeror must recover all of its invested costs prior to the end of the base period of performance. An offeror's banking/financing partner(s) assess risk and set lending fees based on the contract's terms and conditions and the contract's base period of performance. Banks and auditors have strict accounting guidelines that can impact an offeror's proposed unit prices. A base period of performance of five years or more is ideal, and a three-year base period should be considered the minimum. Remember that the offeror must recover all of its investment costs (hardware, software, services, support) before the end of the contract in order for the contract to be financial viable. There are many advantages to stability and long-term commitments (with suitable off-ramps); and perhaps counterintuitively, too frequent re-competes actually add inefficiency and cost to the process for both government and industry.

Conduct a Best Value Evaluation

Lowest price technically acceptable (LPTA) procurements use price as the sole discriminator in the evaluation criteria for technically acceptable proposals. When contracting for IT capacity on-demand there are other qualitative attributes of the service that are equal to, and in some cases, more important than price. For example, an offeror's past performance may be critical to the successful transition to IT capacity on-demand within the agency. An offeror's process, procedures, ordering, invoicing, and reporting systems may be critical to chargeback reporting, accuracy and auditability of the program. The offeror's proposed solution may be easier for the government to use, may be more efficient in terms of ordering, invoicing, and/or financial reporting. The government should be mindful of bidders using unreasonable and/or unrealistically low prices as a way of buying into the contract. Of course, the government's risk is that a low evaluated price may not be close to the actual cost of the service. That is why best value procurements are best suited to the government's desire for evaluation flexibility. Best value procurements allow the government to evaluate non-price criteria on a qualitative basis to arrive at a determination. Without evaluating non-price attributes of an offeror's proposal, the government may not be able to determine the true cost of the solution.

Experience Matters

Past performance is important. Having existing customers under long-term consumption-based contracts or having many consumption-based transactions is a good indicator that the cloud service provider has the effective operational capability to sustain your workflows.

4. Launching Your Cloud Initiative

Next, you'll need to plan and implement your migration strategy. Here are some tips to ease the stress of transition.

Start small and build incrementally

There is value in starting with a bounded workload and then building incremental capabilities as experience and expertise with cloud computing grow. A phased migration strategy—starting with lower risk migrations, developing migration processes and expertise and then moving on to more complex migration efforts can prove very useful.

Stakeholder engagement

The importance of stakeholder engagement cannot be overstated. Remember that it's not just about technology, addressing issues around people, process and governance are key to success. Mission, business support and IT teams must be aligned in addressing governance, risk management and other transition issues. Clear goals and regular

Security—An Imperative and Opportunity

Improving cybersecurity is a national imperative and must be a crucial component of your cloud strategy. Previous concerns about the security of cloud solutions are being replaced with a recognition that, if done correctly, cloud solutions can significantly improve security by doing away with outdated computing infrastructure and systems.

Be a security-conscious buyer; understand FedRAMP requirements, NIST security controls, NARA CUI guidance as well as any unique requirements associated with your agency and/or data. At the same time, implement an effective risk management approach that recognizes the appropriate level of security for your needs. Adoption of the right security model will help ensure the protection of your information and systems without slowing down processes or putting unnecessary restrictions on the secure sharing of information.

Reciprocity is a crucial underpinning of FedRAMP—the willingness to accept certification and accreditation already conducted by another federal agency, rather than duplicating authorization work already accomplished. It is important to work closely with your cloud provider to enable rather than preclude the secure adoption of new capabilities and solutions.

discussions with stakeholders regarding project deliverables, quality of deliverables, and performance are also very valuable. Status reports summarizing activities performed during a specified time period will build confidence and allow all stakeholders to track progress. Well-defined performance goals are also very important. Regular, frequent and candid meetings must also take place between the customer, provider and affected stakeholders to review progress and address any issues that arise.

Planning Migration

Comprehensive planning, driven by a disciplined migration process will contribute greatly to your success. In one of the case studies in this report, the agency created a “Dev in a Day” model that included a process and mitigation strategy to tackle development tasks in parallel while also addressing security considerations. Successful initiatives have developed mature, multi-phased migration methodologies to reduce implementation risk and facilitate database migration in advance of operations. Temporary subsystems can also be established to facilitate migrations and then be taken out of service when the migrations are complete to provide flexibility and minimize issues. Incremental data syncs to update the data in the cloud can significantly reduce service downtime during the final migration cutover. Standardization and automation can help reduce the risk of migration errors. Virtual machine (VM) templates can be rapidly deployed and bring an environment online in a day. Automated data integrity and validation methods can be used to verify and validate data, databases and files during the initial synchronization. Finally, capacity planning, to include looking at current and upcoming programs and their associated cloud requirements, ensure that available capacity can be adjusted up and down as needed.

5. Sustaining the New Cloud Initiative

Your cloud service provider should have documented operating procedures. Look for recognized processes, to include Information Technology Infrastructure Library (ITIL) and ITIL security management, as well as the clear ability to provide comprehensive services including monitoring, security and remediation. Third party accreditations, such as ISO 27001, SSAE 16 and PCI are also indicators that standardized operating procedures and documentation exists. FedRAMP authorization will help ensure that many of the common concerns and potential vulnerabilities of cloud are addressed, to include standardized processes, continuous security monitoring, encryption, etc.

Service Level Agreements (SLAs)

First and foremost, sustainment requires good SLAs. Cloud providers should have a catalog of SLAs, or standard tiers of service that are easily understood. Providers with defined offerings demonstrate a level of maturity and capability that agencies should expect when evaluating consumption-based models. As agencies move applications into the cloud as a way to access IT resources, they should pick the SLAs that match the requirements of the workload. They shouldn't necessarily select an SLA simply because they are accustomed to that level of support. Many systems managers and users have grown comfortable under the legacy model of owning/sustaining their own infrastructure with a fixed workforce. Administrative systems often receive the same level of support as mission critical systems; yet in a cloud environment having the same SLA for both systems would undermine efficiency gains. And, surprisingly, when it comes to SLAs, fewer is better. Focus on the key measures that matter.

Underpinning SLAs are the actual support capabilities, to include the call center, engineers, break/fix teams, etc., that keep the infrastructure running and solve customers' problems. Another thing to consider is that for many federal government implementations, U.S.-based, U.S.-citizen staffed support centers and engineering resources are required. As to the equipment used, in consumption-based buying, the agency shouldn't be in the business of selecting/approving the brands of equipment. Instead, they should be concerned about outcomes and the ability of the company to meet their workload requirements and SLAs.

Monitoring is crucial in today's world of constant threats, vulnerabilities, hacks and data breaches. Beyond the normal network, capacity, operational monitoring and continuous diagnostics, providers must be adept at looking for the insider threat and have effective remediation strategies. In off premise solutions, cloud vendors need to provide a comprehensive end-to-end solution working with customers—either providing data center, network and cloud services or partnering with third party network and data center providers to actively comb the network for unwanted intruders and show customers effective remediation plans and capabilities.

Provisioning and billing tools that allow customers real time access are a critical component in cloud solutions. Customers should be able to actively query their current usage, billing and budget status. In addition, look for vendors that can provide standard deliverables against these metrics on a monthly basis. Avoid those that say they can do it as necessary or upon a customer's request; insist on seeing actual reports.

Security is an imperative in today's environment. There are a number of important security actions that your cloud provider will undertake, to include physical and logical security boundaries, patching, analytics, remediation and continuous monitoring. Data encryption options are also becoming more critical, with technology developments easing the overhead performance impacts and allowing for use of encryption both for data at rest and in critical transaction processing. In addition to precautions to protect and secure data for active cloud services, discuss with the cloud provider data destruction services to make sure that data is truly deleted or unrecoverable if a cloud service is terminated.

Finally, in addition to the initial transition, it is important to understand what a future transition would look like if you decide to significantly change your cloud solution or move to a different provider.

6. Lessons Learned

This report has highlighted a number of things to consider as you plan and execute your move to the cloud. Experience matters. In the pages ahead, you'll find a series of case studies to further inspire and inform you as you take advantage of a commercial cloud solution.

- Cloud is not a "one-time" journey—it's a change in the way IT services are provided. Projects may start small, but can quickly grow to include multiple services from multiple vendors over time. That growth may be unpredictable—once the initial project "goes live," adjacent programs and projects may find that they can take advantage of the new cloud capability. The good news is that in a consumption-based approach, you control the consumption rates. Rather than being stuck with underutilized equipment

and people, or worse, not having enough capacity to meet mission needs, your cloud solution will allow you to quickly change capacity to meet your needs.

- Technology and security are not the hardest parts of cloud adoption. It is the people, process and governance aspects of cloud adoption that are crucial to understand and address. Governance and risk management must be well articulated to ensure alignment of all stakeholders. Many large organizations have multiple stakeholder groups who serve as cloud consumers, service providers and brokers. Ensuring stakeholders have a voice is important to develop and maintain credibility and to minimize any perception of bias.
- Clear goals, performance metrics and regular status reporting are critical to maintaining credibility with stakeholders.
- Remember that cloud services may require a different procurement strategy, as they function more like utilities than traditional IT hardware, software and services procurements. Agility and flexibility in acquisition and execution have to be available for cloud to be successful. Focus on outcomes and results.
- Consumption-based buying also requires a different thought process on placing orders and managing usage. Rather than buying massive amounts of storage up-front, you'll buy services on an as-needed basis. This is good news, as the use of effective SLAs and management reports will reduce a lot of the headaches of planning for new workflows.
- Education and training are critical components to any cloud project. They should be addressed early during the project planning phase.
- Traditional internal processes will change and become even more critical in a cloud environment to include capacity planning, security approvals, integration between cloud and legacy services and configuration management. The degree to which these processes will change in a cloud environment depends on the cloud provider; the agency, and the maturity of existing practices.
- Adopting and migrating services effectively while keeping on-going operations running and meeting their operational objectives is crucial to success.
- Software license costs need to be fully understood when migrating into a cloud model. Be sure to understand which software licenses are renewals and which are new licensing for the cloud-based system.
- Working "early and often" with cloud service providers is invaluable to ensuring that the final solution meets all of your mission and security requirements. Communication is crucial and the power of your cloud partnership is realized when industry and government work together to understand and deliver the best outcomes.

Five Takeaways

- Managed services approach
- Consumption-based model of acquisition
- Focus on delivering outcomes, not systems
- Use the flexibilities in the FAR
- Recognize the value of partnering with industry

While it can always seem daunting to embark on a new IT approach, the opportunities associated with migration to the cloud are outstanding. Whether you choose to launch your project to reduce costs, improve effectiveness or bring innovation to your agency, the time to act is now.

In the pages ahead, you can read more about how some agencies have already made great strides in partnership with commercial cloud providers.

CLOUD COMPUTING CASE STUDIES: *Best Practices in Action*

Accenture Federal Services – Centers for Medicare and Medicaid Services (CMS) – Federally Facilitated Marketplace (FFM)/Healthcare.gov

BACKGROUND. The Centers for Medicare and Medicaid (CMS) needed a contractor to assume application design, development, testing and operations activities for the Federally Facilitated Marketplace (FFM) for Healthcare.gov as a part of the Affordable Care Act implementation.

THE OPPORTUNITY. The contract required that transition be accomplished seamlessly during the end of the open enrollment period while simultaneously developing requirements and initiating software development for functionality necessary to support 2014 business objectives for Eligibility and Enrollment, Plan Management and Financial Management.

THE SOLUTION. Accenture Federal Services was awarded the contract and collaborated with CMS, the outgoing vendor, the systems integrator and other subcontractors to support consistent and unified planning and implementation of desired functionality to support over 7 million users.

Over the next 10 months, Accenture completed the development, operations, and maintenance of the Federally Facilitated Marketplace (FFM). Accenture developed and introduced new functionality in the FFM in preparation for the 2015 open enrollment period. This included essential system releases for Plan Management, Eligibility and Business Operations, Open Enrollment, and the introduction of the Financial Management system into the production environment.

Accenture's technology support extended beyond the online marketplace to include the EDGE system. In order to conduct the Reinsurance and Risk Adjustment programs specified by regulation in the Affordable Care Act, CMS needed to provide insurance companies (issuers) a controlled environment where each issuer maintains control of the environment and the data, but CMS controlled the algorithms, software and reference data. CMS needed an end-to-end solution where several hundred issuers could maintain the balance between control of their computing and data environment, while CMS could control the software, reference data, and could issue commands to execute certain system modules.

Accenture developed a cutting-edge solution that provides issuers a complete data processing environment that each issuer owns and operates. EDGE enables CMS to create a level playing field for all issuers, with consistent software and data version management across the universe of independent installations. EDGE simplifies and expedites deployment for issuers, reducing time from several days in a standard software distribution and configuration model to as little as 15 minutes—including EC2 server provisioning, secure EBS storage, HIPAA compliant infrastructure, database creation and configuration, and software deployment—while enabling hands-free software upgrades and execution of remote commands. The system uses Amazon Web Services (AWS) to connect with several hundred insurance companies and share and process claims information in the cloud according to the CMS analytical algorithms while allowing the issuers to maintain complete control of their proprietary claims and pricing data. Additionally, a significant number of issuers elected to participate as AWS-deployed servers, using a fully-automated environment provisioning process, which have each successfully and securely processed the issuers' data without requiring internal infrastructure investment.

Amazon Web Services (AWS) – NASA Jet Propulsion Laboratory (JPL)

BACKGROUND. NASA's Jet Propulsion Laboratory (JPL) is responsible for the robotic exploration of space and has sent one or more robots to every planet in the solar system. This requires a tremendous amount of innovation with a timeframe of many years and with large associated risks and budgets. Fittingly, JPL's mission statement emboldens employees to "dare mighty things." Because of the extensive risk taken by each new mission, there is usually very little room to add risk through the use of innovative and emerging IT. Faced with reduced budgets and increased capabilities in consumer IT, JPL recognized there was an opportunity for rapid innovation in a fiscally constrained environment.

THE OPPORTUNITY. **How to implement real-time analytics of telemetry data from Mars.** Exploring outer space is hard. The distances are astronomic. The time delays range from minutes to dozens of hours. Radiation and available technology severely limit spacecraft computing capacity. For the past several years, JPL has explored using ground-based technologies, such as cloud computing. For example, the use of cloud computing for the Curiosity Rover's Mars landing in 2012 enabled JPL to stream real-time footage of the landing to a world-wide audience of millions, streaming over 175 terabytes of data in just a few hours and increasing cost-effectiveness by 1,000 times. This was a large effort that involved extensive planning.

A large and crucially important problem involved rapidly and accurately analyzing telemetry data from the Curiosity Rover on Mars, 150 million miles away. If JPL could correctly predict the thermal parameters, Curiosity's drive time on Mars could increase by 40 percent, which could lead to new and groundbreaking discoveries. Conversely, a mistake could end the \$2 billion mission in a heartbeat. JPL operations personnel painstakingly collected thermal telemetry data into PowerPoint and experts would later analyze and suggest corrections. This took weeks and prevented both data interaction and the comparison of data from several Curiosity instruments; analysis was limited solely to the PowerPoint supplied data. This added cost, risk, and led to lost opportunities.

THE SOLUTION. **The *Streams* interactive, real-time analytics tool.** Learning from their initial cloud computing experience and focusing on big data analytics, JPL created an *analytics cloud* (using AWS GovCloud) where developers could safely prototype new capabilities with actual data from Curiosity. As data arrives from 150 million miles away into the pre-built, hardened operational system, it is copied in real-time into the agile *analytics cloud*. A real-time analytics tool named *Streams* made the rapid development possible by using emerging and open source technologies. Similar techniques have been used in consumer tools such as Google Finance. Completed by a few people in a few months, *Streams* added no risk to the Curiosity mission while enabling rapid innovation to flourish.

The Mars results were dramatic. Instead of spending years infusing new technologies into a mission-critical system, the first rapid prototype of *Streams* was completed in a few weeks. The engineers are now able to interact with and touch over 200 million telemetry data points from Curiosity in real time. With *Streams*, engineers can solve previously unsolvable problems by collaborating with experts from around the world, in real time, utilizing current data. Gordy Cucullo, lead Curiosity operator, said: "This has solved previously unsolvable problems and we can now see things that were previously undetectable and unsolvable."

This approach was then applied to the Soil Moisture Active Passive (SMAP) project. The SMAP spacecraft will attempt to predict droughts and global climate change. When the SMAP operations engineers saw *Streams* used on the Curiosity Rover, they asked if it could be implemented on SMAP within two weeks (before the operational readiness tests were to begin). Because JPL used the newly created analytics cloud and emerging open source technologies in an open environment, engineers successfully implemented *Streams* for SMAP in real time. As a result, SMAP operations engineers can now interact directly with 3.2 billion data points, even before SMAP is launched. This enables them to predict or troubleshoot problems, by easily comparing and interacting with both test and operational data from multiple telemetry streams from many instruments aboard the spacecraft from anywhere in the world.

The ITAR-certified analytics cloud (AWS GovCloud) coupled with the open development approach has become JPL's innovation factory. Four new prototypes have been adopted from the *Streams* implementation and infused into existing and new missions.

AWS – National Reconnaissance Office (NRO)

BACKGROUND. The National Reconnaissance Office (NRO) is responsible for the design, build, launch, and maintenance of the nation's intelligence satellites. NRO's goal of providing essential and time-sensitive communications and data to its partner Intelligence Community (IC) agencies means that continual innovation is a necessity. In the wake of the IC Information Technology Enterprise (IC ITE) Strategy to enhance the IC's ability to seamlessly and securely share information, the NRO's focus on innovation became even sharper.

THE OPPORTUNITY. The problem to be solved was how to gather, process, and share vital national security data across the IC. With data coming from more than a dozen different agencies—with several, including NRO, providing a barrage of real-time information that includes high-resolution images—the need for secure, efficient, and responsive technology has never been greater. Recent federal mandates, such as the IC ITE Strategy and the “Cloud First” Federal Cloud Computing Strategy, raised the bar even further. Individual agencies each needed to think strategically about how to truly connect the IC to enhance national security and improve overall operations.

As chief of the NRO Communications Systems Directorate, Information Sharing Group Service Portfolio Branch, Colleen Makridis oversees that agency's approach to cloud services. Her work with NRO and its extensive system of intelligence satellites made her very familiar with the myriad challenges that come with managing large amounts of data. Makridis recognized that by taking a new approach to the cloud, she could not only further NRO's mission and effectiveness, but also provide the entire IC a way to collaborate, provision resources, and share services.

THE SOLUTION. Amazon Web Services (AWS) created the IC's first unclassified cloud services solution. Makridis and her team have revolutionized the way NRO accesses innovation by ushering in the IC's first unclassified cloud services contract vehicle. Launched in February 2014, the agreement with AWS opened the door for IC agencies to use commercial cloud services for development and research in an unclassified environment. Makridis and her team's approach is being widely adopted within the IC and is significantly advancing the ability to share information and services.

Makridis broke with tradition to make the cloud more accessible and usable. While many IT contracts fall under a time and materials or fixed price model, cloud services require a different procurement strategy, as they function more like utilities than traditional IT services. Makridis developed a solution that estimates the types of services used and establishes mechanisms to control unanticipated costs. She also leveraged a purchase card, driving additional efficiencies.

Makridis staffed the NRO cloud program management office with appointees from 12 NRO departments, each responsible for providing expertise in key areas such as networks, security, and procurement. This structure allowed Makridis to not only establish the cloud contract vehicle, but also create effective processes, documentation, and support structures to speed adoption rates. This includes the “Dev in a Day” model, which allows developers to quickly provision and use cloud services without having to wait for the traditional 60-day cycle or have their program create a separate AWS account. This unprecedented model lays out a process and mitigation strategy to tackle tasks in parallel while also showing security due diligence.

NRO's cloud vehicle will change the way the IC does business. Even in an agency that exemplifies its long-time motto “Supra Et Ultra” (Above And Beyond), Makridis' contributions stand out. The groundbreaking \$100 million, five-year cloud services blanket purchase agreement has lowered the barrier to entry for companies offering innovative solutions to the IC while shortening the traditional software procurement cycle from more than a year to a matter of minutes. This is exemplified in the access developers now have to the AWS Marketplace, which was previously unavailable to the IC. Agencies are able to access a broader range of innovative companies and solutions, load software to prototype, and perform testing in a matter of minutes while only paying for the services used. Once the initial development is completed in the unclassified environment, developers can then transfer the developed solutions into the IC's classified cloud environment.

The NRO cloud vehicle is already being used by five other intelligence agencies and has directly influenced the CIA's own commercial cloud contract, which CIA CIO Doug Wolfe described as “one of the most important technology procurements in recent history.”

AT&T Government Solutions – Department of Veteran Affairs (VA) Virtual Training

BACKGROUND. The Department of Veterans Affairs (VA) is the largest healthcare provider in the United States, providing a broad spectrum of health services, surgical services and rehabilitative care to veterans and their families. With 171 medical centers, more than 800 clinics, 126 nursing homes, 35 domiciliaries and local offices, it is a large, dispersed organization with hundreds of thousands of personnel across the country.

THE OPPORTUNITY. To support a high quality of care from healthcare professionals, VA identified an opportunity to create a cloud-based training platform that would assist healthcare workers and students to develop clinical informatics competencies for electronic health records. Building upon the VA's Veterans Health Information Systems and Technology Architecture (VistA) and Computerized Patient Record System (CPRS), the VA launched the Virtual CPRS Educational Platform (VCEP) to deliver cloud-based dynamic informatics education through virtual, experiential training scenarios, and:

- Reduce procurement complexity and capital cost expenditures typically associated with a hardware buildout;
 - Quickly deploy, tear down and redeploy virtual machines loaded with CPRS allowing for the training participants to work in an EHR system that contains high-fidelity synthetic and/or de-identified patient EHRs;
 - Integrate easily with VA-developed learning modules to support student/worker clinical informatics competency development tied to specific learning objectives;
 - Establish 24/7/365 access from any computer with an Internet connection; and,
 - Assess site usage and user engagement through integration of web analytics tools.
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THE SOLUTION. The VA awarded AT&T Government Solutions a task order under AT&T's GSA IT Schedule 70 for off-premise public cloud services—AT&T Cloud Solutions including AT&T Synaptic Compute as a ServiceSM—and professional services for creation and management of computing resources. The award included software configuration, integration of various communications modalities (voice, video, virtual), usability testing, and facilitation of back-end technical functions. The test group was comprised of approximately 123 geographically distributed students who participated in one of nine virtual CPRS training sessions over a period of three months. At the conclusion of the pilot program, the VA and the AT&T account team determined that:

- The VA avoided a lengthy hardware procurement process and transitioned some capital expenditures to operating expenditures.
- The VA realized the benefit of flexible on-demand capacity to fulfill a temporary need for a short term program.
- Upfront time investment to create a baseline VM template can reduce future management requirements.
- Operating system and software installation may involve procurement of additional licenses or configuration or connectivity to a central enterprise license management server.
- Networking configuration for software installation may include special steps such as firewall configuration to open ports for communication, software configuration to use different ports, and DNS routing configurations.
- Transport layer security (TLS) encryption may involve a named certificate instead of a wild card certificate.
- User management capabilities, including Active Directory integration and validation of secure log off versus disconnect, can increase complexity in the solution design.

According to Blake Henderson, innovation coordinator with the VA, "Our innovation projects can be challenging for our industry partners because we are often implementing proof-of-concepts, which usually involves a lot of learning as we prove and disprove assumptions. AT&T did an excellent job staying nimble and adapting so that we could ultimately accomplish all the project goals."

In summary, off-premise public cloud services provided a rapid deployment platform on which to create a scalable solution to assign learners to online training material and software. The training modules ran at 99.99 percent availability, with light administration by AT&T and the VA.

Dell Services Federal Government – Nuclear Regulatory Commission (NRC) Private Cloud

BACKGROUND. The Nuclear Regulatory Commission's (NRC's) mission is to regulate the civilian use of nuclear power and materials in order to protect the health and safety of the American people, environment and the nation. It licenses and inspects nuclear facilities and materials, enforcing compliance with strict standards and requirements.

THE OPPORTUNITY. NRC was looking to reduce IT costs, simplify operations and provide new capabilities to the NRC user community, while meeting strict requirements and supporting the Office of Management and Budget direction for agencies to move to the cloud. In addition, NRC had a goal of consolidating its data centers and ensuring that infrastructure services be provided by cloud delivery models free of technical and vendor dependencies and downtime.

THE SOLUTION. Team Dell, which was comprised of Dell Services Federal Government (DSFG), Information International Associates (IIa) and Global Solutions and Service Frameworks (G2SF), was awarded the task order to build and install a private, on-premise, federal government compliant cloud solution. The scope of the solution included the following:

- Design, configure and deploy a private cloud environment.
- Migration/consolidation of two data centers to a new private cloud environment leveraging the Dell data center transformation process and methodology.
- Regional office consolidation and standardization including four NRC regional offices and one training center on a VMware clustered environment.

Dell's implementation of the NRC private cloud included enhanced virtual machine (VM) reporting capabilities, including software with the ability to report CPU, memory, and input/output resource utilization at granular, per-VM levels. The virtualization solution is based on the VMware hypervisor platform including VM self-provisioning, administration, manipulation (copy, clone back up, restore) including migration between test and production, archiving, and troubleshooting; VMware vSphere 5.5 deployment at Three White Flint (3WFN); VMware Cloud Automation Center & Site Recovery Manager (SRM).

Dell's solution has provided a number of benefits to include helping NRC consolidate data centers, replace aging equipment and take advantage of modernized IT services to deliver improved IT performance and an enhanced customer experience.

Deloitte – Military Organization Cloud Brokerage and Application Migration

BACKGROUND. This case study involves a military organization that is responsible for acquiring services and materials, providing engineering services and delivering acquisition solutions.

THE OPPORTUNITY. The command recognized the value of commercial cloud adoption to support its goals of cost savings and increasing efficiency through the more effective use of available resources, and was looking for a platform to broker cloud adoption and application migration.

The command was interested in determining how commercial cloud would be integrated into the existing governance structure and enabling the necessary adjustments to account for the differences commercial cloud adoption presents. They quickly realized the need to effectively integrate acquisition, financial management, engineering, and security functional areas to support commercial cloud acceptance into their current business processes.

They also wanted to address managing customer expectations. Across their military department, there has been a great deal of interest in leveraging commercial cloud capabilities. Application and system owners welcome the opportunity to reduce costs, increase speed to capability, and expand the scope of products and services they could offer to their end-users. The inexpensive, self-service nature of commercial cloud adoption creates the perception that anyone with funding and a local requirement can justify the acquisition of commercial cloud services. If those behaviors are allowed to play out in an unaligned manner, the value of commercial cloud to the enterprise would not be fully realized.

THE SOLUTION. Deloitte and the government developed, implemented, and optimized a technical and business cloud brokerage framework. The technical functions included development and implementation of a compliant cloud architecture, support for certification and accreditation of the cloud service provider (CSP), establishment and execution of the operating model and concept of operations. The business functions include acquisition of CSP services and capabilities, end-user customer relationship management, CSP vendor management, and financial management.

The brokerage serves as a single integration point for end-users and cloud service providers across all delivery models. It supports the establishment of standards by developing architectures that are used by the enterprise. It provides a single consistent face to customers and providers as well as the organization's leadership teams. The brokerage is the only organization able to acquire commercial cloud services and is the owner of the Authority to Operate (ATO) for the CSPs connecting to the client's networks; thus, allowing the organization to take advantage of the value provided by leveraging commercial cloud capabilities while maintaining the visibility necessary to effectively manage adoption.

Establishing a cloud services brokerage or integrated Managed Service Office (MSO) proved vital to this project, serving as the focal point for the development of business rules, standards, and governance structures associated with commercial cloud adoption. Establishing the MSO saved money by avoiding the development of multiple architectures and ensuring economies of scale are realized through consolidated acquisitions.

Hewlett Packard Enterprise – Hybrid Cloud

OPPORTUNITY. Delivering the right mix with hybrid cloud solutions.

BACKGROUND. A government partner and Hewlett Packard Enterprise (HPE) together implemented an enterprise-wide, shared common operating environment to establish a suite of on-demand cloud services to complement the traditional IT services already being delivered by HPE. These new services needed to be easy to order, secure and common to all infrastructure and application teams across the enterprise. The goals of this initiative were to:

- Reduce the time and cost associated with delivering new government services.
 - Promote reusable services across all organizational elements.
 - Establish on-demand, secure services offerings.
 - Significantly reduce traditional hardware and infrastructure requirements.
-

SOLUTION. To meet the ever-changing IT demands required to support the critical mission of the government and its organizational elements, HPE developed an integrated portfolio of infrastructure-as-a-service, platform-as-a-service, and software-as-a-service offerings, deployed in a private cloud environment, that were customized to the unique requirements of the government. The suite of cloud services developed by HPE seamlessly integrated products from Microsoft, VMWare, and HPE, among other vendors. The implementation of these services gave the government new opportunities to achieve organizational IT objectives by creating a hybrid mix of cloud and traditional hosting environments for the various types of workload deployed across the enterprise. Organizations within the government could choose the optimal platform for each workload based on security, service level, cost, and customization requirements.

RESULTS. The introduction of HPE's as-a-service offerings enabled the government to leverage the right platform for the right workload and allowed them to migrate existing traditional IT workloads to the appropriate cloud environment at the pace and volume that made sense for them. This holistic, hybrid delivery approach incorporated a blend of IaaS, PaaS, and SaaS offerings with the government's existing IT. In the end, the government was able to:

- Reduce costs by shifting workload into these less expensive, ready-to-consume, as-a-service offerings.
 - Establish greater levels of collaboration and standardization across the enterprise through the adoption of these shared services.
 - Retire legacy IT systems thereby reducing traditional hardware and infrastructure requirements.
 - Maintain mission effectiveness by choosing the optimal platform for each system based on workload-specific criteria.
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BEST PRACTICES EMPLOYED. The government conducted this foray into cloud computing by completing several of the best practices listed in this report. First, they started with a clearly documented set of goals they hoped to achieve by adopting cloud computing in select areas and were specific about how these services would fit in the overall context of their IT operations. Second, they spent a lot of time thinking about security and cross-organizational sharing and collaboration. They settled on a private cloud deployment model after weighing their options. Third, they wrote Statement of Objectives for each of the offerings that clearly defined the requirements of the service they desired and not the underlying technology. For each service, they specified the outcomes they expected including the service level agreements by which they would measure HPE's performance. Finally, they pursued a coordinated approach to the roll-out of the service offerings ensuring interoperability and integration between both each of the cloud services and between the cloud services and their legacy IT environment.

IBM – General Services Administration (GSA) Order Management

BACKGROUND. The mission of the General Services Administration's (GSA's) Federal Acquisition Service is to help federal agencies save time and money by standing-up procurement solutions that effectively leverage the volume and scope of the federal government's purchase of commercial goods and services. GSA Global Supply (GGS) is a \$1 billion business that provides packaged consumer goods, office supplies, hardware, and other products to U.S. government, military, and civilian customers around the world.

THE OPPORTUNITY. GGS wanted to streamline its business model to more effectively serve its customers, by reducing the cost and footprint of its distribution centers, enabling vendors to directly fulfill customer orders and establishing an electronic broker for the automation of their supply chain. GSA selected IBM's cloud infrastructure, software and services to lead the agency's transformation to a faster, more efficient business model that provides cost savings for the government with next generation technology customer service capabilities. As part of a five-year contract, the GSA is deploying IBM SmartCloud for Government to create a new order management services system with advanced analytics in order to improve its supply chain and better predict customer needs.

THE SOLUTION. GGS will use cloud-based solutions from IBM's Smarter Commerce initiative, which features software and services that help organizations transform their business processes to more quickly respond to shifting customer demands in today's digitally transformed marketplace. This includes IBM Sterling Order Management and IBM Sterling B2B Integrator, enabling the GGS to have a single view of order management for demand, inventory and supply to provide more control across its entire global supply chain networks and fulfillment lifecycle. The GGS will also deploy WebSphere Commerce, which provides seamless, cross-channel shopping experience for customers.

IBM SmartCloud for Government is specifically designed to help government organizations respond to technology requirements more quickly. This FedRAMP-compliant cloud environment is part of IBM's established and dedicated Federal Data Centers (FDC). IBM FDCs provide secure and comprehensive certified multi-tenant cloud computing capabilities to federal government clients. These IBM FDCs allow data and services to reside in highly secure, scalable, and dynamic data centers that can be quickly accessed by government organizations at a fraction of the cost of traditional technology delivery methods.

The IBM solution will also leverage IBM analytics software that helps to identify trends, online/offline order patterns, and supplier reports. These analytics are accessible in a variety of required formats to assist GSA leadership in analyzing data and making critical business decisions related to the optimization of the business.

The IBM solution will enhance visibility into GGS channel operations and make sense of the big data within, but also optimize inventory and provide considerable process innovation; resulting in improved business processes to manage the agency's vast supply chain and logistics operations. This will reduce costs; creating more efficient outcomes and a better experience for GSA customers, and ultimately translate into a benefit for the taxpayer.

IBM – Army Logistics Support Activity (LOGSA)

BACKGROUND. The U.S. Army's Logistics Support Activity, known as LOGSA, provides on-time integrated logistics support of Army operations worldwide that impacts every soldier, every day. As the Army's authoritative source for logistics data, LOGSA provides logistics intelligence, life cycle support, technical advice, and assistance to the current and future force; integrates logistics information (force structure, readiness, and other logistics data) for worldwide equipment readiness and distribution analysis; and offers asset visibility for timely and proactive decision making. LOGSA is home of the Logistics Information Warehouse (LIW), the Army's official storehouse for collecting, storing, organizing and delivering logistics data. It provides critical logistics information capabilities through analytics tools and business intelligence solutions to acquire, manage, equip and sustain the materiel needs of the U.S. Army. LIW provides services to more than 65,000 users and 150 direct trading partners around the world.

THE OPPORTUNITY. LOGSA was looking to take advantage of the inherent benefits of hybrid cloud: security and the ability to connect cloud systems with existing IT systems and mission critical data.

THE SOLUTION. The Army has chosen to use IBM Hybrid Cloud to power one of the biggest logistics systems in the U.S. federal government. The new hybrid cloud system is designed to connect the IBM cloud to the Army's on-premise environment to enable broad use of data analytics for sharper insights, resulting in improved performance, enterprise scale, better security, and greater reliability. Since migrating to an on-premise hybrid cloud model with IBM in 2014, LOGSA processes 40 million unique data transactions every day—more than the New York Stock Exchange.

With a hybrid cloud approach you don't have to decide if "all your data and applications" can be moved to the public or private cloud. You can utilize the public cloud for the type of services that you determine are appropriate and maintain either a traditional IT environment or a private cloud for those applications and that data that you determine need to stay or that are not ready to be moved. This understanding allowed LOGSA to add new cloud services, such as analytics, without having to move all of their data to the cloud. Utilizing this strategy provided a second benefit which was to leverage the vast IT investments that LOGSA had already made. They did not have to rip and replace, but rather transformed their environment over time. This transition allowed them to baseline the "as-is" environment, develop a plan to get the existing environment stabilized and modernized within 180 days, all while keeping on-going operations running and meeting their operational objectives.

Achieving cost savings of 50 percent with this new model, the Army can now focus on bringing in new analytics services such as condition-based maintenance and data mining that can benefit all Army organizations. LOGSA will harness data and analytics via cloud computing to improve the efficiency and effectiveness of logistical coordination. As the logistics units in the Army equip, sustain, and maintain the force, IBM provides reliability, timeliness, and cost savings. With the new cloud delivery model, Army logistics personnel have the ability to manage the movement of equipment with up-to-date, accurate information.

Microsoft – Mecklenberg County, NC Uses Technology to Save Millions of Dollars and Improve Services

BACKGROUND. Mecklenburg County, North Carolina has a population of nearly 1 million people, many of whom live in Charlotte, the fifth fastest-growing city in the United States. To help county government better serve its citizens, the 150-person county IT division is always seeking ways that technology can streamline county operations.

THE OPPORTUNITY. Mecklenburg County has more than 6,000 employees and many of them have jobs that require them to travel to multiple locations during the day. This includes restaurant inspectors, medical examiners, Parks and Recreation employees, and the social workers of the Youth and Family Services department. In the past, employees had to make frequent trips back and forth to the office between appointments in order to fill out or submit paperwork, which reduced their productivity, increased travel expenses, and delayed the processing of information.

THE SOLUTION. The county has migrated 6,350 users to Office 365; deployed Exchange Online Protection for email security and simplified messaging environment management; and upgraded its desktops and laptops to Office 365 ProPlus, which gives employees cloud-based access to popular Microsoft Office applications, such as Microsoft OneNote note-taking software, that they can install on up to five different devices. Mecklenburg County has also begun deploying tablet PCs, including Microsoft Surface Pro. By choosing Surface Pro as a mobile platform, IT staff can now manage the security of the county's mobile data much more easily. "By providing our customers with Surface Pro tablets running the Windows 8.1 Pro operating system, we are now able to utilize BitLocker drive security, ActiveSync mobile data synchronization, and virtual desktop infrastructure to help secure the data at rest and wipe the devices if a theft or security breach occurs," says Cliff DuPuy, technical services director for Mecklenburg County.

Restaurant inspectors now use the tablets to enter their findings while on-site and to connect to the state's inspection application. They carry portable printers so they can present restaurant owners with results or permits without returning to the office to print. Medical examiners use Surface Pro while at crime scenes, eliminating the need to handwrite notes and enter them into a computer. Parks and Recreation employees can process credit card payments with robust security on the Surface Pro, a capability they didn't have before, and they can more easily check facility schedules and book reservations while working in one of the parks. Youth and Family Services social workers are able to spend more time with the families they serve without carrying piles of paperwork around with them. The county estimates that the increased productivity in the Youth and Family Services department alone will save \$3.2 million a year. DuPuy adds "Employees have said that the ease and convenience of Office 365 and Surface Pro has improved their quality of life and now they enjoy coming to work and are better able to serve their constituents. And that's really the main goal of all the work we do here."

Because many county departments work with confidential personal information, it is important that any software solution adheres to applicable privacy and security standards. These include the Health Insurance Portability and Accountability Act (HIPAA) regulations for the storage and dissemination of personal health information and Payment Card Industry (PCI) data security standards for debit, credit, and other payment cards. Office 365 offers HIPAA and PCI Data Security Standard level 1 compliance capabilities, and Microsoft offers a Business Associate Agreement to assist with HIPAA compliance. These factors helped Mecklenburg County feel comfortable about its decision to use Microsoft to host its data. In addition, by using Microsoft cloud solutions, the county also has the ability to encrypt inactive stored data and provide a secured, direct connection between its systems and Microsoft.

The success of the Office 365 deployment and the county's comfort with the level of security in Microsoft cloud offerings, led directly to another major IT initiative. In order to improve disaster recovery capabilities and reduce the costs of long-term data storage, Mecklenburg County began using the Microsoft Azure cloud computing platform. Once the Azure deployment is complete, the county will be able to close its existing disaster recovery site, eliminate the high-bandwidth connectivity that the site required, reduce the need for on-premises storage, and eliminate aging archival devices. All of this will bring the county substantial savings. "We went from paying \$21 per gigabyte of storage at our prior disaster recovery facility to paying 3 cents per gigabyte with Azure," says DuPuy. "And we're also using Azure for our huge document imaging library. In the first year, Azure will save us about \$500,000 in infrastructure costs."

Microsoft – Operation Smile – Nonprofit Changes Lives with Help from Office 365

BACKGROUND. Operation Smile, a Virginia-based nonprofit organization, provides free surgeries to thousands of children around the globe to correct facial deformities every year. A chance meeting on an airplane introduced the founders of Operation Smile and a Microsoft employee who was directly involved in software for the healthcare industry. The organization runs an average of three simultaneous surgical missions, operates in more than 60 countries, and works with medical and community volunteers from more than 80 countries. That sort of undertaking requires detailed coordination to be sure that all facilities, volunteers, and patients are in place at the right time.

THE OPPORTUNITY. Changing more lives for the better is what Operation Smile aims to do. The nonprofit organization wanted to expand the reach of its work to increase its number of surgical missions and the creation of its year-round care centers. To do so, the organization must train additional medical providers in more locations and have the infrastructure needed to run on a larger scale. Operation Smile and Microsoft worked together to identify areas in which software could help the organization, such as migrating paper medical records and images to a standardized electronic medical records system and transforming its worldwide communications capabilities by adopting Microsoft Office 365.

THE SOLUTION. Operation Smile deployed Office 365 to employees in more than 42 countries who use it to improve mission coordination across geographical boundaries. The nonprofit plans to use its new video conferencing capabilities to hold medical training and follow-up speech pathology sessions. It also plans to provide medical personnel everywhere with direct access to a Microsoft SharePoint Online site where they can get up-to-date medical, training, and mission-planning information, and it will store mission-related documents in the cloud using Microsoft OneDrive for Business. OneDrive for Business consolidated the use of unsupported products, like Box and Dropbox, into one easy, consistent location with plenty of space and the ability for Operation Smile to control it.

Operation Smile expects to integrate its upcoming electronic medical records system with its Office 365 tools and is particularly excited about using Microsoft Power BI for Office 365 to develop insights into its existing information. Operation Smile believes that having the flexibility to communicate in different ways makes it easier to collaborate to achieve common goals. “When you’re doing business around the world, using Lync Online is as close as you can get to shaking someone’s hand,” Ruben Ayala, senior vice president of medical affairs at Operation Smile says. “And seeing that a colleague is available and sending an instant message is like tapping that person on the shoulder and asking, ‘Can we talk?’”

“By adopting Office 365, we’re saving thousands,” said Frank Byrum, Operation Smile chief technology officer. “That means a lot more children are getting the medical help they need.”

Oracle – Kansas City Board of Public Utilities – Fusion Financials and Hyperion Planning and Budgeting for Public Sector

BACKGROUND. The Kansas City Board of Public Utilities (BPU), a not-for-profit public utility, has provided safe, dependable water and electric services in Kansas City, Kansas, for more than 100 years. Today, BPU services nearly 63,000 electric customers and 50,000 water customers, over approximately a 130 square mile area. BPU's primary focus has always been the satisfaction of its customers and a commitment to the quality of life in the communities it serves. This has allowed BPU to be recognized as one of the top public utilities in the country.

THE OPPORTUNITY. Having been a PeopleSoft customer since 2005, BPU had reached a fork in the road. Among their choices were to upgrade their existing PeopleSoft environment or move to the cloud. In 2014 they made the decision to implement Fusion Financials, Procurement and Projects in order to benefit from the long-term cost savings associated with moving their applications to a public cloud. Their decision to migrate to Hyperion Planning and Budgeting for Public Sector as a replacement for PeopleSoft EPM was driven by a growing need for flexibility in planning and to automate numerous manual processes.

The primary objectives supporting this decision were to:

- Capitalize on innovation by negating the cost of business application stagnation;
 - Retain and develop IT staff and attract top talent by using modern technologies;
 - Minimize cyber security risk;
 - Provide business continuity site;
 - Eliminate costly customization;
 - Improve inefficient processes;
 - Avoid expensive upgrades;
 - Reduce maintenance costs; and
 - Improve access/visibility to key operational and financial data.
-

THE SOLUTION. Oracle Consulting and BPU began this transformation in late January, 2015. The project culminated in a successful go-live on September 1, 2015. The seven-month project included the following applications:

- Fusion Financials (General Ledger, Budgetary Control, Payables, Payments, Expenses, Assets, Cash Management and Receivables).
- Fusion Procurement (Purchasing, Supplier Portal, Sourcing and Self-Service Procurement).
- Fusion Projects (Project Costing, Project Billing and Project Contracts).
- Hyperion Planning and Budgeting (Planning Suite, Public Sector Planning, Essbase, Financial Data Quality Management, Financial Reporting and Foundation Services).

In addition, the project included numerous integrations to PeopleSoft HCM, Maximo, Intellilink and Kronos. BPU's implementation of Fusion application in the public cloud and Hyperion Planning and Budgeting for Public Sector on-premise provided them with an opportunity to reduce their annual IT spend, while maintaining a high-level of functionality for business users.

Unisys – Department of Interior (DOI) Financial and Business Management System Cloud Hosting

BACKGROUND. The Department of the Interior (DOI) is responsible for administering programs funded by annual appropriations in excess of \$12 billion. The Financial and Business Management System (FBMS) comprises the single, integrated financial accounting and management system utilized across the DOI and its component bureaus to effectively control and account for all income and expenditures, including appropriations, user fees, and assets held in trust. FBMS is implemented using SAP core business management and financial and reporting components and integrates supporting financial “feeder” systems such as payroll, procurement, and travel systems. FBMS is the authoritative financial system of record for all the DOI budgetary, appropriation, expenditure, and grant processing.

THE OPPORTUNITY. In order to cost effectively meet scalability, storage, and performance requirements for the future, the DOI wanted to transition hosting of FBMS from the National Business Center (NBC) data centers to a cloud-based hosting solution. The DOI challenges included acquiring an IaaS hosting solution as a first step for moving to the cloud, ensuring that the FBMS system remained fully operational during transition in order to perform critical financial functions; minimizing technical, programmatic and schedule risk, and reducing overall costs while meeting high uptime.

THE SOLUTION. In order to cost effectively meet scalability, storage, and performance requirements for the future, DOI turned to Unisys. Unisys recommended a phased delivery of the landscapes and environments to help meet the DOI’s requirement of migration during the first year of the contract. We used a waterfall methodology for the definition of phases and delivery. Unisys’ prepared a detailed plan, tested it on a non-production environment, and monitored and tuned performance in the cloud. The benefit is this was all accomplished without impacting the users. The DOI is in the process of completing the rollout of SAP functional modules in eight deployment phases to all bureaus.

Unisys is providing a highly available (99.999 percent) yet cost-efficient FBMS SAP application hosting environment. The Unisys Infrastructure as a Service (IaaS) solution features Virtustream’s SAP for the cloud and minimizes risk by collaborating closely with the DOI program management team to integrate schedules, define transitions, orchestrate seamless migrations to the cloud, and monitor the services once live. The Unisys technical solution enabled DOI to continue with Oracle databases and replace the Solaris operating systems (OS) with Red Hat Linux. The Red Hat Linux Intel-based virtual machine (VM) resources are run on and monitored by xStream, Virtustream’s integrated Intel X86cloud hosting services that optimize the DOI’s ability to procure cost-effective, highly efficient cloud services.

Unisys provides visibility and management of the DOI environment using a unified service desk and monitoring tool for incident management, service management, and change management. The dashboard provides a comprehensive and integrated workflow enabling automated incident management. This tool also monitors all components of the Virtustream cloud environment—hardware, storage, network, database, and applications—and provides a clear overview of all IT services available, from applications to infrastructure.

The DOI FBMS system went live in production system environments in July 2015 and is successfully operating the SAP applications. FBMS gives the DOI exceptional abilities to plan, budget, allocate, account for, analyze, and report on all the DOI budgetary, appropriation, expenditure, and grant activities. These capabilities are essential for a large federal department to effectively manage scarce resources, optimize performance, and ensure effective operations. FBMS must also provide accounting for assets and resources held in trust for Native Americans. Unisys helped DOI become the first federal agency to transition their SAP application to the cloud.

ViON –Storage on Demand

THE OPPORTUNITY. Storage on demand.

THE SOLUTION. In a recent adoption of cloud services, a federal health agency implemented a ViON cloud solution for managing storage. Historically, the agency's purchase of storage had been done in a disconnected manner that disrupted annual budget planning. Time and effort were expended comparing specifications and brands, rather than focusing on the rapid delivery of storage capacity. The solution the agency chose—storage on demand—assures that they will always have the appropriate capacity, as well as technical and engineering support. The benefits that the storage on demand solution provided include:

- **Budget.** Understanding cloud storage costs (per terabyte, per day) enables the agency to easily predict monthly and annual budgets. By knowing storage tier, anticipated growth, and other requirements, the agency is now able to accurately estimate annual storage spend. This new approach has also proven to be less expensive than performing repeated annual capital acquisition.
- **Flexibility.** Storage on demand has improved operational flexibility; with storage ordered on an "as needed" basis. Processes are in place that look at current and upcoming programs and the associated storage requirements. As new workloads come into production, necessary storage deployments can be timed to meet demand. "Over provisioning" is avoided while still being able to support long-term growth. And when customer workloads decrease, storage is decreased, lowering monthly costs. In addition, the agency can now show more accurate and more transparent pricing to its customer base.
- **Costs.** The agency is spending less on storage. In an analysis of how the agency would have purchased storage over the last three years versus how they've actually consumed it under the new on-demand contract, \$7.5 million in cost avoidances have been achieved. This figure does not even include the cost of IT and contracting personnel to run and manage procurements, nor does it count the staff costs to install and maintain the storage.
- **Capability.** The agency now has the capability to increase and decrease storage without any penalties or minimums, as data centers are consolidated to further reduce operational costs.

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