Intelligent Apps: Lessons Learned

Four stories on intelligent app development and outcomes

Microsoft Azure

Contents

Introduction

When brainstorming ways to solve the most challenging business problems, you might find that some of the best solutions remain out of reach because of technical limitations. Thanks to big data analytics and AI advancements, your organization can make those previously impossible ideas a reality.

App development teams today are under a lot of pressure to deliver high-performing apps that offer differentiated digital experiences and exceed rising customer expectations. Unfortunately, legacy on-premises infrastructures don't have the speed and flexibility to bring sophisticated application use cases to life. Moreover, they hinder the ability to bring those applications to market competitively.

AI represents an avenue to help address these challenges across tech stacks. Using AI capabilities, you can reimagine the way people and software interact, allowing you to pinpoint new ways of creating value and improving experiences.

Future-proof your digital strategy on a cloud infrastructure

Moving to a scalable cloud infrastructure lets your app development teams use AI to deliver apps that offer enriched interactions with your products and services. These "intelligent apps" are the next step in bridging the gap between people and software, allowing them to interact more intuitively and human-likely.

Creating these unique offerings requires considering your data, potential user journeys, and the associated risks in a world with widespread generative AI and evolving systems. Using the scalability and security of the cloud, your developers can more easily manage their data to build new intelligent AI applications—or modernize their existing apps to deliver simplified, personalized experiences to every user.

> **"**
> The potential for simplicity, personalization, and democratization of access to new and existing applications will...tempt many established brands into creating new AI-forward offerings. If they can do more than just amuse, and actually take a customer through more of the requirements of their journey than ever before, and do so in a way that inspires trust, brands could open up new sources of revenue from the services they can enable beyond their currently narrow borders."[1]
>
> **Harvard Business Review**

[1]Customer Experience in the Age of AI (hbr.org)

What makes an app intelligent?

An intelligent application employs cloud-scale computing, predictive or generative AI, machine learning (ML), and big data analytics to automate tasks, improve decision-making, and achieve meaningful business outcomes.

The ability to use real-time data is the driving force behind building value with intelligent app innovation. Using real-time and historical data from user interactions and other sources, an intelligent app can help you deliver personalized digital experiences that close the distance between your customers and their desired outcome—saving them time and effort in their customer journey.

Interacting with an intelligent app provides a more adaptable experience that gets users to their desired destination with fewer steps. Imagine, for instance, a sales rep who can come into work and simply ask their organization's AI-powered sales app, "Which leads haven't I called in the last 30 days?" and receive an accurate answer that lets them start making calls to the right people instantly. But intelligent app capabilities go far beyond that one simple use case.

Intelligent app use cases

Human-like interactions built into software-based experiences

The combination of AI, ML, large language models (LLMs), neural networks, and other advanced capabilities offers the potential for limitless app innovation. Here are some of the ways these tools are being used to give people more value from intelligent apps:

A personal fitness tracker that analyzes the user's activity and offers recommendations to help the user hit a specific goal.

A social media marketing app that incorporates automation to schedule posts and automate responses to the most common customer queries.

A music app that creates personalized playlists based on listening habits.

A language translation app that uses natural language processing (NLP) to translate text from one language to another without losing the context or subtleties of the conversation.

A chatbot or virtual agent—like Bing—that helps users perform in-depth web searches in a friendly, human-like conversational setting.

A generative AI app like OpenAI's ChatGPT that helps expedite tasks like writing emails, generating code, and answering general questions.

Common barriers to AI adoption

Innovating and modernizing applications using AI presents several key challenges. Firstly, there's a perceived shortage of skilled talent capable of developing and deploying AI applications. Finding individuals with expertise in AI technologies can be difficult. Even when found, their services often come at a premium. Many organizations also struggle to pivot their legacy applications to incorporate AI capabilities. Modernizing existing systems to accommodate AI-driven functionalities can be complex and resource-intensive, posing a significant hurdle for many businesses.

Finally, there are concerns about the ethics of AI. As governments and regulatory bodies work to establish guidelines and standards for AI, businesses face uncertainty about the best way of handling these advanced technologies responsibly. Many organizations will find it challenging to balance comprehensive security and privacy with the timely deployment of AI-powered solutions. To meet this challenge, they'll have to adopt a comprehensive approach to responsible AI usage that strikes a balance between security and productivity.

AI adoption challenges

According to a survey of US-based business executives, these are the three biggest barriers to AI adoption:

> A perceived lack of skilled talent to develop and deploy AI apps

> An inability to shift legacy applications

> Regulatory concerns[2]

Overcoming these commonly cited barriers to innovation starts with having a comprehensive, integrated stack of AI and data solutions that work together seamlessly on a scalable cloud infrastructure. With Azure, it's possible to build or modernize apps quickly—ahead of the competition—while running a secure and agile development process throughout the entire app lifecycle.

Wherever your data estate currently stands—and whatever your teams' skill levels—Azure solutions can help you build and modernize exceptional experiences for employees and customers. Offering preconfigured templates, embedded code, integrated APIs, advanced security measures, and curated training resources, Azure helps you develop intelligent, cloud-native applications while also modernizing older systems.

The Azure app innovation advantage

Whether you're looking to build new apps or modernize your existing tried-and-true apps—or both— Azure offers several key advantages no matter where your starting point is:

Innovate with speed $\rightarrow$ Up to 1.5 months faster time-to-market for new applications

Develop and deploy with minimal downtime $\rightarrow$ Up to 25 percent reduced app downtime

Empower developer talent $\rightarrow$ Up to 25 percent increased developer efficiency[3]

[3]The Total Economic Impact™ Of Microsoft Azure App Innovation

NBA enables never-before-seen defensive statistics for players and fans

Basketball captivates over 400 million fans worldwide. Unlike baseball and football—which have structured plays with a fixed number of participants—basketball has a continuous flow that makes it difficult to track individual performance. This challenge is especially pronounced in defensive plays, where numerous team members are continually making incremental contributions to each play. Human observation alone isn't enough to capture all of these small contributions. That's where AI and machine learning come in.

Intelligent app innovation: CourtOptix

Using a cloud-first strategy, the NBA adopted several Azure tools to help build a new platform that would go beyond traditional box metrics to analyze defensive movements with AI and machine learning. Using a camera system that continuously captures player movements—creating approximately 10 million data points per game—NBA CourtOptix helps generate dynamic performance metrics in near real time.

On each game night, NBA teams receive a comprehensive data breakdown that significantly influences their strategies. Once the game is over, teams can use Azure Cosmos DB to check metadata and confirm processing eligibility. Then Azure Kubernetes Service is used to initiate pipelines on Azure Databricks, which employs ML and AI to process data and defensive metrics. After storing the data in Azure Data Lake Storage, it's automatically synchronized with teams' Azure Storage Containers using Azure Data Share. This cloud-first approach offers flexibility to scale resources up and down based on requirements, saving costs while ensuring efficient data processing and sharing with teams. NBA CourtOptix also uses Azure Data Share so the NBA can invite new teams or partners to receive data directly into their Azure environments, eliminating the need for teams to develop data workflows.

The resulting insights are reshaping the game experience for fans and players, who can now use highly specific data insights to get a deeper appreciation for the nuances of the game:

Player tracking data breaks down a player's shooting ability in different scenarios, based on distance from the hoop and the defender.

Player positional data shows which players are pushing their sprint speed to the limit, and reveals which players are drawing the most double teams in the league.

The defense pressure algorithm lets the NBA provide defensive scoring that quantifies how much pressure one team's defense is exerting on the opposing team.

Using sophisticated algorithms that consider various factors, the platform can calculate a range of inputs, such as defensive players' actions like denying passing lanes or positioning themselves relative to offensive players. This analysis generates scores that quantify the defensive pressure each player is putting on their opponents throughout the game. Utilizing a variety of AI and machine-learning techniques on Azure, they identify defensive matchup responsibilities during the game. This allows teams to assess this information post-game, letting them quantify their defensive performance and strategize for improvement.

When the app was first introduced, it was initially focused on enhancing the fan experience. Now, with the support of Microsoft Azure, NBA CourtOptix has expanded to share advanced stats that enrich journalists', teams', and employees' understanding of the game, transforming the overall game experience across the board.

> **"**
>
> Being able to spin up more compute when we need it during games is crucial. We can leverage Azure's compute and best-in-class machine-learning capabilities without investing in those same resources 24/7."
>
> **Sydney Saracheck**
> Director, Stats Technology Product Development, NBA

Intelligent app results:

> Algorithms can quantify previously unobservable nuances in defensive plays during games.

> Fans and players can access near real-time insights during and after games, deepening loyalty and presenting new strategic advantages.

> With the computing power and scalability of Azure and over 1,000 virtual machines, they can crunch billions of historical data points in mere minutes, resulting in substantial time and cost savings.

CarMax used AI-generated content to remove speedbumps along its customer journey

CarMax has revolutionized the way people purchase cars, establishing itself as the leading pre-owned vehicle retailer in the United States. Since its inception in 1993, CarMax has facilitated the sale of over 11 million vehicles. The company's success lies in its unfailing dedication to customer satisfaction and relentless pursuit of innovation.

CarMax continually envisions new ways to simplify and enhance the used car buying experience, ensuring it remains hassle-free and enjoyable. CarMax customers can acquire their desired vehicles on their own terms, whether through online platforms, physical stores, or a seamless blend of both options. However, when CarMax realized that customers were struggling to perform pre-purchase research, it turned to Azure and generative AI to bridge the gap and modernize their app.

Intelligent app innovation: Generated customer-focused content

With a vast nationwide presence and a constantly changing inventory of over 45,000 cars, assisting customers in their early-stage research is a top priority for CarMax. To ensure a smooth buyer's journey, internet search engine results must align with customer needs, providing comprehensive details on all available vehicles, accurate comparisons, concise summaries, and relevant customer reviews. CarMax adopted the cloud-based OpenAI API to tackle this substantial challenge effectively, which grants access to powerful models like GPT-3, Codex, and embeddings. These pre-trained models, enriched with trillions of words, enable users to develop solutions across various applications, including writing assistance, code generation, and data analysis.

However, further modernization was required to help ensure the highest levels of security and accessibility. CarMax transitioned its OpenAI work to the Microsoft Azure OpenAI Service to do this. This move provided CarMax with a comprehensive, Responsible AI framework and offered enterprise-grade capabilities, encompassing security, compliance, and regional accessibility available through Azure.

> " Data is the core of everything we're doing because it feeds our machine learning algorithm that feeds our AI capability."
>
> **Shamim Mohammad**
> Executive Vice President and Chief Information and Technology Officer, CarMax[4]

[4]CarMax drives business value with GPT-3.5 | CIO

Using pre-trained models, CarMax can now generate relevant content for its car research webpages and create summarized reviews for enhanced readability, simplifying the customer journey. Azure OpenAI Service plays a pivotal role in producing content for CarMax's car research webpages, including sections like "New this year" and "2018 Kia Sorento trims," as well as related article summaries and brief customer review summaries.

Compared to their earlier work with the OpenAI API, CarMax observed numerous benefits from using OpenAI Service. The ability to manage deployments efficiently and scale out custom models appealed to CarMax, offering substantial cost and time savings. OpenAI Service's effectiveness in handling data-heavy summarization tasks has freed up CarMax's editorial team to focus on creating strategic, in-depth content that requires deeper insights. CarMax has also improved its search engine rankings by generating meaningful content optimized with relevant keywords, increasing website traffic, and enhancing SEO performance.

> ## " With the help of OpenAI Service, we're disrupting our industry for a second time by delivering cutting-edge digital tools and capabilities and becoming a true omnichannel retailer."
>
> **Shamim Mohammad**
> Executive Vice President and Chief Information and Technology Officer, CarMax

Intelligent app results:

> OpenAI Service efficiently condensed thousands of car reviews into a few easily digestible sentences for each vehicle in CarMax's inventory.

> CarMax is boosting search engine rankings and driving more traffic to its sites.

> CarMax produced 11 years of content in just a few months with an 80 percent editorial review approval rate.

> Letting OpenAI Service handle data-heavy summarization tasks gives CarMax content creators more time to be creative and feel more fulfilled
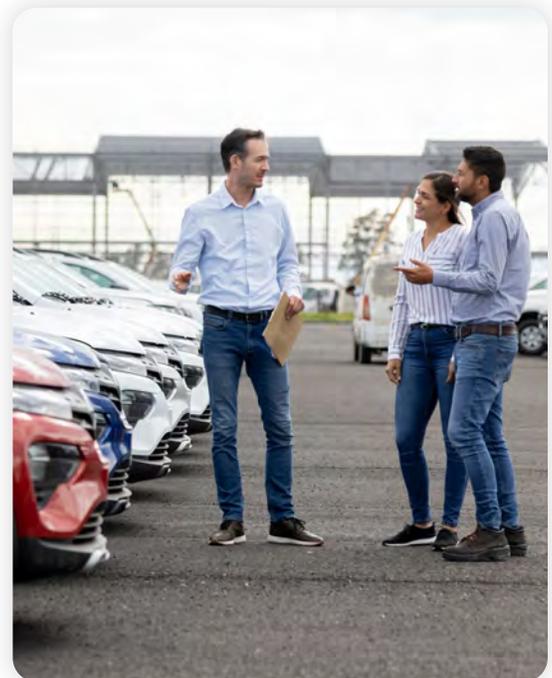
H&R Block simplifies tax season with a scalable cloud-native solution

H&R Block has 21 million clients relying on its services to provide individualized support for their unique needs. Understanding a client's journey comes down to amassing and organizing the right data—which can be an incredibly complex process. A single tax return can have up to 100,000 fields of information and data points. Adding further complexity is the wide range of ways tax information can come in—digitally, in hard copy, or even in picture form. To make the experience less stressful and more personalized, the company underwent an AI-inspired digital transformation that would minimize time spent entering and searching for client information by equipping its team with each client's immediate and comprehensive history.

Intelligent app innovation: AI-assisted tax preparation

Tax preparation is a very personal ordeal. Some clients prefer in-person interactions with paper documents, while others prefer online tax preparation or a hybrid approach. Regardless of the client's choice, the tax professionals at H&R Block aim to provide personalized, hassle-free services. However, tax-related tasks tend to involve massive amounts of data entry—a time-consuming and tedious process, especially given the complexities of the United States tax system.

Since most client engagements happen just once a year—concentrating roughly 25 percent of the company's annual business in a few days—every moment of interaction is crucial. To enhance the experience for both clients and tax professionals, H&R Block needed to streamline data entry by giving its teams instant access to client histories. Already a Microsoft Azure customer, H&R Block turned to Azure Machine Learning and Azure AI, embracing a fully cloud-native approach and using services like Azure Cosmos DB and Azure Data Lake to access previously untapped AI capabilities for personalizing interactions.

> " Keeping customer information secure is a top priority for H&R Block, which is why the investments Microsoft has made in developing AI responsibly are so important."
>
> **Alan Lowden**
> Chief Information Officer, H&R Block[5]

[5]H&R Block Newsroom | Generative AI to Fuel Faster and Better Experiences for Taxpayers (hrblock.com)

With Azure Cognitive Search, each tax professional can retrieve detailed client histories in seconds, even if a client transitioned from online to in-person consultations or met with H&R Block professionals in different locations. Accessing comprehensive records from a centralized source allows tax professionals to understand clients' financial histories better so they can deliver more personalized service. This level of preparation instills confidence in clients, who are often sharing highly sensitive financial information.

To help streamline the data entry process, H&R Block adopted Microsoft Azure Form Recognizer, an AI service utilizing machine learning to extract text, numbers, and crucial information from various tax documents. This automated classification model recognizes tax document language and patterns, transforming stacks of paper into organized digital data while maintaining the highest levels of security.

H&R Block anticipates classifying over 30 million tax documents annually in future tax seasons, with technology reliability being paramount, especially during peak periods. With AI-driven processes in place, tax professionals find data entry and retrieval more efficient, which lets them focus on providing clients with richer financial conversations and a confident approach to tax season. The company's commitment to evolving its tax approach and technology-driven solutions empowers clients to take control of their financial matters.

> "
> Machine learning frees up the precious time we have with the client to actually have richer conversations about their financial needs and aspirations, beyond the immediate task of ensuring the best tax outcome for the current year."
>
> **Aditya Thadani**
> Vice President, H&R Block

Intelligent app results:

> H&R Block can scale their AI-powered tax services during concentrated periods of demand peaks without suffering operational disruptions.

> Tax professionals have more time and mental stamina to deliver differentiated client experiences.

> Azure AI tools help tax professionals retrieve client information quickly without compromising security.

Bosch provides real-time monitoring and intelligent cloud analytics to the global supply chain

Founded in 1886, German engineering and technology company Bosch has been at the forefront of enterprise and consumer technologies, including mobile hardware and software, consumer goods, industrial technology, and energy and building technologies. As part of a tradition of precision engineering, Bosch produces a wide range of IoT projects—developing Java solutions like Track and Trace, which uses IoT tech to help customers locate and monitor assets along their supply chain.

As Java developers, the Bosch team wasn't equipped to manage the infrastructure needed to optimize supply chain logistics for Track and Trace. Scalability was key from a business and technical perspective, and the company began looking for solutions that would let IoT engineers keep up with growth—without having to maintain the infrastructure themselves. A longtime Microsoft partner, Bosch was pointed to Azure Spring Apps as the solution to their scalability needs.

Intelligent app innovation: Track and Trace

Previously, the team had been using Jenkins to push projects to a Cloud Foundry environment and deploy Track and Trace. When Microsoft recommended the team migrate to Azure Spring Apps, however, they realized it was a much more suitable stack for their Java apps.

Azure Spring Apps features scalable components that make it simpler to run Java Spring applications. With support for comprehensive monitoring and diagnostics, configuration management, continuous integration and continuous deployment, life cycle management, and more, the platform offered the Bosch team PaaS fully managed services for deploying and managing its Spring Boot-based microservices.

> " We are Java developers. We are not infrastructure guys. We are not system administrators. With Azure Spring Apps, we don't have to worry about managing Kubernetes or cluster downtime."
>
> **Philipp Stussak**
> Software Architect, Bosch

Moving the Bosch Track and Trace solution to Azure made it possible to scale and react faster to changing requirements. The Track and Trace workflow starts when a worker on a shop floor attaches a wireless tag to an asset. Using a mobile app, the worker can also create a logical link between an asset and a tag. The tag continuously broadcasts its ID to hardware gateways on site, which transfer the raw data to the core system running in Azure Spring Apps. There, the data is normalized and the business logic is added to translate raw data into meaningful information for the end customers.

During the migration, the team followed the best practices from the Azure Spring Apps reference architecture to ensure that microservices could easily communicate with other Azure resources or at customer sites. On the ingestion side, Azure Application Gateway accepts incoming traffic from the devices and ensure requests are valid before routing them to Azure Spring Apps.

Data from devices is transmitted at a constant rate, so the team manually scales the number of virtual CPUs (vCPUs) and the amount of memory needed. Additionally, the Azure Spring Apps Autoscale feature helps applications perform their best when demand changes. With scalability and optimization on their side, Bosch expects to add hundreds of thousands of devices to Track and Trace—confident that Azure can handle the expanding load.

> **"**
> We were lucky to have the opportunity to move to the Azure environment. I promote Azure Spring Apps all the time to other teams at Bosch."
>
> **Philipp Stussak**
> Software Architect, Bosch

Intelligent app results:

> The Track and Trace migration to Azure Spring Apps only took two months—an incredibly short time for a solution of that scale.

> Application Insights and Azure Spring apps let the team detect and diagnose previously unknown bottlenecks that they couldn't find with other tools.

> As they continue setting up multiregion capabilities, Bosch developers have more confidence in their ability to scale their Track and Trace solution.

Create the apps you thought were impossible

The emergence of generative AI has ushered in a transformative era for companies, enabling them to develop and modernize previously unimaginable applications. This groundbreaking technology has empowered businesses like the NBA, CarMax, H&R Block, and Nuance to tackle some of the most complex challenges in their industries, helping them innovate solutions that enhance the experiences of both customers and employees.

With Azure, those companies were able to bypass the toughest barriers to innovating with AI, leading them into a new and exciting phase wherein the only limit is the imagination of those who seize its capabilities.

Azure—Microsoft's cloud computing platform—offers a wide range of benefits for building cloud-native apps and modernizing existing applications:

> **Managed services**
  Azure provides a comprehensive platform with managed apps, data, and AI services to help simplify the app development process and accelerate time-to-market.

> **Cutting-edge AI with Azure OpenAI Service**
  The collaboration with leading tech innovators has led to Azure OpenAI Service offering industry-leading coding and language AI models. This lets developers use AI-driven capabilities to enhance the functionality and intelligence of their applications to provide never-before-seen services.

> **Trusted security**
  Azure boasts security-optimized systems, fine-grained identity and access control, and robust regulatory compliance controls. These features ensure that sensitive data remains protected, and applications meet industry-specific compliance requirements.

> **Role-based access control**
  Azure implements role-based access control, letting organizations manage permissions and access at a granular level to ensure everyone has the data they need to perform their tasks.

> **Responsible AI deployment**
  Azure enables reliable AI deployment so companies can apply AI solutions wherever their data resides. This ensures that AI-driven insights and functionalities are accessible and applicable across diverse environments.

> **Cost savings and efficiency**
  Azure helps organizations save money by offering fully managed services, on-demand tools, and autoscaling capabilities. This helps reduce operational expenses and align costs with demand.

> **Database flexibility**
  Azure supports many databases, including PostgreSQL, MongoDB, and Apache Cassandra. This flexibility allows developers to choose the database that best suits their application's requirements.

> **Built-in intelligence**
  Azure offers built-in business logic and pre-trained intelligence models that use cutting-edge AI research. These models can be easily integrated into applications to improve functionality and user experiences.

Azure offers a comprehensive suite of services and capabilities for building cloud-native apps and modernizing existing applications. Whether using AI, ensuring robust security, or optimizing costs, Azure provides the tools and resources to meet the evolving needs of businesses in the digital age. Learn how building and modernizing apps in the cloud lets you seize the potential of AI to bring your digital offerings to the next level.

Take the next steps

Explore Azure Innovate

Contact Sales >