AWS Whitepaper

AWS Cloud Adoption Framework: Business Perspective

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Abstract

As the proliferation of digital technologies continues to disrupt market segments and industries, adopting Amazon Web Services (AWS) can help you transform your organization to meet the changing business conditions and evolving customer needs. As the world's most comprehensive and broadly adopted cloud platform, AWS can help you reduce business risk, improve environmental, social and governance (ESG) performance, increase revenue, and improve operational efficiency.

The AWS Cloud Adoption Framework (AWS CAF) uses AWS experience and best practices to help you digitally transform and accelerate your business outcomes through innovative use of AWS. Use AWS CAF to identify and prioritize transformation opportunities, evaluate and improve your cloud readiness, and iteratively evolve your transformation roadmap.

AWS CAF groups its guidance in six perspectives: *Business*, *People*, *Governance*, *Platform*, *Security*, and *Operations*. Each perspective is covered in a separate whitepaper. This whitepaper covers the Business perspective, which focuses on ensuring that your cloud investments accelerate your digital transformation ambitions and business outcomes.

Are you Well-Architected?

The AWS Well-Architected Framework helps you understand the pros and cons of the decisions you make when building systems in the cloud. The six pillars of the Framework allow you to learn architectural best practices for designing and operating reliable, secure, efficient, cost-effective, and sustainable systems. Using the AWS Well-Architected Tool, available at no charge in the AWS Management Console, you can review your workloads against these best practices by answering a set of questions for each pillar.

For more expert guidance and best practices for your cloud architecture—reference architecture deployments, diagrams, and whitepapers—refer to the AWS Architecture Center.

Introduction

Rapid diffusion of digital technologies has accelerated change and increased competition across a range of market segments and industries. Because sustaining any particular competitive advantage has become increasingly difficult, enterprises are being forced to reinvent themselves at increasingly shorter time intervals.

As democratized access to cloud lowers barriers to entry, emerging companies are challenging slower-moving incumbents, potentially disrupting traditionally stable industries. Studies have shown that the average tenure of companies on the S&P 500 has been decreasing and has been projected to drop from a high of more than 35 years in the early 1980s to 12 years by 2027. Accordingly, digital transformation is especially relevant for established enterprises that are being forced to reimagine their legacy operating and business models.

Digital transformation is equally relevant for public sector organizations as citizens' evolving expectations and behaviors are putting pressure on governments to improve digital service delivery. Similarly, digital native businesses, which depend on the quality and speed of their innovation, cannot afford to stand still and need to engage in continuous digital transformation. As a result, organizations across the globe are digitally transforming; they are using digital technologies, and increasingly cloud, to drive organizational change that allows them to adapt to changing business conditions and meet evolving customer needs.

McKinsey has estimated that cloud could deliver more than $1 trillion across Fortune 500 companies by 2030, with early adopters capturing a disproportionate share of the total value. This includes potentially more than $400 billion in modernization-related use-cases focusing on application and infrastructure cost optimization, improved business resilience, lower downtime costs, and digitization of core business operations, as well as more than $700 billion in innovation-related use-cases aimed at innovation-driven growth, accelerated product development, and hyper scalability.

Millions of AWS customers, including the fastest-growing startups, largest enterprises, and leading government organizations, are using AWS to migrate and modernize legacy workloads, become data-driven, automate and optimize business processes, and reinvent operating and business models.

Through cloud-powered digital business transformation, they are able to improve their business outcomes, including reduce business risk, improve environmental, social and governance (ESG) performance, increase revenue, and improve operational efficiency.

Organizational ability to effectively leverage cloud to digitally transform (organizational cloud readiness) is underpinned by a set of foundational capabilities. A capability is an organizational ability to use processes to deploy resources (people, technology, and any other tangible or intangible assets) to achieve a particular outcome. AWS CAF identifies these capabilities and provides prescriptive guidance that thousands of organizations around the world have successfully used to improve their cloud readiness and accelerate their cloud transformation journeys.

AWS CAF groups its capabilities in six perspectives:

- Business

- People

- Governance

- Platform

- Security

- Operations

Each perspective comprises a set of capabilities that functionally related stakeholders own or manage in their cloud transformation journey.

The *Business* perspective helps ensure that your cloud investments accelerate your digital transformation ambitions and their aligned business outcomes. It comprises eight capabilities shown in the figure below. Common stakeholders include chief executive officer (CEO), chief financial officer (CFO), chief operations officer (COO), chief information officer (CIO), chief marketing officer (CMO), chief product officer (CPO), and chief technology officer (CTO).

AWS CAF Business perspective capabilities

Strategy Management	Leverage cloud to accelerate your business outcomes
Product Management	Manage data and cloud-enabled offerings as products
Business Insights	Gain real-time insights and answer questions about your business
Portfolio Management	Prioritize delivery of high-value cloud products and initiatives
Strategic Partnership	Build or grow your business through a strategic partnership with your cloud provider
Data Science	Leverage advanced analytics and machine learning to solve complex business problems
Innovation Management	Develop new processes, products, and experiences and improve existing ones
Data Monetization	Leverage data to obtain measurable business benefit

AWS CAF Business perspective capabilities

AWS and the AWS Partner Network provide tools and services that can help you along each step of the way. AWS Professional Services is a global team of experts that provides assistance through a collection of AWS CAF aligned offerings that can help you achieve specific outcomes relating to your cloud transformation.

Strategy management

Use cloud to accelerate your business outcomes.

The purpose of strategy is to help you succeed. Rather than developing detailed action plans that are based on forecasts, strategy focuses on articulating high-level priorities that give coherence and direction to your subsequent decisions and actions. Having a strategy can help focus your efforts on the pursuit of long-term goals, facilitate decision making, and promote coordination between different teams.

Start

Focus on identifying clear and consistent long-term goals and values that are rooted in a deep understanding of the external environment and a detailed evaluation of your organization's capabilities and resources. When evaluating the external environment, focus on technological developments, evolving customer expectations, regulatory changes, as well as supplier and competitor behaviors. Your strategy should articulate how your organization will use its capabilities to deploy its resources within the external environment to meet its long-term goals. It should also indicate how your organization will organize itself to ensure effective implementation.

If you already have a strategy, evaluate your strategic fit; the alignment of your capabilities, resources, goals, and values with the threats and opportunities in the external environment. Ideally, key strategic priorities may have already been articulated in your company's annual report, chairman's letter to stakeholders, organizational strategy, or corporate plan.

Gain leadership consensus on the key strategic priorities for your organization and develop a technology strategy that accelerates related business outcomes, including reduced business risk, improved ESG performance, increased revenue, and improved operational efficiency.

Start by identifying how you can take advantage of the cloud to meet your business goals and what cloud capabilities can provide you with a strategic advantage. Next, identify opportunities for retiring technical debt. This may include migration and modernization of legacy infrastructure, applications, and data and analytics platforms. Doing so may help you lower your risk profile through improved reliability and business continuity, increased performance, and enhanced security. Your strategy should clearly articulate how technology transformation is expected to accelerate the attainment of your business goals.

Get clarity on how key processes will use data and new technologies to optimize your technology and business operations. This may include using new data and analytics platforms to create actionable insights, or using machine learning (ML) to improve your customer service experience, employee productivity and decision-making, business forecasting, fraud detection and prevention, industrial operations, and so on. Doing so may help you improve operational efficiency while lowering operating costs and improving employee and customer experience.

Consider how your business and technology teams orchestrate their efforts to create customer value and help meet your strategic intent. Organizing your teams around products and value streams while using agile methods to rapidly iterate and evolve will help you become more responsive and customer-centric.

Recognize that differences may exist organizationally between how business division product teams are organized and operate. Define a target state for 'what good looks like' within your organization for how high performing product teams operate to map your Cloud Center of Excellence (CCoE) operational practices for optimizing new product management processes.

Make sure to seek and incorporate input from a broad range of organizational stakeholders, including senior management responsible for strategy formulation, those who will be affected by the key strategic decisions, and those who will be responsible for the implementation of strategic initiatives. Input from insiders may be especially critical as they usually have intimate knowledge about the gaps and opportunities in their daily operations.

Advance

Once you have embedded technology in your current business model, explore how you can use technology to reimagine your business strategy and shape your operating model.

- Explore opportunities for strategic partnerships and identify areas of collaboration and value co-creation.

- Develop a research and development (R&D) strategy that will enable you to accelerate the pace of innovation.

- Identify parts of your business that are vulnerable to digital disruption and develop corresponding mitigation strategies. At the same time, identify new technology-enabled value propositions (products, services, and experiences) and revenue models that can help you reach new customers and compete more effectively within your existing industry and market segments.

- Benchmark your resources and capabilities against industry standards and focus on exploiting key strengths while managing key weaknesses.

- Identify what existing resources and capabilities can be used, those that need to be matured, and those that need to be newly created.

- Address how employees, culture, skillsets, and leadership will need to evolve to support effective strategy implementation.

Given the rapidly evolving technology and business environments, your strategies should be continuously reevaluated based on disproven assumptions and/or emerging developments. To avoid decision-making bias and to ensure management credibility, having formal strategy reevaluation mechanisms is especially important.

Excel

Use technology to shape your corporate strategy and build new digital businesses.

- Anticipate your customers' needs and explore how new or improved technology-enabled products and services can help you enter new market segments and industries.

- Consider launching new or participating in existing business ecosystems. Focus on customer journeys and pain points, and use those as stepping stones for vertical or horizontal ecosystem expansion.

- Define a digital business transformation strategy that articulates the roadmap for achieving the desired target state, and sequence your strategic initiatives with a view to quick returns.

- Assign adequate and clear responsibilities for the definition and implementation of your strategy, while ensuring that the senior leader responsible has sufficient organizational, strategic, and digital technology experience.

- As your strategy is implemented you will want visible insights on its progress in order to ensure success. Translate your strategic goals into quantitative targets and monitor the performance achieved against these outcomes. Consider using an integrated framework (such as the balanced scorecard) for harmonizing financial and non-financial goals.

- To promote understanding, continually communicate your strategy, initiatives, and targets to all employees.

Portfolio management

Prioritize cloud products and initiatives in line with strategic intent, operational efficiency, and your capacity to deliver.

At the heart of every business is the business model. The business model articulates how you create value from raw resources of materials and talent into products and services. These products and services are organized into a portfolio to be presented outwardly and communicated to customers through marketing and sales.

The late management guru [Peter Drucker famously stated](#) that the purpose of business is to create and keep a customer. If your purpose is to create and keep a customer, and customers realize the value you create through your products and services, managing your portfolio of these products and services is an essential capability for your business.

Research has shown that customer-centric companies generally outperform their peers. Such companies have product-driven structures and cultures, where products specifically target customer needs, and consider the end-to-end experience across all interactions and business operations. This means remaining true to your mission and brand while also being able to adapt to new opportunities in the market.

Customer-centric companies adopt an enterprise-wide view of the product portfolio, modernize their business and operational governance, and make strategic decisions on where to invest in innovation versus scale, based on customer behavior, operations, culture, and market opportunities.

Portfolio management is a living view of what your products and services are, how you deliver them, how you uniquely message them in the market, and how your customers perceive their value. Done correctly, you will have business insights into each of these areas through operational metrics. Portfolio management that uses the agility, scale, and speed of the cloud enables you to operationalize your strategy, product portfolio, and pace of innovation. It is core to your business model and the heart of your business.

Start

- **Product portfolio analysis** — Product portfolio analysis is the very first step in your portfolio management strategy. It helps you categorize the products into different sections and

implement the right course of action. Whether it's a project or a product, the very first step in any management strategy is to evaluate if the product or service being built aligns with organization's short and long-term goals.

- The analysis should also diligently assess existing products or services offered by your organization. The intent here is to minimize investments in lagging products and bolster the development of the ones that have breakthrough potential. This approach not only impacts the top line but also ascertains that your resources are working on value-adding assignments.

- Given that most product launches fail, as part of the product portfolio analysis, you must diligently study the market, evolving demands, and other parameters, before launching the new product or service.

- **Product lifecycle stages** — The next step after extensive analysis and categorization is to find out where each product stands in the product lifecycle. The comprehensive view of the product and its stance in the lifecycle enables you to prioritize and eventually decide the right course of action.

- **The product portfolio roadmap** — You can start with a cloud portfolio roadmap by considering short-term and long-term outcomes as well as low-risk (proven) and higher-risk (experimental) opportunities. Use automated discovery tools and the seven common migration strategies for moving applications to the cloud (known as the 7 Rs) to rationalize your existing product portfolio and build a data-driven business case.

  - Portfolio plans should include migration, modernization, and innovation initiatives, and consider financial (lower costs and/or increased revenue) and non-financial (for example, improved customer and employee experience) benefits.

  - Portfolio management teams optimize the business value of your portfolio in line with your resource, financial, and schedule constraints. To reduce your time to value, consider increasing the frequency of your planning cycles or adopting a continuous planning strategy.

- **Enable a product-driven organization** — A product-driven organization has the culture, capabilities, mechanisms, and organizational structures necessary to build and maintain a portfolio of products at a scale that delivers customer value and revenue in a profitable way. Products are embedded across organizational levels, through all parts of the organization, aligning everyone (business, technology, finance, sales, marketing, and other shared services) around the same strategic outcomes.

Advance

- **Scaling and sustaining product innovation** — More and more successful organizations are implementing an open Innovation program: ideate, pilot, scale and sustain. It is important to include and embed innovation in your portfolio strategy. With an accelerating pace of change, it is critical to ensure that innovation strategies and initiatives are fast-paced and sustainable. The portfolio management team helps you think strategically about early wins, develop selection criteria for initiatives to create market differentiation, and advance your culture of innovation.

  - Organizations benefit by positioning the intended business results as criteria for determining the best initiative investment.

  - Rapid breakthrough innovations help organizations to build new horizons. It is equally important for organizations to gradually develop and build on the existing products and ideas to ensure longevity.

  - Portfolio management ensures breakthrough innovations and incremental innovations are pursued to fuel the sustainable long-term growth. Seeking simplicity is one of the keys to successful innovation. Portfolio management team priorities big ideas to strategic outcomes and prioritizes initiatives for product teams' ownership to deliver end results.

- **Benefits and value realization** — Organizations measure how prioritized initiatives add true value to the enterprise. Value realization is a highly impactful method to capture quantitative and qualitative outcomes. The portfolio management team guides the product team on how to identify, analyze, deliver and sustain these benefits in alignment with the strategic vision, goals and objectives.

  - Guide teams to establish key performance metrics for each initiative in partnership with the business. The portfolio management team enables appropriate tools, such as benefit register, benefit realization roadmap, benefits breakdown structures, and helps to establish processes to monitor and control progress against the established benefit realization plan. Organizations gain business commitments though transparent communication on the benefit progress report.

Excel

- **Data-driven decision-making** — Your success in portfolio strategy is driven by your vision and long-term growth plans. To be successful, it is also important that business goals and priorities are established and overseen at the executive level. It is important to incorporate key

metrics to drive data-driven decision making to help delivery of program and project teams. Integrate enterprise systems with your portfolio system to help ensure effective performance management. This ecosystem enables faster and more effective decision-making at multiple levels.

- **Strategic delivery excellence** — Organizations that have strong delivery capabilities excel and compete well. These organizations ensure cultural adoption and successful implementation and organizational change. Constant innovation-driven portfolio initiatives help to stay on top of the operations and markets. Innovation is a continuous process everywhere in the organization.

The operations teams focus on the change operation and the development side of the organization focuses on more exploratory and innovative initiatives towards evolution. There is a realization that the fastest and least expensive way for anything new and innovative is through setting up a new program or portfolio. Now it is possible to talk about real strategy delivery with required level of integration within organization.

Innovation management

Use cloud to develop new, and improve existing, processes, products, and experiences.

The ability to innovate is at the center of the most enduring organizations in the world. Failing to innovate means stasis, and over the years leads to irrelevance, decline, and ultimately the failure of many organizations. Therefore, it is vital to build organizational capabilities to accelerate innovation (from ideation to implementation) in the cloud and invent ahead of customers' rapidly-changing demands.

Well implemented innovation management requires the right team structure, capabilities, and culture to foster innovation from all edges of the organization, realize the digital innovation vision and successfully use technology to solve customer problems. Successful innovation programs organize around four interdependent elements: culture, mechanisms, architecture, and organization.

Innovative cultures don't look to develop technology for technology's sake but start by listening to the ever-changing customer needs.

Hire builders who are driven to invent on behalf of your customers and empower them to build fast. Develop processes and mental models that help turn good intentions into action and facilitate high-velocity decision-making and implementation.

Establish a technical and business structure that supports rapid growth and change, reduces dependencies, and allows greater access to the technology that helps your builders build.

Form small, autonomous cross-functional teams that own what they create, with the right resources and agility to support rapid innovation, nimble experimentation, and a single-threaded focus on their customers.

Cloud can help reduce your time-to-value and innovation-related cost and risk by allowing you to instantly provision and shut down resources. To fully take advantage of the potential for increased business agility that comes with cloud adoption:

1. Develop an innovation strategy that includes optimizing your existing culture, mechanisms, and organizational structure.
2. Take a long-term view on how you consider the future of your business and identify opportunities to delight your customers.

3. Develop new ideas and products to solve your customer needs. Test and learn through quick experimentation before validating and scaling them to maximize the impact.

Start

At the start, focus on aligning your innovation plans to strategy and outcomes and discover and validate novel, customer-centric approaches.

- Your first step is to identify why you want to transform your organization into a more innovative one.

- Identify the goals of your innovation program, create an innovation charter and define your metrics to measure success.

- Learn from other companies that have built a successful innovation practice, listen to your customers, and identify future market opportunities for your business.

- Build out a vision for innovation that delights your customer and has downstream impact on your business.

- It is essential to establish senior-level support early. List out potentially influential executives that could sponsor your innovation efforts. Start by proposing a pilot project that requires only a small investment to gather data and metrics to prove its value before scaling. An excellent first project is to assess your organization's current innovation capabilities. The goal of this audit is to gather data to understand how innovation is happening today and assess the current state of different parts of the organization.

- Ensure that you capture input from both leadership and other teams in your organization. Look to capture people's perceptions of the current culture and ask if they feel it fosters innovation. Ask about existing mechanisms that help or hinder innovative thinking and question organizational structure to assess structural blockers. Once done, synthesize the data and insights, identify blockers to innovation, and diagnose possible causes.

- Create a roadmap for the next steps by defining improvement goals and identifying high-impact interventions.

- Look for opportunities to kick-start the change with small interventions to remove the blockers to innovation that will deliver significant impact and create quick wins.

Advance

To advance your innovation management program, start to build, launch and continuously improve solutions, from products to services and ecosystems. The best way to get more innovative is to start innovating.

- Identify innovation mechanisms that can help strengthen your organization's ability to deliver digital products and support thinking differently to meet your customers' current and future needs.

- Identify a few key customer opportunities or big ideas and start implementing innovation mechanisms to facilitate bringing the idea or product to market.

- Start with the customer, identify their key challenge, invent on their behalf, and create a minimal lovable product (MLP) that will delight them. Experiment, test often, and get feedback early.

- To support your innovation efforts, invest in building cross-functional teams that can help you scale your innovation mechanisms beyond yourself. Teach them how to put innovation principles into practice and enable them to develop their ideas to solve business problems. This will allow more team members to learn by doing.

- Another way to push your innovation program forward is to engage with the environment external to your organization through open innovation collaborations with partners, suppliers, customers, experts, universities, start-ups, and the community at large. Be externally aware, and look for new ideas from everywhere.

- It is vital to communicate your innovation charter often and clearly. Customize communication for different roles, personalities, supporters, and detractors. Share your efforts frequently and celebrate teams that take risks and think big vocally and publicly.

- Failure and invention are inseparable twins. Start shifting the culture to promote a fertile environment for creativity and innovation, and encourage learning. Build an environment of psychological safety, where failure is seen as a by-product of thinking big, and the focus is on learning from previous attempts.

- Ensure executives and managers are aligned, support your innovation charter and tenets, and enlist them as champions of your innovation program.

- Encourage them to be vocal about both wins and failures, to build an environment where the ups and downs of inventing are spoken about openly and freely without repercussions. If required, invest in training on creating a climate for creativity and weave innovation into the business strategy and culture leaders.

Excel

The ultimate goal is to embed a culture of innovation into your organization to drive innovation at scale. Transformation at this scale takes time and often goes hand in hand with large-scale technical and organizational change. Be patient and keep going; the shift will happen in small increments.

- To enable change, look at your formal organizational structure, your organizational values, reward systems, and repeatable mechanisms and ensure they all support your innovation agenda.
- Review your organizational structure and question whether it supports a product-driven, innovative enterprise.
- Identify opportunities to create self-sufficient teams with single-threaded owners who don't rely heavily on dependency from other parts of the organization to build their products.
- Review your hiring mechanisms and align them with your innovation principles and values.
- Build innovation principles into your company values and create artifacts and mechanisms to reinforce your values.
- Ensure that you reward innovation efforts that drive long-term value rather than rewarding short-term results. Over time, formalize critical components of your innovation program, such as how to validate ideas and develop a Minimum Lovable Product.
- Create traditions designed to drive collaboration and knowledge sharing within the organization.

To scale your innovation mechanisms across the organization:

1. Identify internal innovators and change agents and enroll them to become champions for your innovation program.
2. Train them to be experts in your innovation mechanisms and turn them into trainers to facilitate large-scale training.
3. Establish a program to continuously enable teams across the organization to adopt your innovation mechanisms.

Lastly, develop a practice of continuous improvement.

- Capture input and feedback on your innovation mechanisms, values, mechanisms, and artifacts and use them to evolve them.

- Continue to watch out for blockers to innovation and remove obstacles.

- To sustain the innovation program, develop a standing, organization-level annual budget for ongoing funding of innovation initiatives.

- Continue to invest in or acquire new technologies, develop new business models, free up capacity for employees to innovate, and scale up new ways of working in all corners of the organization.

Product management

Manage data- and cloud-enabled offerings that deliver repeatable value to internal and external customers as products through their lifecycles.

Amazon uses product management as a discipline to drive ownership and impact for just about any concept. Today, Amazon organizes around products and dedicated product teams, each with a product manager who is end-to-end accountable over a set of a features that delivers value to a customer. This section shares specific tenets to build a mature product management capability.

Start

The first group of tenets is foundational and sets the stage for a customer-centric product organization.

- **Work backwards from the customer** — The key to maximizing value is to deliver products that solve real customer problems. Start by forming a hypothesis and use data to understand who your customers are and what are their pain points. It is important to remember that customers can be internal or external to the organization. Gather data from various qualitative and quantitative methods such as interviews, shadowing, market research, and surveys to prevent biased opinions and better understand your customers. This data will then either validate or change your initial hypothesis, allowing you to identify potential solutions that meet your customer needs.

- **Focus on solving customer problems** — To move to a product-centric model, you first have to align with the product's definition. Identify who the product is built for and re-imagine what each product would be and what problem they are solving. The focus on customer problems will drive adoption and extend the use of functionality, driving further investment in other features rather than consistently delivering custom builds for small audiences.

  Products evolve as the company adopts new goals and the market changes. It is essential to maintain a feature backlog constantly prioritized around customer value. Continue to test potential solutions by running minimum lovable product (MLP) based experiments that keep solving specific customer problems and ruthlessly de-prioritize features not supported by data.

Advance

The second set of tenets focuses on team and organizational structures. These tenets are essential to make your organization product-centric.

- **Organize into product teams** — As you establish your product vision and deliver against it, organize products around self-sufficient [2-Pizza Teams](#) (2PT). 2PTs are autonomous, cross-functional teams that work to identify, rationalize, and achieve business and technology objectives in a defined opportunity area. No matter how large the company gets, individual teams should not be larger than what two pizzas can feed (typically no more than 8-10 team members) to minimize dependencies and increase communication.

  - For 2PTs to be self-sufficient, they need to have all the necessary skills to deliver a product. 2PTs typically include a product manager, designer, operations engineer, engineering manager, application engineers, and any other roles specific to the product. The 2PT approach enables product organizations to move faster.

  - If a product becomes too large and/or too complex to manage with a single 2PT, you can split the product and create a new team rather than adding more people to the original product team, ultimately slowing it down.

- **Reduce risk through iteration** — After establishing 2PTs, the next step is to determine the frequency of your product delivery. Most enterprises typically have "large batch" delivery and funding cycles. Delivery may take place over a year with long phases of analysis, design, development, testing, go-lives, and, finally, handing it over to support.

  - Throughout this long delivery cycle, the organization accrues the potential delivery of a product not aligned with customer needs and hence an increased risk of opportunity cost. The risk of delivering something that no one wants can be mitigated by producing smaller batches and then assessing the feedback collected from the customer to decide whether the product vision and strategy should pivot or persevere. Iterative processes enable you to break up your releases and deliver incremental product value in the form of what Amazon calls, "Minimum Lovable Products" (MLPs).

  - After each release of a MLP, the organization measures business value to justify the funding needs and future iterations. The funding cycles shift from annual budgets to released MLPs to resemble startup funding practices.

Excel

Two practices can help you manage products at even higher levels: bring the work to the teams and letting teams own the entire product lifecycle. The former increases productivity while the latter increases quality.

- **Bringing the work to the teams** — The traditional project-based approach starts with an idea. A business case is created, and once approved, funded, and prioritized, a team is formed to deliver the idea. In most project-based organizations, once the project is executed, it is turned over to operations, and the team is disbanded and moved on to the next assignment.

  This approach works only for one-off initiatives but becomes highly inefficient if more related work is done later. Teams reach high levels of efficiency over time, and breaking them down slows their productivity significantly. In product-based organizations, permanent and empowered teams develop deep contextual knowledge, reach high levels of productivity, throughput, and increased quality.

  Teams feel emotionally connected to their work and customers. If you want to "do more and better with less" keep your teams working together and bring the work to them. Investing in people and building strong teams is the best way to make great products.

- **Own your entire lifecycle** — Business, engineering, and operations groups must work in unison to reduce time to value. Quality and speed diminish when responsibility to ideate, develop, and operate products is fragmented.

  Products need to be owned and operated across organizations to increase customer feedback and reduce handoffs for a more responsive product-based organization. Empowerment and investment in enabling teams to own products from ideation to operation is key to promoting a "you built-it, you run it" mentality.

  This approach guides your teams to invest in self-service documentation and tools that allow 2PTs to be accountable for their product's testing, DevOps, and security.

Strategic partnership

Build or grow your business through a strategic partnership with your cloud provider.

What is a strategic partnership? Let's first look at the definition of each word. As mentioned in the section on *Strategy Management*, a business *strategy* is a comprehensive plan to achieve your business objectives. A *partnership*, in the legal sense, is a business entity where two or more owners contribute resources, share in profits and losses, and are individually liable for the entity's actions. Put simply, a partnership is a *relationship* with a shared commitment on objectives. Therefore, a *strategic partnership* is a relationship where you have identified shared business objectives, and have aligned on a strategy to achieve these joint outcomes.

Why have a strategic partnership? In business, you have core functions, products, and differentiators that you want to focus on to deliver value in the market. You want your brand to resonate in the market with a particular value proposition. You want your people spending their time on the most important tasks that create the most value and business impact. Doing too many things can dilute your strategic focus and confuse your brand in the market. It can also overwhelm your stakeholders. Yet there will be other businesses, potential partners, who could compliment or provide you with added capabilities. Looking outside your business for a *partner* can amplify your business value, extend the impact of your stakeholders, and accelerate your ability to innovate in the market.

Who should you partner with? Identifying a prospective partner often stems from taking a wide view of customers within a shared business domain, community, and ecosystem. A business domain will include the terms, processes and roles for an industry segment. Take the business of software. Terms include words such as "license", "SaaS", "subscription", "user", "developer", "UX (user experience)" and so forth.

Processes include actions such as "building APIs", "onboarding a new user", "billing subscription fee", "application performance management", and so forth. Roles include "developer", "product manager", "sales rep", "program manager", "solution architect", and so forth. Within the business domain is a *community* of people and the services they provide. You see them at the conferences you attend for your industry.

An *ecosystem* is a similar idea, yet it was derived from natural occurring ecosystems, such as the Amazon River in South America, or Great Barrier Reef off the coast of Australia. Natural ecosystems included the air and water quality, the soil, the animals, the natural resources, weather patterns, and so on. In business, an ecosystem will include:

- The terms, processes, and roles of the domain

- The people and services in the community

- The entire business environment affected and influenced by the sum of the domain and the community

Consider software again. The ecosystem includes the devices that will serve the software, the device manufacturers and suppliers. It includes companies that help you deploy and deliver your software such as data storage, network security, and application performance, and more. If you spend some time thinking, your business ecosystem will not only extend farther than you likely realized, it will reveal new customers and businesses where there is value you can offer and receive from a partnership.

These businesses are your prospective partners and you can use them to create new streams of innovative business opportunities. Popular examples include the Amazon Marketplace and other platform solutions such as a connected car or a smart home. In such business models, ecosystem players (producers, consumers, partners) are connected through a platform to create a fly-wheel effect and a buy-sell transaction is facilitated as needed through a marketplace.

- **What are the benefits of a strategic partnership?** AWS created the AWS Partner Network (APN) in 2012, yet has been working with partners since Amazon Web Services launched in 2006. Partnerships are integral to helping AWS deliver customer obsessed solutions, and AWS scales with our partners. An announcement was made for AWS Re:Invent 2021, showing the refreshed APN Partner Paths: software, hardware, services, training, and distribution.

Each of these paths offer unique partnership opportunities. As a business you can participate and benefit from multiple partner paths depending on your business strategy. For each cloud adoption stage (Start, Advance, Excel) think about alignment, accelerators, differentiation, and success stories that will guide your strategic partnership decisions.

Start

- The first place to begin when considering strategic partnerships on AWS is to join the AWS Partner Network.

- Next, consider which of the APN Partner Paths you will participate in. There are unique benefits, programs, and resources for each path. Note these paths can be taken simultaneously.

- Put a plan together of how you will progress through the path(s) according to your desired business objectives in order to build your capabilities, offer your products, and reach new customers. If you have AWS resource contacts, use their expertise for what is not readily available in the documentation or from self-serve options.

- AWS programs are designed to accelerate your business. If you offer cloud-hosted software solutions, cloud-integrated products, or cloud-related professional, consulting, or managed services, strategically partnering with AWS can help you build your cloud expertise, promote your solutions to customers, and drive successful customer engagements.

- As you progress along your partnership journey, use promotional credits, funding benefits, and co-selling opportunities to help you build or grow your business. Use your cloud provider's marketplace channel to expand reach, and technical resources to help you mature your cloud-based products and services.

- Publish joint case studies to highlight success in solving specific business challenges.

- In addition to market research, look at AWS partners listed on AWS Marketplace. Where do you sit in the market? How is your value proposition differentiated? Which partners can you align with to form compelling joint offers? A good example would be if you are a software provider (an independent software vendor, or ISV), you can partner with a services provider for a joint offer of their services packaged with your SaaS product.

- Look for co-sell opportunities with them, and with AWS sales teams if you have reached the relevant APN benefits tier.

Advance

As you improve your capabilities and agility in the cloud, use the strengths of your partnership network, including your cloud provider, where there are operating model overlaps. Look across your business ecosystem. Wherever you identify operating model overlaps, such as marketing or supply chain, assess the strength of your network and determine where deepening existing relationships or exploring new partnerships may allow you to better serve your customers. Engage with them to discover how you both could mutually benefit from a strategic partnership.

There are four primary accelerators:

- Your people
- How you sell
- How you operate

- How you innovate

At the *Advanced* stage, you are starting to have systems in place for upskilling your people, perhaps with AWS Training and Certification and your company's Learning and Management System (LMS) for internal trainings. Look also for partnerships with AWS training and digital learning partners who can help you train your people, and train your customers. Next, improving your sales can be accelerated with AWS Marketplace for ease of procurement, deployment, and transacting. Using APN programs, look to create co-marketing and co-sell campaigns with your strategic partners.

- To improve delivery and operations, consider AWS Control Tower, Service Catalog, and service integrations such as those enabled by AWS Service Management Connector. Strategic partnerships with providers of application performance monitoring or security services can improve the value of your offers.

- Also look into the Well-Architected Program to ensure your applications and workloads are optimized. You can also build Well-Architected services and solutions for your customers. Finally, on the innovation side, as you look to further differentiate your business in the market, consider the resources from AWS Innovation programs, and remember that one of the major benefits of cloud is business agility.

Excel

At the highest level of strategic partnership, with AWS or otherwise, is a clearly defined plan with a roadmap of strategic initiatives corresponding to specific business outcomes and owners. Since it is a *strategic* partnership, it will often include a longer-term commitment (two-three years+) and require significant resource investment from each of you. Prior to constructing a partnership business plan, you will want to first earn trust by being open with what each of you want, and what you can offer.

Think big! Growth will no doubt be a goal of both partners, yet what asks are distinct to your respective businesses? What unique strengths and position can you offer in your partnership? How does your partnership add or magnify value for your mutual customers? What is currently working in the partnership, and what is not working? Having a framework you can both agree on for goals, key performance indicators (KPIs) and metrics, such as objectives and key results (OKRs) can help provide organizational alignment.

Strategic partnerships that excel provide an opportunity for both partners to transform their businesses. A cloud-driven approach can enhance and accelerate the partnership in each of the four CAF 3.0 transformation domains and provide an avenue to measure success.

- From the domain of *Technology*, there may be technical or operational challenges one partner is better positioned to solve that benefits the partnership holistically, such as creating an important integration or product feature.

- From the domain of *Process*, are there operational insights or system pain points that can benefit from your partner's solution or approach? How can you securely and ethically share data relevant to the partnership, such as when co-marketing?

- From the *Organization* domain, a major accelerator is creating partner-specific training programs and partner alliance roles to own business outcomes.

- From the *Product* domain, delivering customer-focused innovation from customer-centric perspective for your joint go-to-market areas will serve the partnership, especially where you align in mission, values, and the experience of your mutual customers.

AWS offers many ways to raise the bar on your strategic partnerships including AWS Professional Services, the AWS Partner Network (APN) with partner management for qualified partners, expert AWS Enterprise Strategists, and programs to help transform your business including the AWS Partner Transformation Program and AWS Enterprise Transformation Program. Ultimately, strategic partnerships that excel result in more successful business outcomes than could be accomplished alone.

Data monetization

Use data to obtain measurable business benefit.

Data monetization refers to the practice and associated processes to generate measurable business value from data and insights. While data monetization, as we will see later in this section, is only one of the two commonly practiced methods of generating business value from data and insights, the practice is commonly known as data monetization in title and understood as data commercialization in practice. We'll define the two practices and their specifics, but first, let's spend some time on the fundamentals of the concept.

A measurable business value ultimately results in economic benefits. However, most of higher-value business benefits generated through practices of monetizing data (for example, augmented positive impact of better decisions, enhanced productivity resulting from employee satisfaction, and improved retention) are hard or practically impossible to quantify in terms of economic outcomes, especially since simulating a scenario where such practices are absent so to create a measurement baseline is often impossible.

In most cases, the first thought crossing a business executive's mind when thinking of data monetization is selling the available data generated through the course of business operation. This thought process focuses on data commercialization, only one and often the more simplistic aspect of generating business value through data and insights.

While easier to practice, especially in case of unregulated data, the business purpose of most organizations is different than generating and selling data. Instead, they acquire and use data in support of their operation, generate it as a byproduct (albeit they often fail to fully collect or properly capitalize on the full potential of this asset), devise patterns, and rely on data usage as the special blueprint and strategic advantage that differentiates them from their competitors.

Selling their data in a data commercialization scheme will commonly translate into making their blueprint and strategic advantage, public knowledge. The foregoing is to emphasize that organizations should look at data commercialization as only one of the potential methods to generate business value from their data and, where possible, only in form of composite insights, as opposed to acting a statement of outright disregard of such strategies.

With this preamble in mind, let's turn our attention to industry practices of generating measurable business value from data and insights. In this conversation, remember to interpret the word *data* in the following methods as both pure data as well as inferences and insights generated through the combination various data sources or the latter as a source for statistical and analytical methods

that generate insights. The two main approaches of *Data Monetization* and *Data Commercialization* help you realize the value of data as a business asset.

Data monetization

Data monetization refers to practices that lead to internal business value realization in service of other business disciplines. Data monetization includes two main categories of implied return and captured value.

- **Implied return** is the first category of data monetization, and arguably the hardest to measure in terms of direct economic outcomes. Implied return typically encompasses examples with qualitative value measurement. Examples are such benefits as those realized through data dissemination (often incorrectly known as data democratization, latter a sub practice of data governance only applicable to specific and limited number of consensus based situations to manage data quality), improved data-informed business decisions, improvement in product development lifecycle (for example, to reduce rate of returns later in the lifecycle), productivity improvement through employee satisfaction, improved retention, improved overall business efficiency and effectiveness are implied value in nature.

- **Captured value** is the second category of data monetization and somewhat easier to measure in terms of direct economic outcomes. Captured value typically encompasses examples with both qualitative and quantitative value measurements. Examples are such benefits as those realized through price optimization (leading to increased volume of sales and thereby profit), cost optimization across the business value chain, customer retention, mass personalization, product cross sell and upsell and market and product opportunity identification.

Data commercialization

Data commercialization refers to the practices that focus on direct exchange through data offerings, data enhanced offerings or insights exchange. This category is easiest to measure in terms of direct economic outcomes since it treats data and insights as an independent product or features of a product. Data commercialization typically encompasses examples with quantitative value measurement.

Examples are direct selling of data through sales or licensing credit, use of data as payment method in exchange for goods and services, use of data in exchange for such value as favorable pricing, conditions (such as favorable shelf space) and discount and addition of data and insights as features to enhance desirability and marketability of a product. The latter example can lead into

secondary source of income in form of licensed or subscription-based models, whether direct or through royalty generating third party channels, that generate personalized insights or offer user friendly interface to consume generated data (such as health information from wearables).

Finally, we focus on the basic steps to embark on the journey towards generating measurable business value through data followed by a high-level maturity model to frame our expectations gain a general appreciation of the complexities surrounding these endeavors.

Foundation

- **Data and insights business value strategy** — As with any strategic initiative, executive sponsorship is an imperative necessity, business and technology governance indispensable to the success of generating business value through data.

  - Begin your journey by performing a business-focused assessment of the data landscape, both internal and currently relevant, and future potential external. The assessment should direct specific attention to identifying business use cases and revenue potentials where augmented use of data has the potential to lead to additional business value. Use the previous *Data Monetization* and *Data Commercialization* model and examples as a guide to help you frame your assessment and classify your findings.

  - The three stages of maturity proposed in the following sections can help inform the stages of your roadmap while you identify initiatives in each stage along the dimensions of business and technology governance, organizational change and communication, talent acquisition and upskilling, process improvement, and technology enablement.

  - Each stage of your roadmap should clearly identify the types of use cases the achievement of its full capability will enable. Managing expectations and clear communication will be crucial to the achievement of this endeavor, maintaining and augmenting executive and business leadership support necessary to see the journey to its successful completion.

  - Aside from identifying use cases, your assessment should cover areas of people and processes and direct emphasis on identifying areas where improvements in business and technology governance can promote adherence to future practices. Use these findings to develop a roadmap to generate business value through data and insights.

  - Obtain executive commitment and support for the execution of this roadmap, secure the resources you need and embark on your journey. Designing the initiatives section of your roadmap in form of shorter in duration yet meaningful in outcome projects (or sprints where applicable) can go a long way to help you maintain organizational interest, excitement and support.

A likely outcome of your initial assessment effort will be the identification of *data leaks*. Data leaks usually happen in three main categories of:

- Various business units buying multiple copies of the same external data set from one or different vendors

- Data or insights shared with outside parties without any clear business benefits

- Data or insights used to generate business value with poorly tracked the value (if at all)

Clearly identifying and stopping these leaks will be an example of immediate value your assessment effort is generating and can help to direct added resources and commitment to your journey of generating business value through data and insights.

Start

- **Operations data and insights business value** — The initial stage of your roadmap should focus on supporting improvement to internal operations, identify efficiencies, develop methods and capabilities to collect additional information in support of enhancing specific process or a set of interacting processes. Quick turnarounds from initiative start to business value is a core characteristic of this step in your journey.

  - In this phase, you should focus on enhancing the culture of data-oriented decision-making in the organization, strengthening the skills required for the upcoming stages of your roadmap (talent acquisition and upskilling) and improving upon the foundational technical abilities you need to promote an agenda focused on generating business value thorough data and insights.

  - Attempt to address most if not all business use cases in the implied value category in this phase. Some of the captured value business use cases could also be good candidates for this phase (such as cost optimization). However, most, especially those that are interacting with or facing your partner organizations (such as vendors, institutional clients and distributors), are likely to gain more traction and maturity in the next stage of your roadmap.

  - Depending on the nature of some of your data and insights sets, your organization and your estimate for its ability to absorb change, develop skills and deliver foundational technology. Limited number of business use cases categorized as data commercialization might prove a candidate for this phase although a good practice would be to delay these business use cases to a later stage of your roadmap and organizational maturity from this perspective.

Advance

- **Community data and insights business value** — The second stage of your roadmap should focus on extending your foundation and practices to the community of entities that play a role in your business value chain. This could include a wide range of entities such as your raw material producers, companies participating in your supply chain, government agencies (such as those regulating your industry and sector or the information it handles), your manufacturing line (especially contract manufacturers, including the labor, governmental and regulatory environment that applies to them), your distribution centers, mass distributors and individual resellers (including their return practices), your outwards facing supply chain, various financial institutions, and diverse set of information providers and consolidators to name a few.

  - The scope of this phase is rather extensive and its benefits are undeniable. You will deliver all the business use cases in the captured value category in this stage. Benefits realized in this stage are more closely and easily relatable to economics outcome and are more likely to generate immediate attention.

  - Most of the initiatives in this phase will take longer to complete, especially those requiring interaction with one or more parties involved in your value chain providing or receiving data and insights. In this phase, you will acquire additional data sources, will likely be involved in more technology integration efforts while developing predictive models that will support your business units make more informed decisions, understand and analyze potential challenges to the business before they happen, and take mitigatory actions for farther time horizons. Organizational change management and training will remain an important success factor in this stage as they were in the former one.

  - Depending on the nature of your business, this stage of your roadmap could prove the last stage of your journey.

  - Depending on the technical prowess of your organization, the nature of partnerships with various constituents in your business community, you might decide to deliver some or most of the data commercialization business use cases you have identified in this stage.

  - Depending on the scope and breadth of your initiative, you will likely consider participating in an insights marketplace (often known as data market place) mostly as a subscriber, potentially as a provider.

  - Should you decide to adopt a provider role, keep in mind that selling raw data is often the lowest form of value realization and mostly leads to short term subscribers. Explore avenue to generate and offer insights based on your data as opposed to offering the data in a raw

format. Majority of the organizations across industries and sectors identify themselves at varying level in this stage of maturity.

Excel

- **Ecosystem data and insights business value** — The final stage of your roadmap recognizes that several external factors, including other businesses likely to be active in different industries and sectors, will regularly influence your reach and business outcomes, could disrupt different aspects of your value chain, and affect your customers and their preferences. In this stage, you will devise approaches to learn from companies that share similarities with your business (for example, market to similar segments of the market, offer complimentary products or services) about experiences they had in launching a product or with an initiative in a segment or geography, or about the manner in which factors in the external environment impacted them and their performance.

  - You will more actively rely on your data and insights channels, develop more informed predictive models based on richer data sets likely wider in variety, and far more actively participate in data and insights marketplaces, likely as a subscriber more than improving your standing as a provider (selling data and insights is a by-product as opposed to core to your business). Your data ingestion practices are advanced and afford you the ability to update your business suggestion while the events and associated data are still fresh and relevant.

  - A somewhat commonly practiced example of an ecosystem level data and insight business value is when companies negotiate the rights to maintain "data residue" from services they provide to their customers. They in turn license this data, often augmented by other data residues or the insight they have generated to third parties.

  - This stage of your roadmap will depend on the maturity of additional disciplines in your internal processes (such as contract and partner management) while it will generate extended benefits to your data monetization (both implied return and captured value) business use cases through models benefiting from improved learning from enhanced data sets.

  - Very few companies will advance to this stage of maturity. Achieving an Advanced status from the perspective of generating business value through data and insights is the proper level of maturity for most businesses.

Business insights

Gain timely operational insights and answer critical questions about your business.

Use analytics to produce insights from data at the right time to track the right metrics to measure performance across the business, improve decisioning, optimize operations, and create capacity for continuous innovation.

Start

- Identify specific business decisions that require high quality insights and define data products that support these decisions. Integrate data and insights into specific business decisions to move toward data-driven decisions and away from heuristics.

- Use data to understand and discover behaviors, relationships, correlations, and issues to resolve.

- Drive from the top; engage senior stakeholders to advocate for using data and generating insights to make accurate informed decisions.

- Use metrics and success stories to align data strategy to business strategy and to grow the data sponsorship within the organization.

- Form cross functional teams focused on specific business use cases and building new data products to encourage operational innovation.

- Support teams across business, analytics, and technology functions to collaborate and use data to measure metrics and improve business performance.

- Use data to track metrics to measure business performance, identify operational inefficiencies, track product performance, and measure customer experience.

- Encourage and elevate the data conversation in business teams.

- Start to build data literacy and business taxonomy for known data.

- Bring top priority data into a single, governed repository that supports consistent data quality and preparation for reporting and traceable improvement in quality in decisions.

- Use data and insights to monitor and improve technical metrics, such as spotting siloed or poor-quality data.

Advance

- Identify impactful business initiatives and operational functions that benefit from high quality insights, and define analytics requirements to deliver such insights and measure their impact.

- Develop a portfolio of data initiatives, with some that address a known business challenge with established analytics methods (for example, reduce reporting time) and others that apply advanced methods to solve problems in a new way (such as forecasting inventory needs using ML).

- Engage executive stakeholders to advocate that analytic insights are mandatory "value add" capability. Define roles required to develop new analytics and data products and assess technical and process readiness across multiple teams.

- Expand data communities with active skill development focused on data visualization, new insights creation, and self-service access to curated data.

- Encourage sharing of knowledge, hackathons, and innovation days to develop organizational excitement.

- For select business goals and operational processes, embed data into day-to-day decision, enable self-serve insights, and automate tracking of KPIs measuring impact. Incorporate predictive insights to enhance traditional descriptive insights to improve planning and operational responsiveness (for example, assess customer sentiment and behaviors, predict equipment failures, improve supply chain forecasts).

- Define and enforce common data standards and governance, architectures and development patterns to enable consistent and efficient insights creation.

- Develop reusable, scalable architectures for the data value chain, including ingestion, transformations, cataloging, analytics, and consumption to support variety of data usage needs across the organization.

- Enable automated insights alongside scheduled analytics insights for BAU processes, ad-hoc analysis, and innovative business requirements.

- Include modern analytics technologies and expand technical expertise to run integrated analytics platforms in order to adapt to customer changes with agility.

Excel

- Showcase the business value of a comprehensive data strategy and incorporate investments of data and analytics into strategic business planning.

- Develop new markets, lines of business, and innovative products using analytic insights. Align data products teams responsible for analytics to the business and empower them to develop, test, and deploy insights using curated enterprise data and standardized DevOps methodologies.

- Reward innovation and experimentation with data and develop clear and transparent methods to identify analytic insights with high potential for business impact and enterprise scalability.

- Establish processes for aligning on business goals and opportunities, assessing their value, designing analytics solutions, developing, testing, and deploying faster than ever before.

- Democratize data through thoughtful data governance so that data is treated as a business asset, there is a single source of truth for historical, real time data feeds, and information about the outcomes of decisions made in the past. This enables frictionless insights.

- Develop standards, methods, and tools for data sharing across different business teams so that new data products can be developed with maximum independence while maintaining adherence to business policies and procedures.

Data science

Use experimentation, advanced analytics, and ML to solve complex business problems.

The use of artificial intelligence (AI) and ML are rapidly expanding within many industries and sectors, with 56% of organizations reporting in a 2021 McKinsey Global Survey that they have at least one use case functioning in their organization. Those organizations are using AI/ML on a broad range of objectives like enhancing products with AI for better customer experiences, creating new revenue streams through new product launches, reducing costs by identifying process optimizations, and many more.

Start

AI/ML technologies enable innovation by converting data at hand into tangible information that can be used to make or improve decisions.

- Begin by defining business problems that can be solved with AI/ML, and have a clear idea of the business value to be gained.

- Establish an observable and quantifiable performance metric for the project.

- Formulate the ML question in terms of inputs, desired outputs, and the performance metric to be optimized.

- Evaluate whether ML is the right approach. Some business problems don't need ML and simple business rules can do a much better job. For other business problems, there might not be sufficient data to apply ML as a solution.

- With the relevant stakeholders, brainstorm which value drivers could be improved through the use of automation or model prediction. This could be through the reduction of manual processing of data or through the consistency/improvement that an automated process would bring.

- Find the key decision points along the process and collect an inventory of data that could be used to inform those decisions.

- Frame the decisions and the data into the AI/ML context. Conduct a proof-of-concept study with offline data to test whether the problem can be modeled and if the required business value can be achieved. If the results are not satisfactory, reframe the problem, collect more data, or move on.

- Workshop to see how the stakeholders will use the modeling results in their process. Maybe choose an owner from the business who will collect user requirements and give feedback.

- Create an approach for collecting, cleansing and joining the data that comes from different data sources. Creating reliability within this data pipeline will allow you to begin to experiment with different proof of concept approaches with minimal investment to better understand what insights your organization values and highlight areas for future focus.

- Once you've identified a successful approach, build a Minimum Lovable Product (MLP) to validate the return on investment (ROI) in a real-world business scenario. The MLP can then be augmented and enhanced to create your first productionized AI/ML solution.

- Collect feedback from the stakeholders and improve the solution. If the results are acceptable, create an approach for collecting, cleansing and joining the data that comes from different data sources.

Advance

- Enable the broader organization to think in the AL/ML context. Framing an AI/ML problem is simply another competency just like mathematics or programming. Anyone from the organization can lead an initiative, but it is essential that the leader has a firm understanding of the business drivers and can formulate how the solution will be used. Data scientists and engineers can be consulted to create an initial scope and estimations.

- Define value from a business point of view and work out the value of key metrics in financial terms; there are many value-based management approaches that can be applied. This way any improvement or automation can have a business value and a return on investment attached.

- Once you've identified opportunities where data can drive value for your customers and organization, begin creating mechanisms to allow you to deliver insights programmatically throughout your organization.

- Create the right environment for this invention of ML value to happen. Paramount to this is making data accessible within the organization in a standard way. Allow people to be able to access data relevant to their roles and get them to explore how they can automate their analysis and reporting.

- Define your organization's approach to data warehousing to provide access to data to everyone who needs it. Utilize data pipelines and data catalogs to support the building, training, and testing of your ML models. Use continuous integration and continuous delivery (CI/CD) practices to improve operational resilience and reproducibility of your ML workflows.

- Enable other groups to use the insights created by sharing information through dashboards and data visualizations. At the same time, iterate frequently while you measure the effectiveness and the route to business value. Learning from your experiments will form the basis for future approaches tailored to your organization.

- Instrument your model and pipelines to monitor their performance, ensuring that they are behaving in production as expected. Continuous monitoring will reveal whether model outputs are matching what you expect, or whether they are drifting.

- Build an approach to adjust or retrain your models proactively, this may require data scientists to interpret results and review changes in response data changes and retraining.

- To help mitigate risk, delegate low confidence predictions for human review.

- Set up a review process to evaluate how implemented projects are working. Sometimes things do not go as planned; perhaps the projects do not realize the saving, or user interaction is low. Always get feedback and use the findings to update and improve the model pipeline.

Excel

As the number of ML projects grows, the need for an effective governance strategy for data and automation becomes more pressing. This responsibility cuts across your organization, from the central infrastructure and IT teams, DevOps, data engineering, ML Ops, data stewards, and business stakeholders. Governance provides a common operational model with well-defined guardrails to allow scaling ML beyond specialists.

- Use multi-account patterns to organize, standardize, and expedite the provisioning of secured, governed ML environments to provide teams with flexibility in their tooling choices. Flexibility enables teams to use production data to train high-quality ML models to move fast to meet business objectives.

- Set up a centralized, curated, and secured repository that stores all your data, both in its original form and prepared for analysis.

- Grant fine-grained access to datasets, and audit access over time across a wide range of analytics and ML tools and services.

- Secure access to your sensitive data using granular controls at the column, row, and cell-levels. Let your users access a centralized data catalog that describes available datasets and their appropriate usage. They can then use these datasets with their choice of analytics and ML services.

- Set up methods to trace ML model lineage from data preparation, model development, and training iterations, and how to audit who did what at any given point in time, across different accounts. This includes the ability to reproduce the ML model based on model lineage and the stored artifacts.

- Enable methods that help explain and interpret the trained model and obtain feature importance. Empower all teams and individual decision makers to create ML systems at scale. Business users or data analysts can build prediction systems based on the data they analyze and process every day, without having to learn about hundreds of algorithms, training parameters, and evaluation metrics, and deployment details.

Conclusion

Digital business transformation is no longer a question of if or when, but a question of how. While technology is both a critical driver and an enabler of digital business transformation, to increase the likelihood of success, your transformation needs to be business-driven rather than technology-driven. Implementing the eight capabilities identified in this paper can help you ensure that your cloud investments accelerate your digital transformation ambitions and business outcomes.

AWS CAF perspectives and foundational capabilities

Business

- Strategy Management
- Portfolio Management
- Innovation Management
- Product Management
- Strategic Partnership
- Data Monetization
- Business Insight
- Data Science

People

- Culture Evolution
- Transformational Leadership
- Cloud Fluency
- Workforce Transformation
- Change Acceleration
- Organization Design
- Organizational Alignment

Governance

- Program and Project Management
- Benefits Management
- Risk Management
- Cloud Financial Management
- Application Portfolio Management
- Data Governance
- Data Curation

Platform

- Platform Architecture
- Data Architecture
- Platform Engineering
- Data Engineering
- Provisioning and Orchestration
- Modern Application Development
- Continuous Integration and Continuous Delivery

Security

- Security Governance
- Security Assurance
- Identity and Access Management
- Threat Detection
- Vulnerability Management
- Infrastructure Protection
- Data Protection
- Application Security
- Incident Response

Operations

- Observability
- Event Management (AIOps)
- Incident and Problem Management
- Change and Release Management
- Performance and Capacity Management
- Configuration Management
- Patch Management
- Availability and Continuity Management
- Application Management

AWS CAF perspectives and foundational capabilities

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Further reading

For additional information, see:

- [AWS Architecture Center](#)
- [AWS Case Studies](#)
- [AWS Cloud Adoption Framework](#)
- [AWS Cloud Adoption Framework (eBook)](#)
- [AWS General Reference](#)
- [AWS Knowledge Center](#)
- [AWS Prescriptive Guidance](#)
- [AWS Quick Starts](#)
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AWS Glossary

For the latest AWS terminology, see the [AWS glossary](#) in the *AWS Glossary Reference*.