



RIVA

Cloud Modernization Accelerated:

**Increasing Speed from
Assessment to Deployment for
Legacy Applications in Federal
Environments**

How to Empower the Federal
Government to Increase the Pace
of Cloud Modernization to
Achieve Optimal Outcomes

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Introduction

Federal agency CIO's oversee a multitude of critical functions in the process of producing outcomes directly linked to agency missions. Many CIO's often rely on aging legacy systems that can slow down mission execution. Over time these systems can be costly to maintain, vulnerable to failures, and incompatible with modern technological solutions. By efficiently moving to the cloud, CIO's can achieve better resource utilization, improved security posture, reduced costs, and enhanced agility, which directly supports the the goal of having efficient internal processes and IT infrastructure.

RIVA tailors approaches designed to help agencies overcome the hurdles of cloud migration. This paper outlines the key components of RIVA's Migration Acceleration Program and demonstrates how federal agencies can benefit from our offering.

Focusing on Outcomes. To reduce unnecessary complexity and improve service delivery quality and turnaround time, contractors must support agency modernization goals by facilitating the replacement of legacy technology for operations, employing cybersecurity advances, and leveraging private-sector best practices with a focus on business outcomes. Many technology vendors offer cloud solutions with a focus on project outputs such as resource count or service count of completed cloud migrations. While project outputs are important to measure progress, RIVA takes a different approach by prioritizing outcomes over outputs. For example, an output could be a functional cloud environment after migration, while an outcome mapped to business objectives could be represented as a modernized export license management system with increased end user adoption and improved customer satisfaction scores.

As shown in Figure 1, our Optimal Outcomes digital product delivery model is both a mindset and an integrated framework of delivery.

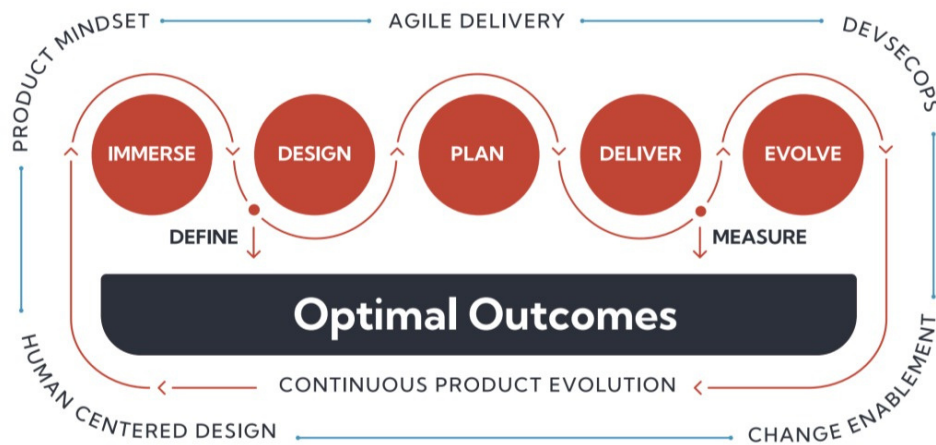


Figure 1: RIVA's Optimal Outcomes Digital Product Delivery Model
Produces Measurable Outcomes for Federal Agencies.

The Optimal Outcome framework is based on four pillars:

1. Relentless focus on mission
2. Holistic customer and user experiences
3. A product mindset
4. Continuous delivery of value, leading to optimal outcomes

It is important to note an optimal outcome delivers value at every stage of the process, not just the end. It understands that modernizing government digital services is not orchestrated through a grand reveal, it's done intelligently throughout the journey. Our approach embraces taking ideas and gives them form. We try new things and test early, constantly evolving to meet customer needs.

RIVA's Optimal Outcomes framework is used to oversee the overall migration journey from a disparate legacy technology environment to a fully modernized, scalable, secure, department-wide cloud shared service offering. Our Optimal Outcomes model is ideal for agency modernization efforts and guides the delivery of value and outcomes that are required to support an agency's greater mission including key modernization programs across the enterprise

We leverage the AWS Migration Acceleration Program (MAP), a comprehensive framework and support system that address common challenges and streamlines the migration process. MAP is a proven cloud migration program based upon AWS's experience migrating thousands of enterprise customers to the cloud. MAP uses a proven three-phased framework Assess, Mobilize, and Migrate and Modernize to help agencies achieve migration goals. Through MAP, agencies can build strong AWS cloud foundations, accelerate, reduce risk, and offset the initial cost of migrations.



The Challenge

Many agencies utilize legacy systems in their data centers, mainframe, midrange, proprietary, and other aging systems that need to be modernized or require large operations and engender high maintenance burdens. Moving older legacy equipment to cloud environments is necessary but can present a multitude of challenges. Some of the primary obstacles include:

Technical Incompatibility: Legacy systems within federal agencies often use outdated hardware or software that isn't compatible with modern cloud platforms. They also might be highly customized which might not be easily replicated or might become irrelevant in a cloud environment.

Data Migration Issues: Transferring large amounts of data from legacy systems to the cloud can be time-consuming and risky. Data might be in outdated formats that aren't easily migrated or integrated into cloud-based applications.

Integration Challenges: Legacy systems often have specific integrations with other in-house systems. When moving to the cloud, these integrations might need to be redeveloped or replaced. Systems with dependent functions must be carefully planned and moved in phases. For example, healthcare.gov is a collection of over 20 applications that in one way or another are dependent on one another. They need to be thoughtfully grouped together by dependency and migrated accordingly.

Performance Concerns: Some legacy applications might not perform as efficiently in a virtualized cloud environment as they do on dedicated, on-premises hardware. In addition, many federal environments often pin hole network traffic between on premise and cloud environments which may lead to performance bottlenecks.

Security Concerns: Older systems might not adhere to modern security standards, making them vulnerable and difficult to maintain Authority to Operate (ATO). When integrating these systems into cloud environments, there's a risk of exposing vulnerabilities.

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Up-Front Costs: While cloud migrations can lead to cost savings in the long run, the initial investment required to migrate, especially when dealing with complex legacy systems, can be significant.

Cultural Resistance: Federal employees and stakeholders used to operating on legacy systems might resist the change due to familiarity and comfort with existing systems.

Successful cloud migrations include careful planning, relentless communication, expertise in both legacy systems and cloud platforms, stakeholder buy-in, and as appropriate a phased approach to ensure that all issues are addressed. Migration approaches mainly use hardware emulation, middleware emulation, automated refactoring, or middleware re-platforming. Depending on the scenario, the right mix of tools and processes must be deployed to ensure an optimal outcome.

Our Approach

AWS MAP is a comprehensive and customer-centric approach to cloud migration which focuses on accelerating the journey to the cloud while ensuring security, compliance, and cost-effectiveness. The three-phase migration process is designed to help develop an approach a migration of tens, hundreds, or thousands of legacy applications. While each phase is a common component of a successful migration, they are not discrete phases, but an iterative process. As we iterate and migrate more applications, RIVA drives repeatability and predictability in processes and procedures, which accelerates the migration process. The comprehensive portfolio of AWS migration services and mature third-party migration tooling ecosystem provides automation and intelligent recommendations based on AWS machine learning to simplify and accelerate each step of the three-phase migration process. The MAP three-step approach for cloud migration is illustrated below in figure 2.



Assess Agency Readiness

The Migration Readiness Assessment (MRA) phase determines the current state of an agencies' readiness to migrate and identifies areas of strong capabilities and where further development is needed to migrate at scale. The MRA is based on the AWS Cloud Adoption Framework (CAF) and evaluates cloud readiness along eight dimensions: landing zone, operating model, security and compliance, migration process experience, skills and center of excellence, migration plan and business plan. MRA typically involves a one-day workshop conducted by AWS and/or a MAP Partner.

Mobilize Resources

During the Migration Readiness & Planning (MRP) phase agencies team with a MAP Partner such as RIVA Solutions to build the foundation for a large-scale migration and gain experience migrating and operating several workloads on AWS. AWS and MAP partners have developed a prescriptive methodology and approach based on best practices gleaned from hundreds of customer migration projects that significantly reduce time to migrate while lowering cost and risk. To prepare a cloud operational foundation, agencies follow an agile approach with workstreams for cloud center of excellence, landing zone, operation model, and security and compliance. In addition, AWS will work with agencies to develop a strong migration plan and compelling business case that articulates the total cost of ownership (TCO) and return on investment (ROI) for a cloud migration. At the end of this phase, which is usually completed in 2-4 months, agencies will be ready to migrate at scale.

Migrate and Modernize

In the Migration phase, agencies will complete the migration plan developed during the MRP phase. A key component of this phase is establishing a migration factory composed of teams, tools, and processes to streamline the movement of workloads from on-premises to AWS. The migration factory teams work through a prioritized backlog of workloads based on migration patterns identified in the portfolio discovery and planning process. Where possible we apply known migration and operational patterns to accelerate the movement of workloads, reduce risk and improve the outcome. With this approach, agencies will quickly see tangible benefits of lower operating costs while gaining agility and scalability. Once in the cloud, agencies may focus on optimization of applications, processes, operations, and costs. This phase typically takes 12–24 months to complete.

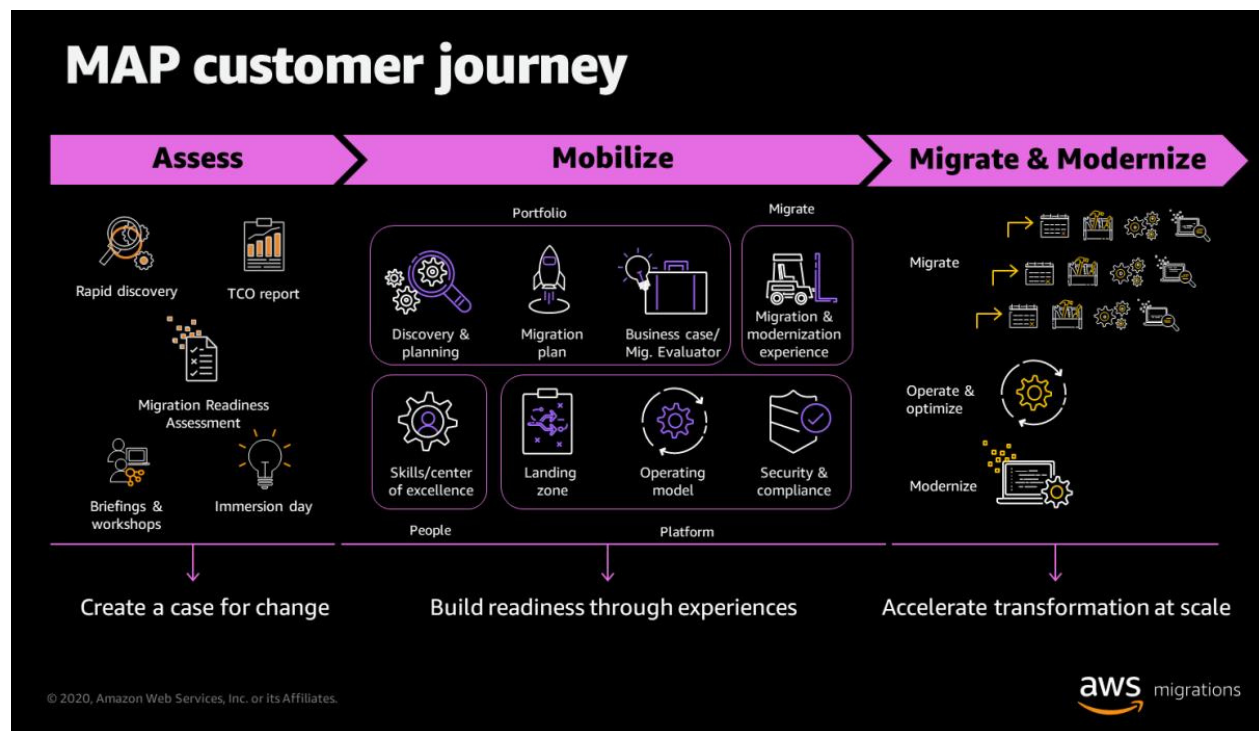


Figure 2: AWS Migration Acceleration Program (MAP)



By utilizing MAP, federal agencies stand to gain several benefits:

- The MAP process expedites the migration process, allowing agencies to quickly realize the benefits of cloud technology without extensive upfront capital.
- The structured approach of our MAP process minimizes risks associated with migration, ensuring data security and compliance.
- Agencies can optimize cloud spending and reduce operational costs with MAP cost management strategies. FedRAMP cloud providers offer robust security and compliance features, allowing federal agencies to meet strict regulatory requirements.

Migration Scenarios

Migration options can be tailored for faster ROI by ensuring the migration approach is in alignment with overall business outcomes. The diagram in Figure 3 shows, for each type of legacy migration, a purpose-built architecture exists for components that would need to change and components that could stay the same during the migration. Diving a little deeper:

Legacy Hardware Emulation: The hardware emulator replaces the legacy hardware, but the legacy operating system and applications stay the same.

Legacy Middleware Emulation: The middleware emulator replaces legacy middleware APIs and OS APIs required by the application, allowing for porting. Most of the application source code is recompiled without changes, with some adaptations for changed dependencies.



Legacy Automated Refactoring: Code, data, and dependencies are automatically converted to a modern language, data store, and frameworks, while guaranteeing functional equivalence with the same business functions. AWS Blu Age powers the automated refactoring pattern within AWS Mainframe Modernization service to accelerate the modernization of the mainframe applications complete software stack including application code, dependencies, and infrastructure. Modernized applications implement best practices and design patterns, leveraging industry standards and cloud services to derive business components and macro services.

Modern Middleware Re-Platforming: This applies only to modern languages, middleware, and runtimes that are available across legacy and x86 systems such as Java, PHP, and relational databases. It allows for reuse of the application code and databases.

Depending on agency constraints and budget cycles, it is possible to combine elements of these options to enact a multi-phase approach with incremental progress throughout. In addition, this is where our cloud migration roadmap strategy can pay dividends by providing a holistic view of an agency's entire migration lifecycle.

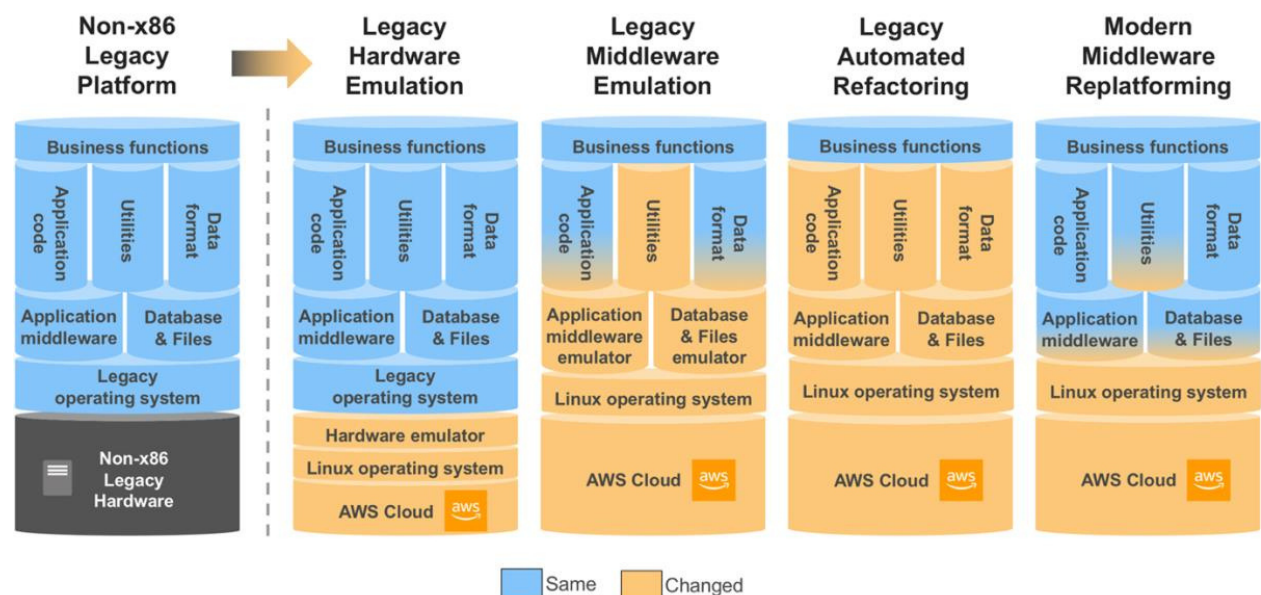


Figure 3: Legacy migration approaches

Tailoring Specific Value Propositions

Each of the migration options outlined in Figure 3 serve unique use-cases and value propositions, relevant for specific legacy workloads. Migrating legacy systems to the cloud offers several value propositions for organizations. These value propositions can vary but some common benefits include:

Cost Savings: Legacy systems can be expensive to maintain and operate. Migrating to the cloud often results in cost savings through reduced hardware and infrastructure costs, as well as lower operational expenses. Cloud providers typically offer pay-as-you-go pricing models, allowing organizations to scale resources up or down as needed, further optimizing costs.

Scalability: Cloud environments provide on-demand scalability, allowing organizations to easily accommodate increased workloads and user demands. This flexibility can be particularly beneficial for businesses with fluctuating resource requirements.

Improved Performance: Cloud providers such as AWS offer state-of-the-art hardware and infrastructure, which can lead to improved system performance and faster response times compared to aging legacy hardware.

Considering the various types of existing legacy workloads within federal environments, the diagram in Figure 4 shows key differentiating characteristics, like project cost, project duration, and cloud agility which promotes use of cloud native design principles, microservices and automation such as CI/CD. The value proposition of each approach must be balanced with overall program objectives and associated costs. For example, there are scenarios where hardware emulation can provide a first step in moving assets to the cloud and ultimately achieve ROI with a future refactors being part of the roadmap for a legacy application.

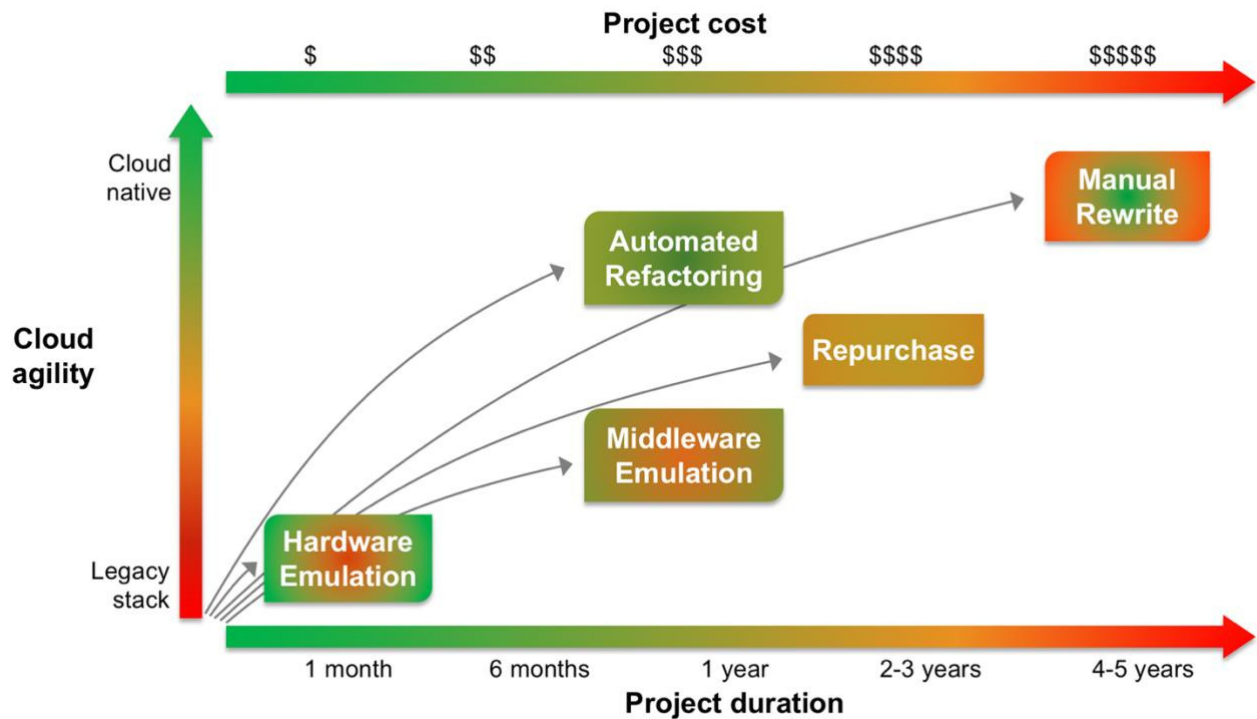


Figure 4: Migration options relative to duration, cost, and agility

RIVA evaluates an agency's specific needs, goals, budget, and existing IT landscape to choose the most suitable cloud migration option that balances duration, cost, and agility effectively. Often, a mix of these options may be employed for different workloads within an organization's migration strategy.

Measuring Success

When migrating legacy systems to the AWS cloud, setting clear and measurable Objectives and Key Results (OKRs) is essential to ensure the success of the migration project. Here are some important OKRs to consider for legacy migrations to AWS:

Objective: Achieve Cost Savings

- **KR1:** Reduce on-premises infrastructure costs by X% within the first year of migration.
- **KR2:** Achieve a return on investment (ROI) of at least X% within 18 months of migration.
- **KR3:** Optimize AWS resource utilization to maintain a cost efficiency ratio of X.



Objective: Improve Performance and Scalability

- **KR1:** Increase application response times by X% compared to the on-premises environment.
- **KR2:** Ensure that the migrated systems can seamlessly scale to accommodate X% growth in user demand.
- **KR3:** Achieve an uptime of at least 99.99% for critical applications post-migration.

Objective: Enhance Security and Compliance


- **KR1:** Achieve compliance with industry-specific regulations (e.g., HIPAA, GDPR, etc.) within the AWS environment.
- **KR2:** Reduce the number of security incidents and vulnerability by X% within the first-year post-migration.
- **KR3:** Implement AWS Identity and Access Management (IAM) best practices and achieve a security audit score of X.

Objective: Foster Innovation and Agility

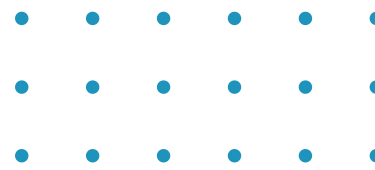
- **KR1:** Accelerate the deployment of new features and applications by X% post-migration.
- **KR2:** Foster a culture of experimentation by launching X new proof-of-concept projects on AWS within the first year.
- **KR3:** Embrace AWS-native services (e.g., AWS Lambda, AWS Step Functions) for X% of new application development.

Objective: Customer and Stakeholder Satisfaction

- **KR1:** Conduct regular surveys or feedback sessions to measure customer and stakeholder satisfaction with the migrated systems.
- **KR2:** Achieve a customer satisfaction score (CSAT) of X% for services hosted on AWS.
- **KR3:** Resolve critical customer-reported issues within a defined time frame. (e. g., X hours or days).



OKRs should be specific, measurable, achievable, relevant, and time-bound (SMART), and should align with the agencies' overall business goals and objectives. Regularly tracking progress toward these OKRs will help ensure a successful and well-managed migration to the AWS cloud. Adjust them as needed based on changing priorities and circumstances during the migration project.



In addition to OKR's measuring Key Performance Indicators (KPIs) and metrics during a cloud migration is crucial to ensure the success of the project and to track impact. To do this effectively, start by defining clear and relevant KPIs aligned with migration objectives.

Common KPIs include cost savings, uptime and availability, performance improvements, security enhancements, and agility gains. Next, establish a robust monitoring and tracking system that collects data from various sources, such as cloud provider dashboards, application performance monitoring tools, and security logs.

Continuous monitoring and refining of KPIs and metrics are essential for ensuring that agency cloud migrations align with organizational goals and delivers the expected benefits. Some specific public sector related metrics with outcomes are outlined below:

- Improve the Department's Federal Information Technology Reform Act (FITARA) score: employee rating for internal service quality
- Percentage of Federal Information Security Modernization Act (FISMA) reportable systems adopting National Institute of Standards and Technology (NIST) Special Publication (SP) 800-53 Rev. 5 Security Controls
- Percentage of on-time, on-budget deployments of mission critical agency systems
- Percentage of application services migrated to Cloud-Based platforms
- Percentage of normal priority Personnel Action Requests (PAR) completed on time
- Number of employees with Federal Acquisition Certification for Program and Project Managers (FAC-P/PM)
- Percent reduction of service level agreement timelines due to process reengineering
- Percentage of workforce trained or credentialed in innovative acquisition techniques

Conclusion

RIVA's Optimal Outcomes approach represents a paradigm shift in how agencies can successfully manage the intricate process of migrating legacy systems to AWS Cloud and get the most strategic value—real, measurable outcomes—for their efforts. This comprehensive and strategic framework is designed to unlock the full potential of cloud migration while mitigating risks and maximizing the return on investment. Through a meticulous focus on defining clear objectives and key results (OKRs), the Optimal Outcomes approach empowers organizations to align their migration efforts with overarching business goals. It places cost efficiency, performance enhancement, security and compliance, operational efficiency, and innovation at the forefront of every migration project.

By prioritizing continuous improvement and adaptation, our Optimal Outcomes approach provides a roadmap for organizations as they navigate the complexities of legacy migration with agility, evolving in step with the ever-changing landscape of cloud technology. AWS's MAP process coupled with best practices in product management, RIVA's approach enables agencies to not only migrate but also transform and modernize their IT ecosystems.

The journey to the Cloud is not merely a technical endeavor; it is a strategic move that has the potential to reshape an agencies' future. Optimal Outcomes provides guidance, structure, and vision necessary to navigate this journey successfully. As agencies embrace the cloud, they can do so with confidence, knowing they have a proven approach that delivers outcomes not just outputs, fosters innovation, and positions them for long-term success in the digital age.



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