Cloud Adoption
Center of Excellence

Playbook

GSA

IT MODERNIZATION
Centers of Excellence

Introduction

Today's challenging missions require modern IT to move in lockstep with the business. The cloud enables agile feature delivery, which makes customers happy, and enhances cybersecurity to better protect systems and data. To get these results, agencies will need to think, work, and buy technology differently. Cloud adoption empowers agencies to modernize processes, cybersecurity, and workforce skills.

The Cloud Adoption Center of Excellence (CoE) analyzes systems and applications to recommend optimal pathways to modernization using cloud adoption. The team developed a 9–play Playbook to help agencies deliver modern digital services using cloud services. While not every play will apply to your agency, they can help you work towards adopting modern cloud computing practices to support your mission. The Cloud Adoption CoE developed this Playbook according to relevant laws, policies, and guidance.
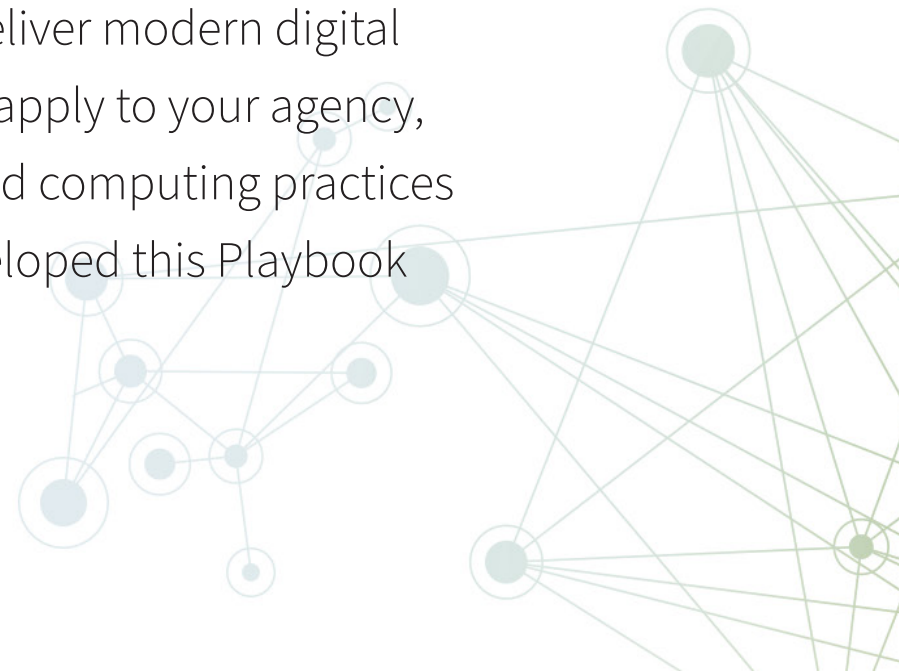
Key Concepts

Throughout this document, we will refer to the following key concepts:

- **Infrastructure as a Service (IaaS)** – Infrastructure as a Service (IaaS) is a service model that delivers computer infrastructure on an outsourced basis to support enterprise operations. Typically, IaaS provides hardware, storage, servers and data center space or network components; it may also include software.

- **Platform as a Service (PaaS)** – Platform as a Service (PaaS) describes a computing platform that is rented or delivered as an integrated solution, solution stack, or service through an Internet connection.

- **Software as a Service** – Software as a Service (SaaS) is a model for distributing software where customers access software over the Internet. In SaaS, a service provider hosts the application at its data center, and a customer accesses it via a standard web browser.

- **Serverless** – Serverless is the native architecture of the cloud that enables customers to only be concerned about developing and running software code and shift all of the cloud operational responsibilities to Cloud Service Providers (CSP), improving their own agility and innovation. Serverless offers practically endless scaling, allowing customers to pay only for the resources and services they use. Customers do not need to keep the frontend and database servers running when nothing is happening on their site. Serverless allows customers to build and run applications and services without worrying about servers to manage, software to install, or runtimes to maintain or administer.

- **Microservices** – An approach to application development in which a large application is built as a suite of modular components or services. Every module supports a specific task or business goal. Each uses a simple, well–defined interface, such as an application programming interface (API), to communicate with other sets of services. It's a design pattern that can be built using various technologies and stacks; it doesn't rely on any particular technology.

Cloud Adoption Plays

PLAY

1 Create Business Alignment

2 Align and Engage Stakeholders

3 Identify an Empowered Leader

4 Inventory Systems & Rationalize Application

5 Develop Cloud Adoption Plan

6 Develop New Cloud Capabilities

7 Use Strategic Communications

8 Pilot Solutions

9 Iterate

Create Business Alignment

Many executives still believe that cloud computing is about technology. It's not. Cloud is a new model for using and delivering digital services securely and quickly.

Successful cloud adoption requires aligning business value with a technology transformation strategy and agile implementation plan. Because cloud-based IT modernization projects focus on enabling business practices, you'll have more relevant stakeholders than with more traditional IT initiatives.

Shifts in cloud markets and technologies, price pressures from oversight and compliance, and demand for more cloud-based service features, quality, and bandwidth combine to make cloud-based modernization challenging.

The ability to deliver capabilities faster while reducing the cost of delivery is driving federal IT transformation, with the most common objectives being:

- Cost optimization
- Faster time to market
- Assured quality
- Effective security and control
- Better customer experience
- Future readiness

Rapidly adopting modern cloud services provides a real opportunity to effectively attain your agency's transformation requirements.

CHECKLIST

☐ Agency leadership should set the direction for modernization and define customer-centric outcomes that cloud computing technologies can enhance.

KEY QUESTIONS

- **How will modern cloud computing services improve your agency's customer experience?**

- **How will modern cloud computing help your agency better deliver its mission?**

- **What are some of the initiatives you could launch if you had access to modern IT services like artificial intelligence (AI), robotic process automation (RPA), API-enabled web services, and data management services with a reduced maintenance burden?**

Align and Engage Stakeholders

Rapid digital transformation requires intensive communication, collaboration, and learning by doing. Aligning and engaging business, technical, and security stakeholders by creating an actionable list of priorities can help define a modernization pathway that can help build momentum and get buy-in.

Before they can work together more effectively, agency stakeholders must agree on the high-level goals, aligned with business objectives and the overall agency mission.

Business owners need to set clear goals so business owners have an incentive to make all the changes necessary to improve processes and work in new ways.

Cloud computing, with its ability to connect information, systems, and people, provides the means to not only support collaborative decision making, but also to create a level of coordination that can transform federal IT processes.

KEY QUESTIONS

- **What are the variables that affect choosing commercial cloud options?**
- **Where will the budget for initial cloud investment come from?**

CHECKLIST

- ☐ Have a kickoff meeting with a wide group of stakeholders and implementers for agency leaders to share their vision of how cloud adoption will enhance mission delivery.

- ☐ Hold follow-up workshops that focus on different aspects of cloud adoption, modernization, and migration. These workshops should refine goals and involve business owners and technical managers' perspectives.

- ☐ Make sure the security and the Authority to Operate (ATO) processes are ready for new tools, products, and services that come with a cloud platform.

Identify an Empowered Leader

In a small agency, this might be an individual; in a larger agency, this will need to be a cloud team with a leader who has significant support from senior leadership.

Organizations that successfully leverage cloud do so with a business model that balances the following:

- A variable, scalable, and elastic technology service consumption model
- A variable (but customer-driven) business model
- An economic model that directly links business benefits to product or service delivery costs
- A self-service approach to building and scaling resources

Once you have a leader(s), stakeholders need to reach out to other key enablers for cloud adoption success.

Beyond identifying these enablers, the cloud team, with the Office of the Chief Information Officer (OCIO), should clearly communicate roles, responsibilities, and expectations. These should align with the particular subject-matter expertise or sphere of influence of each potential key enabler.

Empowered leaders need the space and authority to make sure business practices are adaptive. If all business practices stay the same, you will merely duplicate your current systems and not get the full benefits of a cloud adoption.

CHECKLIST

- [ ] Identify the individual(s), team(s), or office(s) that will be adopting cloud technologies.
- [ ] Prioritize the cloud goals for the team (e.g., the efforts are a part of their performance plans; other duties will not detract from the work that needs to be done).
- [ ] Have an escalation plan for the team when blockers arise.

KEY QUESTIONS

- **Do we need to modify our organizational structure to accommodate this effort?**
- **What people and resources can we commit to knock down blockers?**
- **How do you make sure you don't just replicate existing IT problems in your cloud environment?**

Inventory Systems & Rationalize Application

An understanding of systems applications' current state helps set the stage for developing an effective modernization strategy. Reviewing current systems, their cost footprint, end of life, security, and customer satisfaction scores can help in creating an iterative modernization plan based on organizational priorities. Further, analyzing and rationalizing systems and applications can help reduce duplication and free up money for modernization projects.

Use this opportunity to improve visibility into your assets and identify opportunities for rationalization by categorizing assets using industry standards, such as Technology Business Management (TBM).

Most agencies have a small subset of systems that process their most sensitive data, such as financial information, protected health information, and personally identifiable information (PII).

As you conduct your inventory, ensure people know about these systems—particularly business applications. Ultimately, the most important thing is for agencies to have their regular, disciplined, and methodical inventory process that is well communicated.

To develop the best solution to a problem, you have to understand the problem's full scope. If you have a detailed and accurate inventory, with a Concept of Operations (CONOPS) that describes the current computing environment, you can develop the best solutions, respond to potential vulnerabilities, and position emerging technologies to address any upcoming challenges. With this assessment, you will want to work with stakeholders to identify cloud-ready apps that need improvement outside of the cloud migration project, and opportunities to consolidate or retire apps.

CHECKLIST

- ☐ Update or create system inventory.
- ☐ Identify opportunities for standards adoption, such as TBM.
- ☐ Gather existing documentation on systems and architecture.

KEY QUESTIONS

- **What kind of data do you have?**
- **What rules and regulations are relevant to your systems?**
- **What systems can we merge or retire?**
- **Can we automate this kind of inventory?**
- **What risks exist within your current infrastructure?**

Develop Cloud Adoption Plan

Once your agency decides that cloud adoption is appropriate, follow our CoE approach that initially concentrates best practices and subject-matter experts to jump-start adoption. The Cloud CoE has developed this cloud adoption plan that weighs opportunities and risks—and defines specific outcomes expected of cloud adoption. Here are the recommended steps to developing an effective cloud adoption plan:

- **Cloud Assessment** – Planning costs, assessing architecture, and evaluating security
- **Proof of Concept** – Studying solution(s), establishing a pilot, and gaining support within the organization
- **Data and App Migration** – Leveraging various storage alternatives and conducting migration itself
- **Leverage Cloud Models** – Exploring use of IaaS, PaaS, and SaaS cloud models as well as new cloud service patterns such as serverless computing
- **Optimization** – Taking care of utilization, controlling and efficiency, and improving performance and re-engineering

Picking cloud providers can be daunting. To successfully procure cloud services, you must have clear requirements, create service-level agreements (SLA) that reflect these requirements, and measure those agreements to validate service delivery – along with their performance and remedies. To be able to decide on moving to the cloud, you must have data on measurable capabilities (e.g., quality of service, availability, and reliability). A best practice is to give the cloud service customer the tools and opportunity to make informed choices—and to gain an understanding of the service being delivered.

Develop Cloud Adoption Plan

CHECKLIST

Remember: Systems that are not 12-factor apps (e.g., systems with multiple persistence storages and maintaining state mechanisms) will be harder to migrate.

- [ ] Develop a cloud strategy to define your vision and business goals for cloud computing in your agency.

- [ ] Conduct market research to identify innovative and cost-effective cloud services.

- [ ] Create a cloud-adoption essentials checklist to document common services (e.g., IAM).

- [ ] Create an application modernization prioritization checklist.

- [ ] Compare your current situation to cloud solutions.

- [ ] Create clear metrics to track your success.

- [ ] Identify cloud-ready apps that have considerable business value.

KEY QUESTIONS

- What cloud services meet your agency's needs?

- What level of support will your agency need from a cloud provider?

- Will your agency need more vendor and full-time equivalent (FTE) support for migration?

- Do you have the resources to set up and fine-tune configurations with Infrastructure as a Service (IaaS)?

- Would it be better to save time by using a Platform as a Service (PaaS)?

Develop New Cloud Capabilities

Once your agency decides to implement new cloud capabilities, use a step-by-step approach, using your agency's goals and objectives to strategize and implement the new cloud capabilities.

Use these planning steps to develop new cloud capability strategy:

- **Plan the required capabilities** – Planning costs, planning for the service catalog, evaluating security, and shortlist the projects and technologies

- **Draw out the new cloud capability model** – Assessing architecture, evaluating security, enlist the services catalog, and draw digital models

- **Cloud Service selection** – Serverless, microservices, auto-scaling, automations, networking, and achieving elasticity and high availability (include possible vendor evaluations)

- **Proof of concept** – Studying solution(s), establishing a pilot, and gaining support within the organization

- **Execution** – Establishing application sets, gaining support within the organization, implementing the solution(s), testing the implementations, and moving the application to test and production slots

- **Optimization** – Taking care of utilization, controlling and efficiency, and improving performance and re-engineering

Picking cloud providers and evaluating vendors for the services can be daunting. To successfully procure cloud services, you must have clear requirements, and create service-level agreements (SLA) that reflect these requirements. You also must be able to measure these agreements so you can validate service delivery—along with the company's performance and remedies.

As part of the decision-making framework for moving to the cloud, acquiring new capabilities in the cloud, and having data on measurable capabilities (e.g., quality of service, availability and reliability) give the customer the tools and the opportunity to make informed choices – and to understand the service being delivered.

Develop New Cloud Capabilities

CHECKLIST

- ☐ Conduct market research on the different products and services.

- ☐ Evaluate vendor services and selections.

- ☐ Identify cloud-ready apps with considerable business value.

- ☐ Assess what kinds of technical approaches are needed for your applications.

- ☐ Benchmark your availability and reliability.

- ☐ Compare your current situation to cloud solutions.

- ☐ Create clear metrics to track your success.

- ☐ Create KPI evaluation sets.

- ☐ Create the following Checklists for applications sets:

  - ☐ Implementation

  - ☐ Testing

  - ☐ Test or production readiness

  - ☐ Test or production migration planning

KEY QUESTIONS

- **Which cloud services meet your agency's needs?**

- **What level of support will your agency need from a cloud provider?**

- **Will your agency need more vendor and full-time equivalent (FTE) support for new capability development?**

- **What are the best ways to implement cloud to achieve your agency's goal ?**

- **What KPIs will match your agency's needs?**

Use Strategic Communications

Agencies require a targeted communications strategy to help staff understand how and why more IT systems will move into the cloud. This can include shutting down old systems. Employees may feel uneasy about such change, especially when they need to learn new systems. It's important to listen to all those who will be using the new systems; they will have excellent feedback.

Moving to the cloud is necessary to succeed today. Pushback from within an agency is inevitable, because people naturally resist change. Quickly and visibly addressing concerns early on in a project can help build trust. It's essential to use strategic communications to communicate the work's business value and reiterate how it enhances mission delivery.

Best practices are not just about tools and technology, so it's important to communicate to people about these new ways of working.

CHECKLIST

- ☐ Explain the business benefits your agency has achieved so far and periodically reiterate them to the agency.

- ☐ Provide lines of communication so the people affected by these changes know how to get support.

- ☐ Train people on the new systems and provide refresher training.

- ☐ Give demos to stakeholders as work progresses.

KEY QUESTIONS

- **How will these changes affect the way your agency works?**

- **Are employees getting the training and support they need to work in the new environment?**

- **Will there be impacts on the public?**

- **How will your agency learn about these impacts?**

- **How can you minimize inconvenience during this time?**

Pilot Solutions

Once the migration work begins, you will learn a lot about what works or doesn't work for your systems. Using an agile approach reduces risk and increases quality. You deliver working code with real value in every sprint.

Start with some lightweight prototyping. This will either validate your assumptions or quickly uncover process or technology issues.

Cloud migrations provide an opportunity to introduce best practices. You have a wide range of opportunities to improve security, business, and technology. Increase your frequency of deployment. Have version control. Treat your configuration and infrastructure as code. Add or improve application testing as part of your continuous automation and automated deploys.

Security and compliance are essential parts of cloud migration. Ensure a detailed understanding of the ATO process at the beginning of the project, not near the end. Securing cloud computing requires a paradigm shift that requires a lot of support from the CISO and decision makers from the security team. The ATO helps secure cloud computing.

Pilot Solutions

CHECKLIST

- ☐ Prototype key infrastructure areas to validate assumptions and highlight unforeseen problems.

- ☐ Frequently deploy working code to a production environment.

- ☐ Understand industry standard best practices for cloud hosting and deployment.

- ☐ Incorporate best practices from the beginning.

- ☐ Bring in the CISO and security team as early as possible.

- ☐ Use the FedRAMP agency authorization process to coordinate with CISO.

KEY QUESTIONS

- **What were the key takeaways from prototyping?**

- **How can business practices and technological implementation improve with every iteration?**

- **What steps can you take to ensure a development team can deploy to a production environment as quickly as possible?**

- **Can your agency automate security and compliance?**

Iterate

Once you have a working app, make sure to budget time to test and improve it.

During the migration process, check for lessons learned after migrating or improving each system. Constantly reassess what's working and what's not to improve business practices, security, and technological implementation.

Prioritize other app migrations and optimizations. Some features may not be needed immediately, but will be necessary once you start migrating more complicated apps. For example, you'll need auto-scaling to get elasticity for high-availability apps that must meet larger demands.

As your implementation becomes more sophisticated, you can focus on utilization, efficiency, improving performance, and refactoring.

CHECKLIST

- ☐ Continue agile practices, such as regular retrospectives and post mortems, for all major outages or bugs and other opportunities to improve.

- ☐ Continually reassess priorities to make sure you are prioritizing the right work.

- ☐ Measure performance against the metrics that your agency laid out in the beginning.

KEY QUESTIONS

- **What new technologies have emerged since this process started?**

- **How might they benefit the current architecture?**

- **Are there other ways to simplify deployments?**

- **Are there more automation opportunities?**

- **Are there apps that might be easier to migrate to the cloud now that the agency has more cloud expertise?**

- **Are we collecting and benchmarking deployment-related metrics?**

Additional Resources

→ [Cloud Adoption Service Catalog (PDF)](#)

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