



2024 INDUSTRY INSIGHTS

Banking on the Cloud



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Introduction

The pace of change in the banking industry remains brisk, fueled by evolving customer expectations, the creation of new business models, and the application of new technology that accelerates innovation and transformation.

In our inaugural Banking on the Cloud report, published in 2023, we explored seven trends that are changing how banks serve customers, as well as operate and secure their enterprises. These trends will persist in 2024, and will continue to shape the industry. At the same time, we're seeing the emergence of several important new trends and the evolution of others.

The 2024 Banking on the Cloud report combines insight from analyst firms and global consultancies with knowledge gained by working alongside our customers in the banking industry.

We view each trend through a lens of “how” banks are responding and transforming their organizations to capture value in an evolving market. We also outline how Amazon Web Services (AWS) is helping our banking customers to accelerate their journey.

Generative artificial intelligence (AI) is transforming how banking services are delivered, and how humans will interact with computers. In this report, we highlight how banks are using generative AI in the activities of banking to transform and reimagine their customer interactions, as well as their internal processes.

As always, your feedback is very important to us, and we look forward to hearing from you.



Charith Mendis

*Head of Worldwide Banking Market Development,
Amazon Web Services*

2024 Banking Trends

This year, we again highlight seven trends—some new and some that have evolved from last year—that we’re seeing banks focusing on in 2024 and likely beyond to drive innovation, improve customer outcomes, and enhance core operations in the bank.



- 1 | Enhancing the customer experience**
- 2 | Evolving ecosystem banking**
- 3 | Disrupting fraud and financial crimes**
- 4 | Advancing ESG in banking**
- 5 | Implementing composable banking**
- 6 | Modernizing finance**
- 7 | Transforming compliance and internal audit**

TREND 1

Enhancing the customer experience

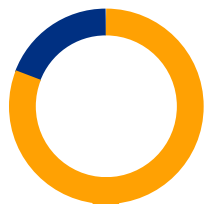
AI and machine learning (ML) capabilities are increasingly essential as banks work to differentiate their services to achieve a competitive advantage.

Recent research on AI/ML and generative AI in banking conducted by AWS and Qorus indicates that:



49%

of respondents are leveraging AI/ML today to manage customer experience¹



82%

of respondents highlighted AI/ML investments to improve customer experience as a top priority over the next 12-18 months¹



How banks are evolving their customer experience

Customer experience is an ongoing priority for banks. It continues to evolve, and in the later part of 2023 we saw increased focus on two areas that we anticipate will continue into 2024 and beyond.

Improving experience for corporate customers

Our banking customers have told us that they've historically focused on customer experience in retail banking due to scale and the standardized nature of products. This is changing, however, as we see saturation in the retail sector, AI/ML advancements that are making it easier to understand complex customer needs, and the growth of financial technology companies (FinTechs) in the small business banking market. Banks are recognizing the importance of expanding their focus to the specific needs of business customers, who often have more complex requirements, higher service expectations, and seek a more seamless experience.

We see our banking customers investing in several areas:

Data-driven, relationship-centric service: Banks are improving their corporate banking relationships by providing greater insights to their customers, such as predicting cashflow, that allow chief financial officers (CFOs) to arrange lines of credit ahead of shortfalls. This is done through the application of data, both internal and external to the bank, coupled with AI/ML to provide insights that customers can leverage to inform their business strategy. For example, [Goldman Sachs](#) built its transaction banking service on AWS and offers real-time data insights into cash transactions and payments, as well as integrated reporting. The company also leverages ML on transaction data to offer cash flow analytics and support cash flow forecasting.

Seamless omnichannel experiences: Banks are embracing digital channels to service their corporate banking customers. This enables the delivery of real-time information, such as account balance transactions and financial insights (for example, 30-day cash position forecasts), which drives informed decision-making and supports anytime, anywhere services at a much lower cost. Banks are also integrating their platforms across various customer channels (such as voice, web, and chat), streamlining processes, and eliminating the need for multiple software systems. This reduces costs and makes it easy and intuitive for businesses to navigate their finances.

Ecosystem integration: Last year, we explored how banks are using APIs to transform treasury services for small-and medium-size businesses (SMBs). We're seeing banks accelerate adoption of this API-based approach broadly across commercial and SMB banking, including areas such as lending, payments, trade finance, and merchant services. Customers benefit from the enhanced efficiency gained through integration with their accounting software and the ability to automate payment flows. SMBs also gain added value through access to innovative third-party solutions. These capabilities lead to a more positive and engaging banking journey. For example, [Klarpay](#), a Swiss FinTech company, built an API-enabled transaction banking platform on AWS that serves modern online businesses. It provides a full range of products, such as API-enabled multi-currency accounts, virtual international bank account numbers (IBANs), and corporate expense cards.

Leveraging generative AI to enhance the customer experience

Customer experience is being improved by leveraging generative AI, albeit with the first use cases involving a human in the loop. Accenture highlights that client interactions and advice are responsible for approximately 80 percent of banking revenue. The group also projects that generative AI could result in a 17 percent increase in time allocated to these functions by removing non-value-add manual effort, such as summarizing external and internal information, scanning knowledge repositories to prepare recommended answers, and more. This additional time could translate into a potential 9 percent revenue increase.²

While banks are looking to leverage generative AI across the entire customer journey, we're seeing the most interest today in the following use cases:

Personalization: Banks have used AI to predict what a customer might want and the propensity of a customer to engage with one offer over another. Generative AI extends personalization to the content and imagery of the message, depending on whether it will be sent through text messages or a more open format like email. For example, [NatWest](#) is using AWS generative AI services to create hyper-personalized, branded content, delivered at scale with variation in content generation across channels. While recently deployed and involving a human in the loop for review, this initiative has **resulted in a four-fold improvement** in message click-through rates and a 900 percent increase in high-interest saving account applications.

Customer Service: This function is going through an evolution with generative AI, making it easier for customers to obtain (and for employees to deliver) highly personalized service—with early use cases including an employee in the loop. AI/ML has been used to identify sentiment patterns and trends, and generative AI is now being used to summarize those items for agents (or customers) using a bank's knowledge repository. For example, one of our financial services customers is experimenting with generative AI to empower agents with real-time, personalized response suggestions to boost service speed and improve customer satisfaction.

How the cloud helps banks transform the customer experience

AWS helps customers deliver innovative customer experiences through the power of cloud and AI/ML, including:

Accessible and flexible generative AI capabilities: AWS is the easiest place to build with leading foundational models (FMs). With Amazon Bedrock, banking customers can access leading foundation models, customize their own data, and use the leading security, access control, and features. Customers can also train and run inference at scale with infrastructure purpose-built for machine learning. From the highest performance GPU-based Amazon EC2 P5 instances to our purpose-built accelerators AWS Trainium and AWS Inferentia—customers get the most performant and low-cost infrastructure for generative AI. Use AWS generative AI-powered applications to transform user experiences. AWS provides powerful new applications that can help you boost productivity, streamline coding, and simplify business intelligence. For example, Amazon Q your business expert, delivers quick, accurate, and relevant answers to employee business questions, securely and privately. With security and privacy built in, easy customization, and seamless data integration, you can quickly take advantage of generative AI adapted to the specific needs of your organization.

Unification of data: AWS enables banks to cost-effectively aggregate disparate data sources across departments and lines of business to drive insights that enable more personalized services. Rather than replicating data into a centralized data warehouse or lake, AWS makes it more feasible to analyze data spread across databases, storage systems, and regions through on-demand connectivity, all while providing fast response times to ad-hoc analytical queries.

Faster experimentation and greater agility: AWS accelerates innovation by allowing companies to quickly experiment and prototype ideas at scale. On-demand access to resources such as storage, compute, analytics, and AI removes infrastructure limitations and setup time so teams can focus on rapidly creating and deploying new products and features to differentiate their organizations in the market.

By harnessing the power of cloud computing, banks can forge deeper relationships with their customers, drive growth, and establish themselves as trusted partners in the financial journey of individuals and businesses alike. Customer experience transformation in banking is not a one-time project, but an ongoing journey. Banks that embrace innovation (including generative AI, leveraging data, and empowering their employees) will be well-positioned to deliver exceptional customer experiences and thrive in the ever-evolving financial landscape.

TREND 2

Evolving ecosystem banking

By 2025, approximately 30 percent of the revenues in the financial services industry will be generated through cross-industry ecosystems, and the greatest opportunities for banks are ecosystems related to housing, mobility, services for the elderly, and travel and hospitality, according to Deloitte.³ These ecosystems are primarily based on collaborative models, set up with the knowledge that no single business can address all the needs of its customers, and a collective of differentiated businesses is much better positioned to do so.

Therefore, it's not a surprise that we're seeing banks explore ecosystems (both those they own and those that they integrate with) to provide customers with contextualized offerings that improve the overall customer experience.



77%

of banks say ecosystems will have significant importance in the future growth of their business³



75%

of banks expect to be an active part of an ecosystem in the next three years³



How banks are leveraging their ecosystem approach

In the 2023 Banking on the Cloud report, we covered how banks were approaching ecosystems in general. This year, we're exploring how banks are extending the concept of ecosystems to capture cross-industry opportunities. Emerging technologies are making it possible for banks to strengthen their digital core by leveraging the power of cloud, data, and AI through an interoperable set of systems across the company. A strong digital core allows enterprises to develop new capabilities rapidly, try new things with less risk, and fail fast when needed.

We highlight three examples below.

Business-to-consumer (B2C)

Many banking and financial services firms began their ecosystem journey with the retail and B2C sectors, as they attracted new customers, including those without credit cards, with contextualized offers at the point of check out on e-commerce sites. We saw this with buy-now-pay-later (BNPL) offerings with Affirm, Klarna, and others.

Banks can meet rising customer expectations by applying AI to offer intelligent propositions and smart servicing that they can seamlessly embed in partner ecosystems. Imagine that your bank, in addition to offering its current financial services, could provide customers with the latest smartphone a few days after the launch of the new model in a few clicks from your banking app.

As a part of these offerings, banks are capturing data about consumers' shopping patterns and prior purchases, which is helping to inform AI/ML-based credit models that banks can then use to make decisions on credit for their end users. [Itaú Unibanco](#), for example, launched the Itaú Shop, which is at the heart of their ecosystems strategy. Itaú Shop is a mobile-app-based marketplace offering products and services from the bank's third-party partners. It enables a frictionless journey with the bank's digital channels and a simple and secure payment experience, with the option of 12 interest-free installments for all products.

Automotive/mobility

Financial services organizations have long been part of the automotive purchasing journey, whether through a bank providing a secured loan or an integrated offering from a captive finance provider. We see this trend evolving today, with many financial services organizations building ecosystems that extend from simply the loan to purchase the car to the complete ownership, servicing, and re-sale journey. To achieve this, our customers are partnering with other companies within the ecosystem to either personalize offers or use sensor data to enhance decision-making for their customers' financing needs. One example of a partnership is between [HDFC Bank](#) and Tata Motors. This collaboration enables Tata Motors' customers to easily access HDFC Bank's vehicle financing solutions through Tata's online sales platform and mobile application, Tata e-Guru.

Housing

Banks and lenders are an integral part of the home buying journey. Today, the banks we're working with are expanding their focus to encompass the entire value chain—from the discovery phase and using external data to better help their customers through purchasing, renovating, and, ultimately, re-sale of their home. Banks do not need to deliver all of these services directly, rather we see a combination of ecosystems that a bank may wish to own, with partners embedded into the bank's ecosystem, compared to those where they embed their services into another industry's value chain by using their partners. They're building ecosystems across these value chains by integrating with different parties, such as notaries, architects, and construction and renovation companies.

BBVA's ecosystem banking is a great example of how a bank can partner with other organizations to contextualize and transform more traditional approaches to home buying by creating new options that are helping consumers become homeowners more easily, quickly, and with a more personalized experience. For example, BBVA's API for mortgages enables partners to help their customers access the necessary financing to buy a property without leaving the partner's digital platform.

How the cloud helps banks to build a cross-industry platform strategy

In our experience helping banking customers build their ecosystems, we've found that agility and speed are important. This includes being able to experiment and shift models without a significant capital expenditure to explore various ecosystem opportunities. Cloud is ideally suited for achieving agility and speed in a cost-effective way.

AWS supports financial institutions to imagine and create ecosystems through:

Seamless integration that drives cross-platform ecosystems: AWS services enable banks to achieve seamless integration across multiple cross-industry platforms and access the real-time data feeds needed to create rich ecosystems. This is done through the use of services like AWS PrivateLink, which allows customers and partners to connect services without using public internet lines. Advancements in technology, including APIs and cloud computing, have facilitated the growth of embedded finance. This has made it straightforward for non-financial businesses to integrate financial services into their platforms by using common developer portals and API integrations.

Accelerated product velocity: The cloud enables banks to innovate rapidly and roll out new features and services based on customer feedback and market needs. This is done through enhanced DevSecOps tooling, capabilities, and patterns that simplify change management and the developer experience. Beyond this, banks can build, test, and scale environments to match their needs by using the scalability of AWS. For instance, during the COVID-19 pandemic, Block (formerly called Square) quickly launched new features to support online selling and contactless payments for businesses pivoting to digital operation for their ecosystems—bridging their services with other FinTechs.

Enhanced data analysis for embedded finance: AWS offers tools for data analysis and AI, enabling financial institutions to gain deeper insights from their data and quickly make decisions, such as being able to approve a 12-month installment loan at the point of checkout. This capability can enhance decision-making, risk management, and customer service, that is core to embedded finance capabilities. These data-driven insights also inform the personalization of customer experiences and product customization. Customers like [Affirm](#) use AWS to manage, analyze, and apply ML tools to large and real-time data sets for more efficient lending decisions.

The cloud has facilitated the growth of cross-industry platforms, new ecosystems, and embedded finance through the use of scalable infrastructure, ease of integration, and access to AI/ML to remove friction. This has made it easier for non-financial businesses to integrate financial services into their platforms.

TREND 3

Disrupting fraud and financial crimes

Financial crime continues to evolve as fraudsters leverage more sophisticated and advanced methods to circumvent detection. More than 59 percent of financial firms expect financial crime levels to rise, and 58 percent expect to hire more staff to combat increases.⁴

Banks also face rising costs associated with financial crime, with approximately 60 percent of financial institutions reporting an increase in compensation to customers related to fraudulent transactions.⁵ Banks also see the emergence of new types of fraud that lead to the need for increasingly sophisticated prevention mechanisms. Synthetic identity fraud alone costs banks \$6 billion annually and is one of the fastest growing financial crimes globally as data breaches became more prevalent.⁶

Realizing that financial crime is an ever-moving target, financial institutions are adopting modern technology, such as big data and AI/ML, to develop an effective financial crime prevention framework that can adapt quickly to accommodate emerging threats. Although this has led to significant improvement in fraud detection, banks still face limitations in detecting potential fraud in inter-institutional financial transactions, as fraudsters move money multiple times across institutions.



>59%

of financial firms expect financial crimes levels to rise⁴



58%

of financial firms expect to hire more staff to combat increases⁴



4. Comply Advantage, [The State of Financial Crime](#), 2023.
5. LexisNexis Risk Solutions, [Financial Crime Compliance | 7 Trends to Watch in 2023](#), 2023.
6. KPMG, [Synthetic identity fraud](#), 2022.



How banks are disrupting fraud and financial crime through collaboration

We explore two approaches that banks and technology solution providers are taking to establish and strengthen financial crime data collaboration, while complying with data privacy and other regulatory requirements.

Financial institution-led consortiums

With over \$800 billion in money laundered annually, there is growing expectations that financial crime risks will continue to rise.⁷ One emerging approach banks are adopting is enhanced data collaboration with other financial institutions to detect and prevent fraudulent money movements within an institution and across multiple institutions. Banks now seek improvement in fraud detection mechanisms as they look beyond traditional rules-based approaches. Banks do this in several ways. For example, banks are capitalizing on access to consortium-led fraud datasets that capture fraud typologies beyond what a single institution may face. They're also leveraging AI/ML and data analytics at scale to run on datasets that span transactions from a variety of institutions.

Several banking customers utilize network analytics alongside graph vectors to create and build a network effect of transaction movements, which includes accounts, customers, location, channel type, and transaction type, to identify fraudulent patterns. These network effects have shown higher efficacy as they span multiple institutions to capture a holistic view of transactions and counterparties.

Regulatory technology solution providers offering data consortiums and analytics

As regulators become more supportive of using modern technology, such as big data analytics and ML, to improve the efficacy of money laundering programs, we see the emergence of regulatory technology (RegTech) solution providers. These providers are building aggregated data lakes that pool and securely store transaction data received from a diverse set of financial institutions. This allows RegTech companies to have a holistic view of transactions to capture known patterns and also use ML to detect emerging patterns of fraudulent transactions. Banks, thus, benefit by having API-driven access to risk rank their financial transactions based on potential fraud attributes assessed against a variety of patterns existing in the data lake.

For instance, [Verafin](#), a Nasdaq company, leverages AWS to provide industry-leading financial crime management solutions.* Their approach uses consortium data from 2,500 financial institutions, in a cloud environment powered by AWS, to provide exceptional fraud prevention, including effective detection for payments, check and deposit fraud, as well as effective money

laundering detection. Using AWS allows Verafin to offer the agility and scale needed to store large data sets and run analytics at scale and in real-time. In a recent proof of concept with a Top 5 U.S. Bank, Verafin's approach delivered a 25 percent reduction in false positives and a 250 percent improvement in wire fraud detection by value.

Similarly, [Mastercard](#) uses AI/ML at scale to detect and prevent fraud, realizing a 300 percent increase in fraud detection while reducing false positives tenfold.

How the cloud enables and accelerates the build of financial crime data consortiums

Irrespective of the method used to build a financial crime data consortium, the approach requires a mechanism for secure data transmission, the ability to build and access immensely large and diverse datasets while ensuring data governance and data privacy, and the capability to run on-demand or real-time analytics. AWS enables a robust data consortium build that supports enhanced suspicious transaction detection across different financial institutions.

We support our customers in several ways as they build out consortium initiatives.

Scalable data lake and analytics: AWS enables API-based integration with financial institutions' core banking systems to import transactional information and other data as needed for consortiums. AWS Cloud-based APIs provide better integration with security and authentication services natively. Financial institutions can build secure, private connectivity for such data transfer using AWS PrivateLink and AWS Direct Connect services, even if they are not yet on the cloud. This allows for a scalable data lake built with a defined data model for input from multiple institutions. AWS also provides data and analytics services, such as Amazon EventBridge, to help integrate data and provides clean rooms that offer a mechanism to share data with external parties.

Data security: As consortiums hold data from multiple financial institutions, security and data privacy are of the utmost importance. Using data lakes on AWS, consortiums keep data encrypted using key management services while allowing for fine-grain security and control (row- and cell-level permissions) over personally identifiable information

(PII). For example, [TMNL](#), an independent entity formed by the top five banks in the Netherlands, is harnessing cloud-based data lake and ML capabilities to build a secure data lake containing anonymized customer and transaction data from all five institutions. It is also building ML models at scale to enhance transaction monitoring and fraud detection.

Streaming data feeds: Using cloud technology, banks can set up both real-time and batch data feeds into a consortium from their internal systems, such as teller systems, check imaging, card providers, peer-to-peer (P2P) platforms, wire processors, automated clearing house (ACH) systems, and online banking platforms. All of the data is standardized using extract, transform, and load (ETL) services as part of the data exchange, so it's easily accessible for analysis by consortium participants.

ML at scale: As consortium-based transaction monitoring and detection involve significantly more data (typically at the petabyte scale) and diverse patterns to monitor across financial institutions, banks are relying on cloud-based ML deployment that can scale to meet such demands. Customers are leveraging graph vectors and network analytics for comprehensive transaction monitoring, which can be significantly compute-intensive, therefore it is more efficient and cost-effective to deploy them in the cloud.

Financial crime continues to grow in volume and sophistication. Increasingly, banks and regulators are realizing that they are stronger when they collaborate, fueling the creation of a growing number of financial crime data consortiums. These consortiums, which leverage vast amounts of data and sophisticated AI/ML tools, require tremendous compute and scale, as well as the most advanced security controls. AWS is uniquely qualified to effectively and cost-efficiently meet these needs and support important anti-crime initiatives.

TREND 4

Advancing ESG in banking

The global transition to a net zero economy will bring about a €19 trillion financing opportunity for loans and bonds toward 2030, which could represent an opportunity of €215 billion in bank revenues in the form of credit spreads on green and sustainable lending products.⁸ Hence, it's no surprise that ESG is a priority in C-suites and boardrooms across the industry.

Beyond the revenue opportunity, banks play a unique role in society and the economy by providing access to capital to corporates, governments, and individuals. As such, they're looking across a broad range of ESG factors, including mandatory reporting, changing consumer and corporate behaviors, and integrating ESG into lending and risk management processes.

How banks are leveraging and evolving ESG strategies

Although mandatory reporting for ESG and sustainability impacts are becoming common across all organizations, below we dive deeper into how ESG is being applied to the business of banking across lending, consumer behavior, and risk management.

Consumer behavior

Banks see customers seeking a better understanding of their emission impacts, and they're leveraging AI/ML to analyze transactions and report on the potential ESG impact of purchases to their end customers. To enable this capability, they need the ability to process transactions and ingest and process unstructured data to determine the sustainability impact (assumed CO2 output), even when L3 receipts (line-item data about what customers purchased) don't exist. For example, [NatWest](#) uses Cogo on AWS to launch an in-app carbon-footprint tracking feature that helps 8 million customers to identify and understand how their spending affects the environment.



8. Alvarez & Marsal, [ESG as a business opportunity](#), 2022.



TREND 4: ADVANCING ESG IN BANKING

In addition, banks increasingly are taking a holistic view to help customers understand and change their environmental impact. To achieve this, they're building ecosystems to help homeowners understand their financed emissions across the complete home ownership life cycle, as outlined in Trend 2. They're also integrating smart metering data (accurate and up-to-date consumption data that enables both utilities and consumers to monitor and manage energy usage more effectively) to provide customers with insights. Further, they are introducing partners that can help them to reduce their emissions (for example, by installing solar panels or a heat pump), and, thus, lower the bank's financed emissions for customers where the bank is the lender.

Lending

Banks are leveraging ESG data within the credit-decisioning process to assess future ESG risk and undertake portfolio exposure analysis. To support this, they're leveraging data ingestion and management capabilities to consolidate structured and unstructured data from sources such as annual reports, ESG files, and data aggregators providing structured data feeds with services such as Amazon Data Exchange. This external data is being processed and included within the credit decisioning process to determine credit worthiness and inform additional covenants.

Beyond using ESG data for credit decisions, banks we're working with are also using alternative data to inform their credit decisions to support their ESG objectives. We see this especially in the case of using alternative data to better meet the needs of underserved individuals and SMB customers. For example, [Serasa S.A.](#), leverages alternative data and AI/ML models to offer credit to underserved customers in Brazil, and integrates generative AI using Amazon Bedrock to provide customers with the education they need to use and manage credit while creating financial freedom.

Risk management

Banks are leveraging optical character recognition (OCR) and AI/ML capabilities to ingest, process, and analyze ESG data from external sources, such as corporate filings, news feeds, and more to optimize portfolio credit risk models and understand impairments, covenants status, and counterparty risks in near real-time. For example, [Broadridge](#) automated the extraction of ESG and other data points from proxy voting forms, which was previously a manual task that required a team of 160 individuals and over 50,000 hours. Using AI/ML tools, Broadridge significantly reduced manual efforts and can now generate insights from over 5 million proxy voting data points going back more than 10 years.

How the cloud is helping banks to accelerate their ESG strategy

Our banking customers are leveraging the cloud and digital capabilities to build or buy solutions that use ESG data to reduce their carbon footprints, protect financial and social capital, and comply with emerging disclosure requirements.

The ability to consume external data is key to enabling the use cases noted above, however, this has often been a challenge for banks. Today, with services like Amenity, Amazon Data Exchange (ADX), Clarity AI, and Sustainalytics, banks have a single location to source, test, and integrate data directly into their existing data pipelines.

Once banks have access to a common view of internal and external data, cloud-based AI/ML solutions can provide them with the ability to modernize their credit and risk models and drive insights that further inform their ESG strategy. These solutions enable them to:

Streamline data collection: Pre-built services such as Amazon Textract reduce the time to market and effort on non-core development activities. Broadridge, for instance, used the service to streamline its manual data collection processes, as mentioned previously.

Improve efficiency: Managed AI/ML services allow data scientists to focus on model development, rather than the underlying infrastructure management. For example, by using Amazon Sagemaker, [OakNorth](#) can rapidly spin up the resources needed to train and test new models. This capability enabled it to go from releasing software once per month to every other week. Through the use of technology, OakNorth maintains a cost-to-income ratio of less than 30 percent.

Experiment quickly: AWS provides the scalable compute needed to train and manage LLMs and the cloud-based data storage needed to support these LLMs in a way that is more cost efficient than on-premises data centers. AWS offers our banking customers the flexibility to choose the right LLM and cost structure for their use case through services such as Amazon Bedrock and Amazon SageMaker Jumpstart.

In addition, running their enterprises on AWS can also help banks to reduce their overall carbon footprint. For example, AWS infrastructure is up to five times more energy efficient than typical European data centers. In addition, in 2022 more than 90 percent of the energy consumed by Amazon was attributable to renewable sources.⁹

Building the foundation to respond effectively to ESG is, in part, a data and technology problem for banks. By using AWS capabilities, banks can focus on those things that will inform their strategic response, rather than the commodity activities of sourcing and structuring external data, managing infrastructure, or building stove-pipe integrations to share data across partners.



TREND 5

Implementing composable banking

We're seeing our customers increasingly adopt a composable architecture pattern while building out core banking platforms in the cloud because of the agility it offers in driving modern customer experiences. Gartner predicts that organizations that have adopted a composable approach will outpace competition by 80 percent in the speed of new feature implementation.¹⁰

Composable architecture is a practice where an application is built by assembling multiple smaller modules together. The modules are generally self-contained and offer a specific functionality through a pre-defined and standard set of APIs. Composable banking applies this architecture approach where a module (such as deposits, loans, or mortgages) can be added, deleted, or swapped with a different module without having to overhaul the entire application. Pre-defined APIs are what make the platform composable as they are not tied to any single platform or solution, but rather are standards that a bank adopts. Banks and technology providers either develop custom APIs or use available industry standards to implement the API integration layer.

It's a complex process for a bank that sits on a legacy platform to achieve a composable platform. Banks have historically been adding new features and capabilities to their legacy core banking platforms, which were typically hosted on mainframes. As a result, these legacy platforms have become bloated with complex code and functionality making it increasingly difficult to add new functionality and accelerate speed to market.

McKinsey recently highlighted that adding complex functionality to a legacy core could take a bank anywhere from 200 days to more than 400 days. Whereas, on a modern core, a bank could add the functionality in less than a month.¹¹

With the adoption of cloud, many banks, as part of their broader modernization journey, are addressing the shortcomings of their legacy cores by moving to a composable core banking platform. This approach enables them to combine best-of-breed solutions using APIs as the interface layer to form a composable platform, rather than going with a single monolithic solution.



10. Gartner, [Gartner Identifies the Top Strategic Technology Trends for 2022](#), 2021.

11. McKinsey & Company, [Next-gen Technology transformation in Financial Services](#), 2020.

How banks are achieving composable banking

Banks that are modernizing their core platforms primarily take one of two approaches to achieve composable banking.

Digital challenger

In the first approach, banks are looking to provide a cloud-native digital platform to their customers in the shortest possible time. They develop the entire composable architecture that covers most or all of the lifecycle associated with a customer journey from onboarding through to the core banking platform in the cloud. This composable architecture allows them to change the onboarding platform, if necessary, without affecting the rest of the platform and the customer-focused functionality it provides. Once the target state is defined, banks onboard new customers onto the target platform, and then gradually migrate the existing user base in phases.

For example, Western Union used Deloitte's Converge Prosperity solution on AWS to offer a digital banking solution to its customers in Germany, Poland, and Romania in just under 11 months. Over time, they were able to offer additional value-add products to their customers because of the composable nature of the platform.¹²

Phased migration

The second approach is to phase the migration from the legacy core to a cloud-native, composable platform in increments. Specifically, a bank first breaks down its mainframe application into specific domains and/or modules and then defines the API interfaces and data domains for interoperability of the modules. Next, it develops a cloud-native API interface layer on top of the legacy core platform, which facilitates the interaction between the legacy platform and the composable modules built in the cloud. Finally, the bank builds composable modules in the cloud that will replace the specific functionality of the legacy platform and migrates the data for that module from the legacy platform to the cloud.

An example of this approach is the work that Mambu and Thoughtworks did to help Bluestone, an Australian non-bank lender, transition its business from the mainframe to a distributed cloud-native composable architecture on AWS in just under seven months.¹³

Banks typically use the first approach when they're looking to add new products and experiment on these new products and offerings. Banks that are focused on modernizing their existing customer experience and also want to focus on improving total cost of ownership of the platform are more likely to use the second approach.



12. Deloitte, [Deloitte Collaborates With AWS to Put Enterprise-Class Banking Solutions in the Hands of Consumers Faster](#), 2022.

13. Thoughtworks, [Cloud-native composable banking: a guide for courageous leaders](#).

How the cloud helps banks enable composable banking

Our customers are leveraging AWS services to accelerate modernization by utilizing the scalability, agility, and the large partner network that is inherent to the cloud. At the same time, they're improving the developer experience by providing modern tooling and automated development pipelines and making it straightforward to follow DevSecOps practices. Our services enable:

Increased agility and flexibility: Developers can spin up new staging and development environments quickly to build and test new features at very low cost. They also can try new services by updating or making new API calls, which leads to faster innovation cycles.

Scalability: Banks can develop and release new services and features without having to worry about scaling the underlying infrastructure. They also can scale the microservices individually up and down to meet changing business requirements. For instance, with a statement generation module, a bank does not have to plan and run the module for peak capacity for the entire month. It can scale up the workload for the time of the event and then scale it down to zero for the rest of the month.

Partner ecosystems: Given that many of the modules in a typical banking platform are often provided by third parties, building a composable banking platform on the cloud can be made much easier given the large partner network available in the cloud as compared to an on-premises environment. For instance, [SBI Sumishin Net Bank](#) leveraged APIs to create new value in financial services for its many partner corporations and their customers. As part of this strategy, it has introduced AWS PrivateLink and begun connecting FinTech corporations with financial institutions. Currently, this is used for online personal authentication like electronic know your customer (eKYC), mortgage screening through AI, AI OCR for handwritten application forms, and foreign exchange rate synchronization.

We're starting to see more banks that are modernizing their core platforms adopt a composable banking pattern. This approach enables them to offer best-in-class solutions to their customers while future-proofing their technology choices. They can adapt and be flexible to changing business and customer needs, release new features quickly, and achieve faster return on investment (ROI) for those features. In addition, they can minimize risk by avoiding large platform-wide changes, keeping changes local to specific modules.

TREND 6

Modernizing finance

Our customers tell us that their finance functions still rely on a complex mix of legacy spreadsheets and manual governance and control processes that proves difficult to scale and typically results in higher operating costs. This matches the findings from the [Bank of England](#), which estimates that United Kingdom banks spend between £2 billion–£4.5 billion per year on regulatory reporting alone, and in our experience with customers, these cost pressures exist around the world.

It is estimated that the transformation of finance (through data-driven decision-making and process automation) can reduce costs by 30 percent.¹⁴ This view is supported by our customer interactions, where organizations on legacy platforms often experience siloed data and different versions of the same data. This adds operational complexity and extends the time needed to find, verify, and prepare information for analytical business purposes. Legacy finance systems also typically aggregate some data sources, reducing granularity and, therefore, limiting flexibility in managing information and reporting.

Further, the full benefits of technology innovation, such as AI/ML, may be delayed or not fully realized when they're simply bolted on to existing processes and data sources, or constrained by inadequate access to compute resources when they're needed. This could ultimately impair a banks' ability to demonstrate the returns on their technology investments.

How banks are transforming finance

Integration of financial and non-financial data

This is one of the most common finance use cases that banks face today. For example, this is often seen as a challenge when reporting ESG metrics, such as for carbon accounting disclosures. To generate these metrics, banks must be able to ingest and process unstructured data from third parties, and then consolidate that external data with



TREND 6: MODERNIZING FINANCE

the bank's internal data assets, which are often structured. We see some banks moving away from building a single data warehouse for all possible use cases. Instead, they're adopting lakehouse and data mesh-like approaches that allow them to combine various data to inform decision-making.

Improving financial planning and analysis processes

Banks are accessing more granular transaction-based data from their systems to speed up and increase the accuracy of decision-making. This fine-grain data, enabled by modern cloud-based data architectures, is being used in conjunction with AI/ML capabilities to improve forecasting and projections. For example, solutions like Anaplan's [PlanIQ](#) tool (which uses AI) are being used by customers' financial planning and analysis (FP&A) teams, often in conjunction with high performance compute (HPC). This drives more accurate forecasts and projections based on wider ranges of modelled outcomes.

Leveraging comments and unstructured data

Finance teams, as partners to business stakeholders, have always provided context and commentary to support their analysis. However, this process can be labor intensive and requires reviewing numerous, disparate data sources. Today, we see banks experimenting with the use of generative AI to create initial analysis, with the financial analyst in the loop. BCG also recognized this trend in a recent report, noting that [generative AI](#) can help finance teams leverage text-based comments from reports and management information and unstructured data to provide further insights on data reporting.¹⁵

Modernization of the general ledger

Although general ledger (GL) modernization isn't exclusive to banking, we're beginning to see banks think about undertaking this initiative. We're seeing banks doing this to reduce costs as well as build agility and flexibility to allow the business to innovate. For example, they're decoupling the account rules engine and the data from the GL and the product ledgers to allow them to adapt to business and account treatment changes faster.

How the cloud helps banks transform finance functions

Cloud technology is enabling the transformation of finance functions in several ways—from teams building secure and resilient solutions to meet specific business requirements using AWS services to leveraging solutions already built on the cloud by partners such as Anaplan, Workday, and SAP.

Banks require big data solutions and petabyte-scale data processing capabilities to process both financial and non-financial information. Amazon EMR plays a key role as an industry-leading big data solution, enabling banks to extract data from different sources, process it at scale, and make it available to finance teams to enrich business analysis.

The emergence of modern data architectures, such as data mesh, and the use of cloud-enabled federated query tools that can interrogate data held across operational databases, data warehouses, and data lakes is simplifying complex ETL pipelines and making it easier and more cost effective to prepare and analyze data in the cloud.

Cloud-based services, like HPC, can be consumed and paid for on demand, making it more cost-effective and flexible, as well as better suited to supporting finance teams experimenting with training a wider range of models to optimize the use of financial resources.

AWS is the home of AI/ML, and migrating finance data to the cloud enables more effective governance and control, as well as efficient preparation and analysis of reports. The ease and speed at which this can be built on the cloud, compared to legacy technology stacks, means that finance teams can deliver business value quickly and adapt solutions to meet evolving needs—and accomplish this cost effectively. Our customers are using AWS to solve a wide range of business challenges in finance, knowing that they can efficiently scale solutions and adapt them to changing needs over time.

TREND 7

Transforming compliance and internal audit

Compliance functions face ever-changing and more demanding regulator and customer expectations, such as Customer Duty rules in the United Kingdom, which will set higher and more clear standards of consumer protection across financial services and require firms to put customer needs first. Frequently, compliance functions require effective controls to ensure regulations are met and operational risk is well managed.

We hear from our banking customers that their legacy infrastructures make it difficult to quickly adapt and respond to compliance incidents, as well as evolving regulatory and compliance requirements. Banks have shared that these legacy systems are often complex, rigid, and costly to change. They can also be siloed, which makes it difficult and time consuming to collect, prepare, and analyze data.

In response, banks that we're working with are accelerating the digitization of their compliance and internal audit functions. Given the increasing complexity of the regulatory landscape, banks understand that having a lean, efficient, and effective compliance organization is a competitive advantage.



73%

of compliance officers say they expect an increase in regulatory activity in the next year¹⁶



27%

of compliance officers expect significantly more regulatory activity in the next year¹⁶



How banks are transforming their compliance and internal audit functions

Our customers are focused on enhancing various aspects of compliance. Some of the most common initiatives include:

Improving user observability and activity tracking

Automating observability and change tracking is a focus for our banking customers as they look to achieve a real-time view of what's occurring in their business and ensure that they enforce least privilege principles and approaches. [Goldman Sachs](#), for example, is using AWS to improve compliance by creating more granular permissions in their transaction banking business to enforce least privilege, audit the usage of their keys with real-time indicators and historical logs, and safeguard the security and privacy of their data.

Identifying and masking PII

Banks are using cloud tools to protect sensitive data sets, such as PII, from being used for unauthorized purposes. ML and pattern-matching tools can be used to discover sensitive data anywhere in an organization, providing visibility into which users and applications present data security risks and enabling automated protection against those risks. AI/ML tools remove the need for spot checks and random sampling and, instead, enable the bank to shift left to an always-on (or fully automated) protection mode to guard against risks.

Enabling safe and secure data sharing

Banks are using cloud-hosted data and data governance frameworks to enable different teams (such as front-office control, compliance, and internal audit) to access and share data in ways that ensure their respective segregation of duties and responsibilities, while maximizing the value of the data and improving communications. Unifying data sets collected by different functions removes silos created by legacy technology, reduces costs, improves transparency, and increases the value of data to an organization and the effectiveness of control functions.

A good example of this approach at scale is the enterprise compliance platform at a leading global bank. The bank worked with [FTI Technology](#) and [Smarsh](#) to implement the platform. The platform, built on AWS, helps the firm archive and monitor communications for compliance, risk mitigation, and business insight, enabling a key operational priority of effectively transforming compliance for long-term success.

How the cloud helps banks to transform compliance and internal audit functions

Our customers are using AWS to simplify and automate compliance and internal audit functions, reduce costs, and increase effectiveness. We're helping them in several important ways:

Observability, tracking, and governance and control can be enhanced in the cloud as AWS services have the capability to log use activity for customers. These cloud-enabled tools that are configured to support compliant processes also make internal auditing tasks and investigations easier and less resource intensive. AWS allows customers to run tools in the background so that there is no disruption to business processes.

The cloud is the natural home of AI/ML tools that banks can use to generate more predictive analytics and more proactive intervention activity to reduce compliance risk. Services such as Amazon Macie can constantly scan for PII and enable banks to focus resources on initiatives that drive a competitive advantage, rather than allocating resources to validate that data is securely stored and obfuscated. [Oportun](#) for example, needed a better way to quickly identify and remediate potential security risks to its members' PII. Other solutions that Oportun tried could take weeks or months to scan data and identify exposed PII, making it difficult for company leaders to reduce risk. With Amazon Macie, Oportun is seeing 100-fold improvement on both speed to scan and time to discovery, and a 99 percent reduction in the cost to discover sensitive data.

Data sharing is simplified and more secure on the cloud, shifting from automating ETL tasks to enabling federated data queries. This reduces the build effort to integrate data and allows banks to apply advanced analytics and AI/ML tools to a wider set of data assets, both structured and unstructured.

We understand that improving compliance and internal audit is not simply a technology challenge. It also requires banks to look holistically at people, processes, governance and control, and culture. The ever-changing nature of compliance risk places large operational and technology requirements on banks. AWS can enable more innovative solutions, increase the ability of functions to adapt and change, and enable compliance teams to be more data-driven in their analysis and decision-making.

Conclusion

By leveraging the cloud, our bank customers are building solutions differently. They're delivering business use cases at lower cost and with greater innovation, security, privacy, and resilience. This has allowed our customers to implement what they've always wanted to but could not do so before the cloud.

We're not alone in this view. For example, McKinsey projects that Fortune 500 financial institutions, could generate between \$60 billion and \$80 billion in run-rate EBITDA in 2030 by making the most of the cost-optimization levers and business use cases unlocked by cloud.¹⁷ In addition, Bain reports that banks leading in technology deliver an average of 5 percent higher total shareholder return, 10 percent lower cost-to-income ratio, and a 12-point higher Net Promoter Score than their peers.¹⁸ The four banks that Bain cites as regional leaders (BBVA, DBS, Capital One, and JPMorgan Chase) partner with AWS to drive their transformation.

Navigating the trends explored in our report and building the future by taking actions to do things differently today rests, in part, on three core imperatives:

Choice and flexibility

The advantage of providing customers with choice is at the core of what Amazon and AWS are all about. At AWS, you see that reflected in the many choices we provide across our products and services and the breadth of our global infrastructure. This is why AWS is a comprehensive and broadly adopted cloud provider.

With the speed of technological change today, choice and flexibility are even more paramount. As we've seen the rapid evolution of AI and the emergence of generative AI, it's important to note we are still early in the journey. As our former CEO [Adam Selipsky](#) put it, "We are three steps into a 10-kilometer race." That's why we provide our customers with choices when it comes to how they leverage generative AI within their organizations. Customers choose to leverage services such as Amazon SageMaker Jumpstart and Amazon Bedrock because they give them a choice of FMs from AWS and leading providers, including models such as Claude, Llama 2, Stable Diffusion, and Jurassic.



17. McKinsey Digital, [Three big moves that can decide a financial institution's future in the cloud](#), 2022.

18. Bain & Company [How Banks Can Parlay Technology into a Competitive Edge](#), 2023.



Speed and agility

In financial services, being able to move forward, backward, or pivot quickly with confidence reduces the risk associated with change. We only have to look back to the global pandemic to be reminded that there are situations when the timeline for change needs to be measured in weeks or days and not in years. From helping some of the largest financial institutions in the world create new contact centers over a weekend to serve tens of thousands of agents, to harnessing ML to automate loan origination for the distribution of relief funds to those in need, AWS helped banks move quickly and confidently when it mattered most.

Today there are new challenges and opportunities in banking, and speed and agility matter. The global pandemic taught us what was possible, demonstrating the true potential of technology as a powerful enabler for rapid innovation. Although we cannot predict what will be next, speed and agility have shifted from being a choice to being a necessity.

Trust and experience

Mission-critical applications that power banking, payments, risk management, and more have exacting requirements for ensuring that the global economy functions. Availability, uptime, reliability, and resiliency are business imperatives and regulatory requirements, and the basis of the trust between a financial institution and its customers.

They're also the basis for how AWS helps our financial institution customers, such as Standard Chartered, NuBank, Goldman Sachs, and Nasdaq, as they build and operate mission-critical applications using our services. This is the foundation upon which we work to earn trust every single day. Being able to leverage the power of trust in a partnership means being able to rely on your partner for undifferentiated heavy lifting, and together focusing on delivering differentiated value.

These three imperatives: seizing the advantage of choice, moving with speed and agility, and leveraging the power of trust and experience are the difference between idea and action when it comes to navigating change successfully and building the future of banking today.



AWS for Financial Services

AWS is a pioneer at the intersection of financial services and cloud technology, enabling our customers to optimize operations and accelerate growth through the broadest set of services and partner solutions—all while adapting to ever-changing regulations. Thousands of financial services firms—from the fastest-growing FinTechs to systemically important financial institutions—are redefining their future on AWS.

For more information about AWS for Banking, visit aws.amazon.com/financial-services/banking

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