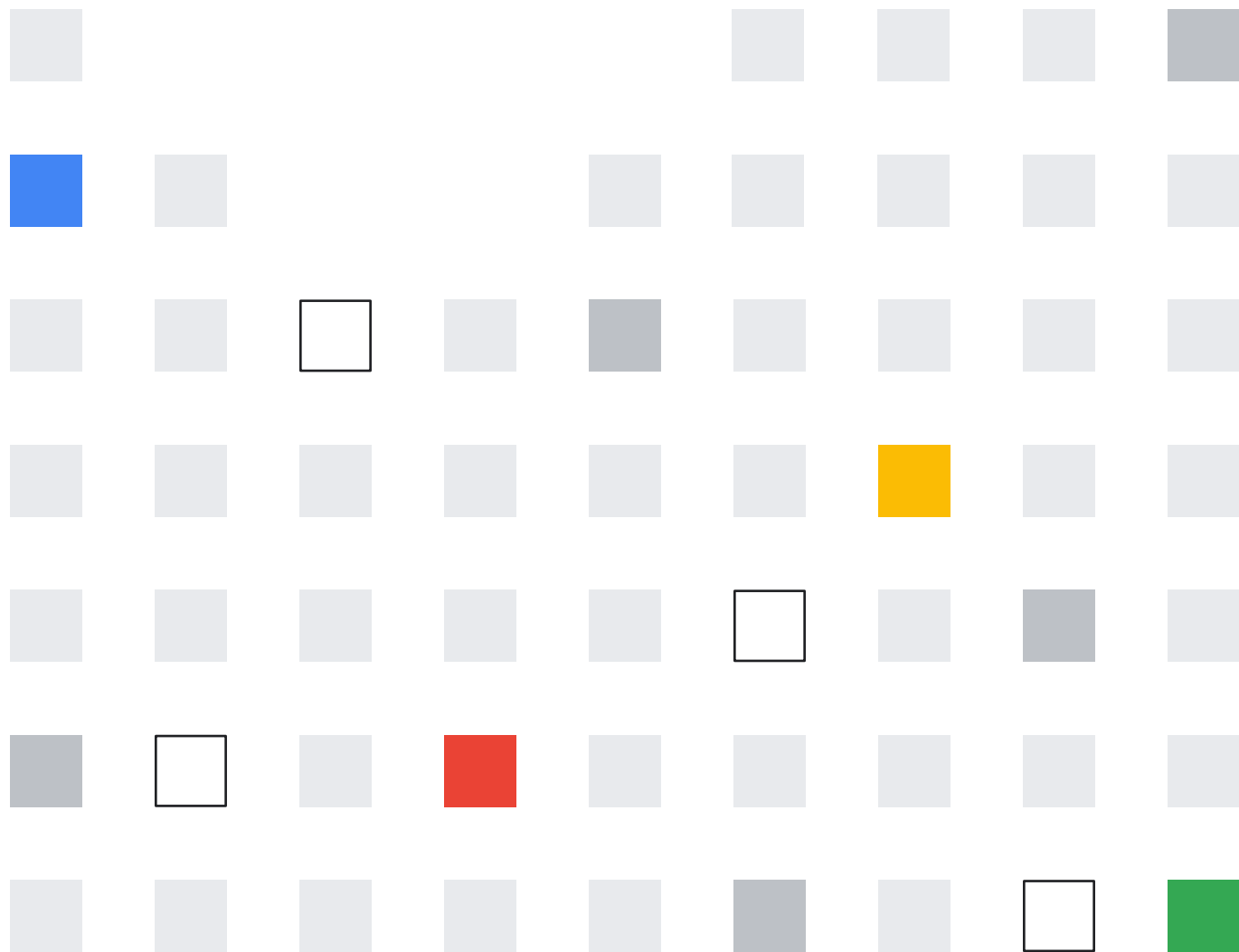


Why Google Data Cloud?



Chapter 1

The potential of the data economy 03

Chapter 2

Data-driven organizations innovate faster 05

Chapter 3

Google’s Data Cloud: A unified, open, and intelligent data ecosystem 06

◦ Unified data and AI platform 08

◦ Open and standards-based 10

◦ Built-in intelligence and AI/ML 12

Chapter 4

Managing unpredictable data costs in the digital economy

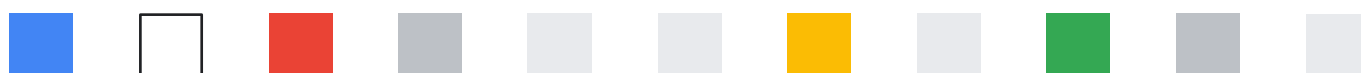
◦ Unlock new revenue streams 15

◦ Lower operating costs 16

◦ Proactively monitor cloud usage and cloud spend 17

Chapter 5

Conclusions 18



The potential of the data economy

Applications

Q. How to bridge digital and physical worlds with web and mobile apps?

Predictions

Q. How to increase revenue per customer?

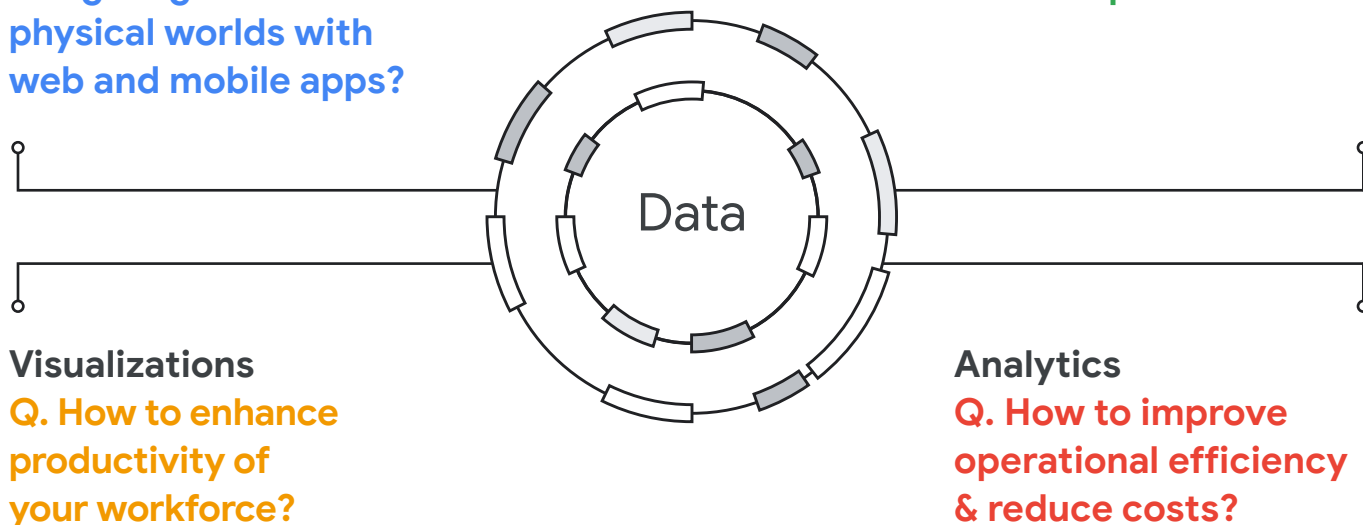


Figure 1: Key business questions that can be answered and acted upon with a Data Cloud platform

Data is at the heart of digital transformation, yet many organizations struggle with exploding volumes and complexity of data trapped in different silos and formats. In a [study by HBR](#), 92% of firms agree that the pace of investment in data and AI is accelerating. However, only 30% of the respondents report having developed a well-articulated data strategy and only 24% say that they considered their organizations to be data-driven in this past year. We are at a tipping point of AI technology maturity where it can deliver tangible business value in every industry. Today's data and AI investment decisions will determine who will be the leading organizations of the future.

Data and AI solutions available today offer unprecedented opportunities for organizations to accelerate their most strategic business outcomes in 2023, such as:

- **Bridging digital and physical worlds** with sophisticated web and mobile apps
- **Increasing revenue** by anticipating your customers' needs and preferences
- **Optimizing operations** with real-time access to key business metrics
- **Enhancing the productivity** of your workforce with role-specific access to data and insights
- **Lowering costs** and improving the predictability of IT spend

Google Cloud

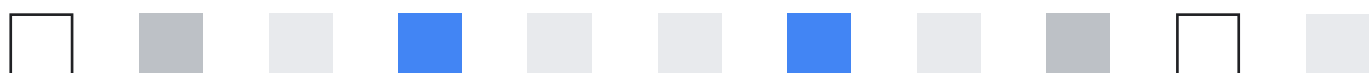
Industry leaders excel at using their data to find answers to key business questions (see Figure 1).

AI adoption is the next opportunity for digital transformation and the ability to generate, access and act on data is critical. The state of a company's data strategy not only determines the ability to gain traction with their first AI use cases, but also whether they can reach a mature state of AI adoption where the entire organization benefits from an AI transformation. Thinking beyond AI data-readiness, companies cannot afford a siloed approach to their data and AI strategies. Data and AI are highly interdependent technologies that require synchronization and shared operations. Companies need to build AI into their data strategy, not just with point-based AI solutions, but with AI embedded into every component of the data lifecycle.

A **data cloud platform** that unifies data and AI capabilities is crucial to provide transformative experiences for customers through modern applications, unlock timely insights across various data sources, and enable businesses to act on data-derived decisions to drive impact. An ideal technology partner should offer a complete solution that supports innovation across all four key areas of data and AI use cases within applications, analytics, visualizations, and predictions. That's why Google's data cloud vision comprises of services around databases, data analytics, business intelligence, and AI:

By having these critical capabilities at their disposal, data leaders can accelerate their most strategic business objectives. With data and AI at their fingertips, developers can build innovative applications with transformative and open databases, while business leaders can identify opportunities for boosting revenue by knowing their customers' preferences and creating personalized offerings. Employees of data-driven organizations are more productive as they can easily access insights crucial to role-specific needs. Finally, AI-powered systems generate more high-quality insights to power the virtuous data to AI cycle.

-
- 01 **Databases:** build global, responsive, and interactive applications that delight your users
 - 02 **Data Analytics:** unlock all the insights from all data with the freshest analytics
 - 03 **Business Intelligence:** democratize access to insights through visualizations, dashboards and custom user interfaces
 - 04 **Artificial Intelligence:** use patterns to predict outcomes, optimize business operations, automate routine tasks, and create compelling customer experiences



Data-driven organizations innovate faster

Data leaders adapt quickly if the market trends change or if unpredictable events occur, such as a global pandemic. Data and AI help create competitive advantage, enable agility, and help survive the most challenging of situations.

Firms that lead in data and AI are also better equipped than their industry peers to continuously optimize their operational efficiencies, regardless of the size and complexity of their organizations. As a result, they keep costs down.

Case studies

Home Depot

During the Covid 19 pandemic, [Home Depot](#), a major US-based retailer of home improvement tools and products, had to quickly pivot how they engaged with customers. As many people in the US were under lockdown in the first weeks of the pandemic, the traffic to Home Depot's website and mobile apps nearly doubled. In response, Home Depot offered their customers more shopping options *digitally* combined with *physical* curbside pickup. This provided customers with a seamless experience across digital and physical worlds. As a result, they increased the number of customer transactions by nearly 20% YoY.

Lufthansa

When [Lufthansa](#) committed to a net-zero carbon emissions future, the key to achieving this goal was to improve efficiency of both in-air and on-ground operations. This task was incredibly complex because it included factors outside of Lufthansa's control, such as unpredictable resource availability, volatile weather conditions, and economic instability. The airline partnered with Google Cloud to develop a platform that facilitates better planning and steering of the airline's daily flight operations. Thanks to our technology partnership, Lufthansa can now rely on AI for scenario planning. In addition, they have a greater visibility into weather patterns, routing options, aircraft fuel-efficiency, and aircraft usage, resulting in more efficient aircraft deployments and measurable CO2 reductions. Last but not least, Lufthansa projects €30 million+ total savings once rollout is complete.



Google's Data Cloud: A unified, open, and intelligent **data ecosystem**



Figure 2: Google's vision for Data Cloud

Google Cloud

Google's Data Cloud enables organizations to digitally transform with the most unified, open, and intelligent data cloud platform:

- o A **unified** data and AI platform to manage every stage of the data lifecycle, including databases, BI, data warehouses, data lakes, streaming, AI, and ML
- o **Open** and standards-based for portability and flexibility, an extensive partner ecosystem, and designed for multi-cloud environments
- o Built-in **intelligence** and AI/ML, resulting in Google's AI experience infused everywhere with comprehensive tools and processes

Google's Data Cloud supports various data use cases (e.g. applications, analytics, predictions, visualizations) and we have different products that cater to different data personas (e.g. application developers and system builders, data engineers and data analysts, data scientists and ML engineers, and business users). This allows our customers to decide on architectures

based on their resource pools to achieve similar business goals with combinations of different products and talent.

With Google, organizations can manage each area of the data systems —from running operational databases to managing analytical workloads. This offers rich data-driven experiences that break down silos because you don't have to duplicate and move data across different systems; our products are pre-configured to work together, saving you time and money. Google Data Cloud improves efficiency and productivity of your data people, resulting in cost effective maintenance of your data platform, better governance, and less friction during collaboration between teams owning different workloads. AI/ML is a core component of the solution, helping organizations not only build improved predictions but also automate business processes using data.

Now let's dive more deeply into each of the three key characteristics of Google's unique approach to Data Cloud.



Unified data and AI platform

Google Data Cloud is your one-stop shop to power interactive applications and turn your data into a competitive advantage. We are truly unique in how we build our systems to provide a unified data and AI platform for data leaders in every industry.

Figure 3: Google’s vision for Data Cloud:
Unified data and AI platform

Manage & Govern

Reduce risk by centrally managing and governing distributed datasets

Data warehouse & lakes

Analytics Lakehouse combines structured and unstructured data to support a big range of use cases

Transactional & analytical

Break down data silos between transactional and analytical workloads

Unifying data management and governance

A data cloud should enable organizations to manage, secure, and observe their data. This helps ensure their data is high-quality and enables robust, flexible data management and governance capabilities. Google’s data cloud comes with a single pane of glass for data management across data silos with centralized policy control. This approach to management and governance delivers several key benefits:

- **Reduced risk** by centrally governing distributed datasets with built in intelligence, while avoiding managing multiple copies of data
- **Higher confidence** in data quality so that you can trust the accuracy of data-derived decisions
- **A data-as-a-product** paradigm where domain-organized data is curated and made readily available across the organization without friction
- **A one-stop-solution** to store, process, and manage all types of data at global scale, enabling data products that unify structured and unstructured data

Learn more: [Put your data to work: Top data governance strategies to accelerate business outcomes](#)

Unifying data warehouses and lakes

Data lakehouse architecture was designed to unify data warehouses and lakes. Google Cloud BigLake gives teams the power to analyze data without worrying about the underlying storage format or system. It eliminates the need to duplicate or move data, reducing cost and inefficiencies. With BigLake, users gain fine-grained access controls along with performance acceleration across BigQuery and multicloud data lakes on AWS and Azure. It also makes data uniformly accessible across Google Cloud and open source engines with consistent security. BigLake extends a decade of innovations with BigQuery to data lakes on multicloud storage, with open formats to ensure a unified, flexible, and cost-effective lakehouse architecture.

Learn more: [BigLake: unifying data lakes and data warehouses across clouds](#)

Unifying transactional and analytical workloads

Building rich data-driven experiences demands a unified and integrated data cloud for both operational and analytical data. At Google Cloud, we're uniquely

positioned to help organizations break down barriers across their data because of how we've architected our data platform. Our transactional and analytical databases are built on a highly scalable distributed storage system with disaggregated compute and storage and high-performance Google-owned global networking. This combination allows us to provide tightly integrated data cloud services across operational databases, data warehouses and lakes. Solutions such as datastream for BigQuery allow easy replication of data directly into BigQuery from operational database sources such as AlloyDB, PostgreSQL, MySQL, and Oracle. Customers can also use BigQuery federation to query data residing in Cloud SQL, Cloud Spanner, and Cloud Bigtable without moving or copying it. Finally, integrations of Spanner and AlloyDB with Vertex AI allow developers to simply call Vertex AI models using SQL in operational transactions. This allows data scientists to build their models easily in Vertex AI and developers to access those models using the SQL query language.

Learn more: [What's new in Google Cloud databases: More unified. More open. More intelligent](#) and [Datastream for BigQuery](#)



Open and standards-based

Open and standards based Portability and extensibility while preventing lock-in	Multi-cloud Single-pane management and security controls across clouds
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Example: Integrations with open source standards and APIs

The best open cloud databases

(PostgreSQL, MySQL, Redis)

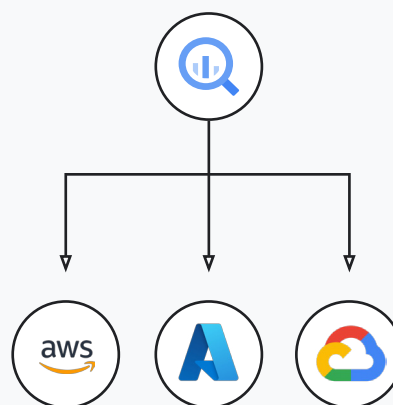


Open data lake processing with real-time streaming

(Flink, Spark, Beam, Iceberg)



Example: Cross-cloud analytics with BigQuery Omni



Partner ecosystem

800 tech partners & growing

Example: Data Cloud Alliance

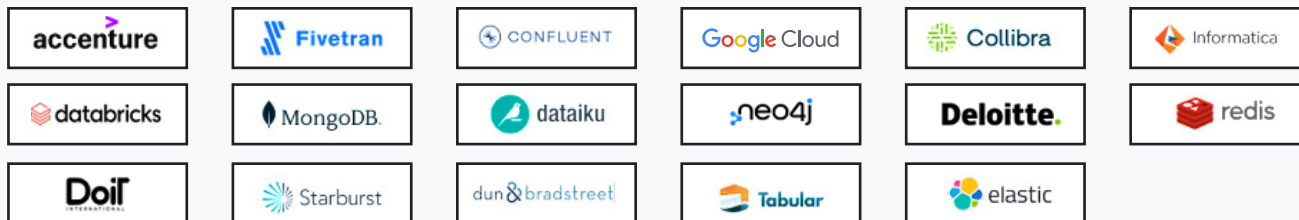


Figure 4: Google’s vision for Data Cloud: An open innovation ecosystem

Google Cloud

While we continue to build out strong integrations across our own data cloud, we fully believe in and embrace an open data ecosystem.

Integrations with open source standards and APIs

Best-in-class integration with open source standards and APIs ensures portability and extensibility to prevent lock-in. To name just a few examples, customers can leverage their open database implementation of choice with PostgreSQL, MySQL, or Redis. They can also ease their migration from Oracle Databases or Microsoft SQL Server. In addition, customers can leverage open technologies for data lake processing with real-time streaming support for Flink, Spark, or Beam. This allows customers to realize 54% lower TCO compared to on-prem data lakes for data science.

Learn more: [Why open cloud?](#)

Cross cloud data analytics

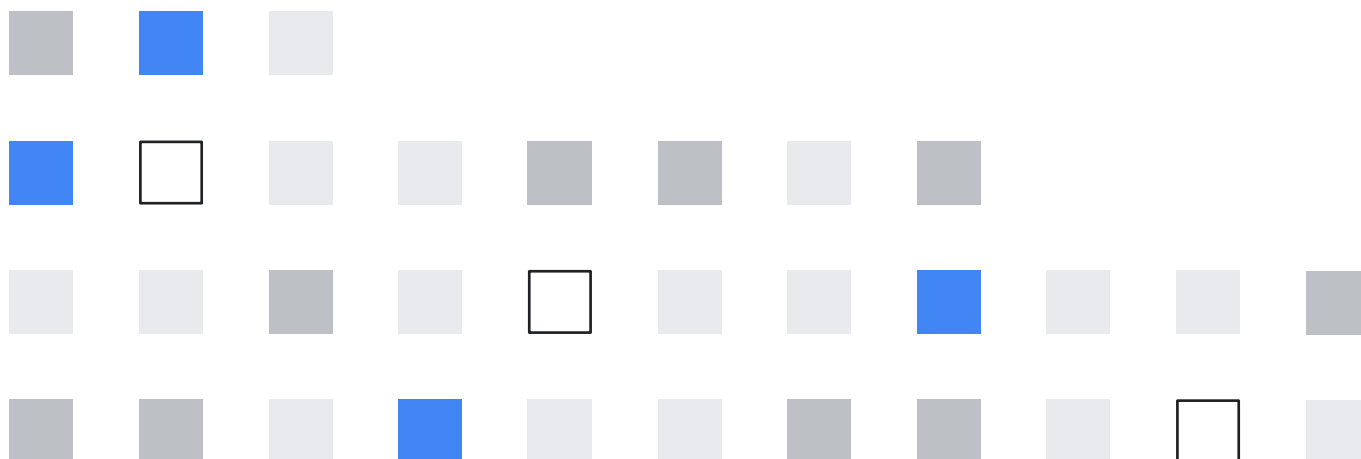
Google's Data Cloud can run anywhere. This includes running queries natively on AWS and Azure in addition to Google Cloud by using BigQuery Omni. You can query any data set from any cloud (e.g., stored in AWS S3) without the need to copy the data over to Google Cloud. In fact, [90%](#) of BigQuery customers analyze data stored in other clouds.

Learn more: [BigQuery Omni for AWS and Azure, for cross cloud data analytics](#)

Data Cloud Alliance

The Data Cloud Alliance is an ecosystem initiative with a mission to solve the modern data challenges of enterprises and accelerate their path to value creation. It ensures that global businesses have seamless access and insights into the data required for digital transformation.

Learn more: [Data Cloud Alliance](#)



Built-in intelligence and AI/ML

Google is an AI-first company. For two decades, we have constantly leveraged AI to solve some of the toughest challenges in the market and we have made our AI algorithms accessible through developer friendly APIs and [AI agents](#) designed to solve common business challenges. From enhancing the performance of our Search algorithm with ML to sharpening content recommendations on YouTube with unsupervised learning, we've learned how to make data-to-AI workflows as cohesive as possible and we've poured that experience into Vertex AI, our unified AI platform. With Google, you can shorten time to value from AI initiatives by eliminating barriers between data and AI. Vertex AI provides every tool you need to build, deploy and manage ML models. With integrations across our

data portfolio, customers can easily work with any data with minimal data movement. Consistent tooling across data and AI workloads is designed to increase the reach of AI/ML to more users and help data scientists achieve greater productivity. This includes the ability to start building fully custom models from scratch or build on top of Google models and tune them for your needs. This comes together with centralized MLOps capabilities that speed up time to production — no matter how you train a model, our platform can register, deploy, and manage it throughout its entire lifecycle.

Learn more: [New AI Agents can drive business results faster: Translation Hub, Document AI, and Contact Center AI](#)










Shorter time to value Improve your team productivity	AI for anyone and everyone Meet users where they are	Ubiquitous impact Make AI work across your organization
<ul style="list-style-type: none"> Build ML models faster Build AI powered applications faster AI integrated with all data cloud products	<ul style="list-style-type: none"> For business analysts High performance model serving For developers Pre-trained APIs and AutoML For data practitioners Custom models with Vertex AI	<ul style="list-style-type: none"> End-to-end MLOps for the entire ML lifecycle Best-in-class Google AI/ML infused Virtuous cycle: AI > better data > better analytics > better AI

Figure 5: Google's vision for Data Cloud: Built-in intelligence and AI/ML

Shorter time to value

For data leaders, unification of data and AI systems is a critical priority. By keeping these highly interdependent technologies in sync, and by operationalizing AI, they can take meaningful action from data. With Google, you can shorten time to value from AI initiatives by eliminating barriers between data and AI systems:

- **Build ML models** faster with less context switching thanks to a unified interface for data science and AI development
- **Build AI-powered applications** that delight customers with developer-ready ML models invoked from databases
- With **AI integrated with all data cloud products**, you eliminate barriers between data and AI; for example, you can use a simple SQL statement in a relational database like Spanner to call a machine learning model in Vertex AI, Google's end-to-end ML platform

Learn more: [Meet Google's unified data and AI offering](#)

AI for anyone and everyone

Google's Data Cloud supports the needs of all data users and helps democratize AI/ML innovations throughout organizations:

- **For business leaders:** Pre-built technology solutions that let organizations apply the best of AI to common business challenges and include Google Cloud products like Document AI and Contact Center AI (which offers broad support for AI agents from Google and partners)

- **For developers:** Pre-trained models accessed via APIs and low-code custom training (APIs)
- **For data analysts:** Integrated analytics and AI platform to quickly solve real-world problems (BigQuery ML)
- **For data scientists:** Leveraging Vertex AI, our end-to-end ML platform, data scientists can fast track ML model development and experimentation by 5X

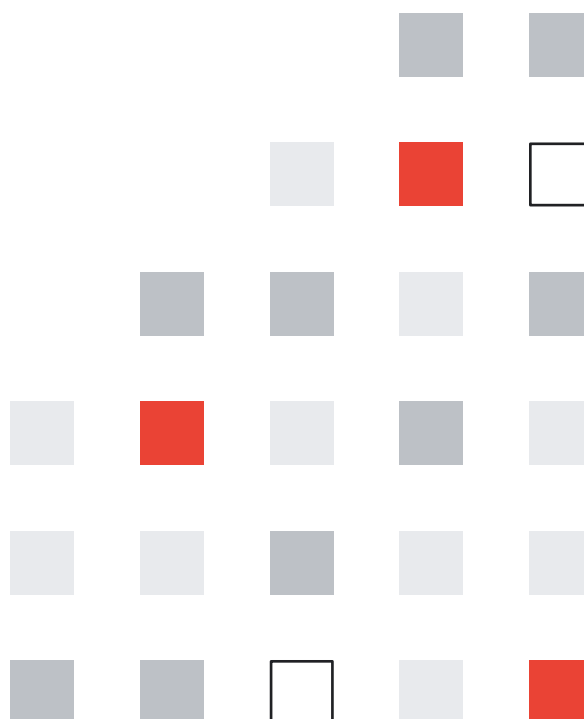
Learn more:

For business leaders: [New AI agents can drive business results faster](#)

For developers: [Vertex AI Vision: Easily build and deploy computer vision applications at scale](#)

For data analysts: [Move from raw data to ML faster with BigQuery and Vertex AI](#)

For data scientists: [ML models: prototype to production](#)



Ubiquitous impact

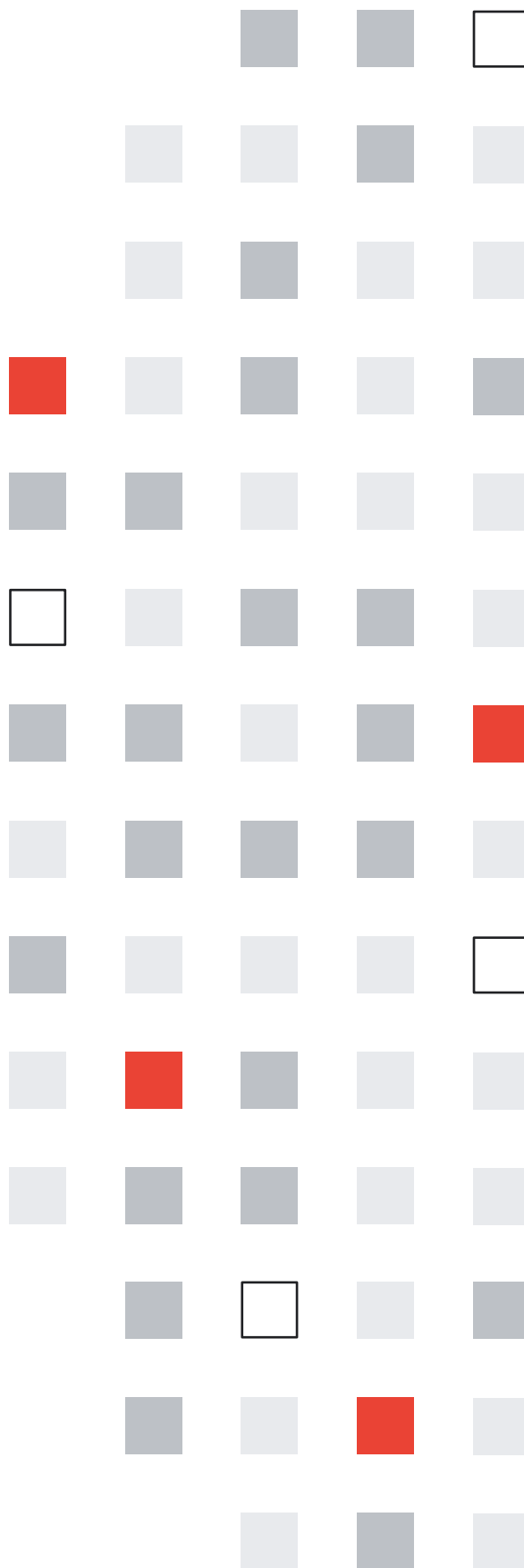
The vast majority of completed ML models never make it into production. The reason for this is that AI/ML is a multidisciplinary activity where barriers between data and AI continue to slow innovation. Google has developed Vertex AI's MLOps tooling by leveraging years of experience in creating and formalizing the best practices around getting ML models to production. With Google, you gain end-to-end MLOps that allow you to efficiently, responsibly, and repeatedly operationalize ML projects throughout the entire development lifecycle. By making AI work across your entire organization, you create a virtuous cycle. AI unlocks the business value of your data, which encourages you to gather more and better data, which leads to better AI.

Example: How to increase revenue of an online retailer?

01 AI unlocks the value of data: Use Recommendations AI to increase revenue per user with immediate business impact

02 Gather better and more data: Increased customer usage allows you to build custom AI models for highly accurate customer segmentation and propensity modeling, leading to increased overall revenue

Learn more: [Practitioner's guide to MLOps](#) and [Best practices for implementing ML guide](#)



Managing unpredictable data costs in the digital economy

When implemented correctly, Google's Data Cloud solutions can help businesses not only drive innovation but also improve profitability by unlocking new revenue streams, reducing operating expenses, and driving overall cost transparency.

Unlock new revenue streams

By treating data as business assets and managing them as products, customers can monetize their data sets to unlock new revenue streams.

Case studies

BankBRI

With its digital technologies and large customer base, based in Indonesia [BankBRI](#) is sitting on a treasure trove of big data. Bank BRI packages this data through more than 50 monetized open APIs for more than 70 ecosystem partners who want to carry out credit scoring, business assessments, and risk management, resulting in **\$50 million new revenue**.

Ulta Beauty

[Ulta Beauty](#), a U.S. retailer of beauty products, also drives personalization with Google Cloud AI. Virtual Beauty Advisor, an AI-powered shopping tool, provides shoppers with an interactive experience through data-driven personalized recommendations. The tool is trained to understand and continuously learn the typical customer's buying process. This includes how they navigate Ulta's vast assortment and reach a purchasing decision. This has **increased sales and decreased returns**. Ulta also developed GLAMLab,

a virtual try-on experience that allows shoppers at home to see how different shades and types of makeup will look on them using augmented reality, addressing one of the biggest obstacles for online beauty sales.

Carrefour

Headquartered in France, [Carrefour](#) is one of the world's largest retailers, operating supermarkets, e-commerce, and other store formats in more than 30 countries. With Google Cloud, the company developed a new platform called Darwin that enables data scientists to securely access enormous amounts of data within minutes (e.g., 15,000 SQL queries/month) in a structured way. This helps them build smarter models for customer behavior and underpins a personalized recommendation engine for Carrefour's ecommerce services. The company partly attributes a more than **60% increase in ecommerce revenue during the pandemic** to this personalization.

Learn more: [Walmart's next generation data platform](#) to build differentiated customer experiences at any scale with efficiency and reliability.

Lower operating costs

With the power of Google's Data Cloud, organizations are able to optimize and automate business processes and reduce management overheads. For example, organizations using [Google Cloud's CCAI for Chat](#) have been able to manage up to 28% more chat conversations concurrently with the same level of call center staff. They achieved this while responding 15% faster to customer

inquiries and increasing customer satisfaction by 10%. Other use cases include:

- Optimizing sales and marketing programs
- Automating manual processes with AI
- Improving contact center efficiency
- Optimizing logistics and supply chain
- Reducing IT management costs

Case studies

TUI France

[TUI France](#), a leading tour operator in France, used Google's data cloud to aggregate data across multiple platforms, allowing them to analyze and apply machine learning algorithms to optimize sales and marketing programs. This led to a 7.5x reduction in the cost of sales on display channels and a **29% reduction in the cost of bringing customers to the website.**

Unifiedpost

[Unifiedpost](#) (EU) was able to **lower their TCO of procure-to-pay processing costs by up to 60%** and boost data accuracy by 250% with Document AI for procurement. This solution provided them with a cost-effective approach to data extraction for invoices, receipts, and other valuable documents in the procurement cycle of procure-to-invoice and invoice-to-pay.

Renault Group

[Renault Group](#) has manufactured cars since 1898. Today, it is an international group with five brands that sells millions of vehicles every year. Renault migrated their 70 apps from Oracle to fully managed Cloud SQL for PostgreSQL. With this migration, Renault has been able to reduce database maintenance and operation activity, resulting in faster and more stable applications. With this migration, **they reduced their cost to just one dollar per user per year for all software and infrastructure.** Renault is also using BigQuery and Dataflow to further improve scaling and costs.

Learn more: eBook - [Optimize costs and drive profitability with Google's data cloud](#)

Proactively monitor cloud usage and cloud spend

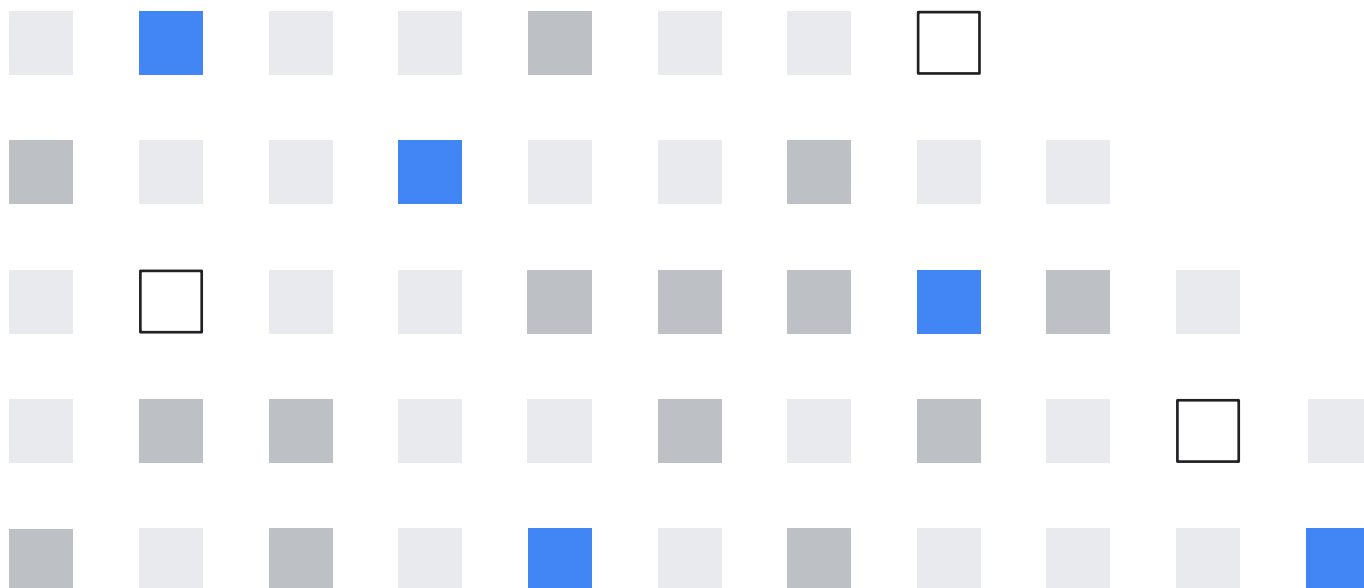
Google's Data Cloud is embedded with intelligent financial operations capabilities that effectively control, plan, forecast, and optimize data analytics and AI costs. Our flexible pricing models are tailored to customers' business requirements, so they pay only for what they need and use.

[Cloud Cost Management](#) provides necessary reporting and granular insights into data cloud expenditures across projects, teams, and resources. It offers:

- Advanced automation and built-in actionability for monitoring and optimizing cloud spend
- Transparency across all major clouds with real-time access to the underlying cloud data

For example, organizations who have chosen to run cross-cloud analytics on Google Cloud can view and query data across Google Cloud, Microsoft Azure, and Amazon Web Services through a single pane of glass without any data movement. This significantly reduces the costs and risks of moving data across environments.

[Active Assist](#) is a portfolio of intelligent tools that helps you optimize your cloud operations with recommendations to reduce costs, increase performance, improve security, and even help you make more sustainable decisions. For example, Active Assist can recommend to delete unused or idle resources, downsizing VMs or Cloud SQL instances to fit your workload needs, using committed use discounts to save money.



Conclusions

When the Covid-19 pandemic disrupted the world in early 2020, companies were forced to quickly pivot to using new tools and platforms. They had to invent new ways of running their day-to-day operations that weren't necessarily part of their pre-pandemic business and technology strategies. Several organizations greatly benefited from accelerating their digital transformations due to this unpredictable event. They either found new revenue streams or unlocked greater operational efficiencies, and no longer missed the pre-pandemic way of running their businesses.

Fast forward to late 2022 and the current economic climate combined with the ongoing supply chain

issues have once again put global businesses to the test. Will they use this time of crisis to invest in the right technology stack to re-emerge stronger and well poised for future opportunities? At Google Cloud, our belief is that data is at the core of digital transformation, and that now is the time to evaluate your current data and AI technology selections. Do these solutions adequately support the level of innovation you want to drive across all four key areas of data and AI use cases within applications, analytics, visualizations, and predictions? Let's talk about how Google's Data Cloud can help accelerate your journey to data and AI leadership.

01

Learn more at
cloud.google.com/data-cloud

02

Take the [2 minute multiple choice questionnaire](#) to see where you're at on your data intelligence journey and receive a free guide to help you get to the next step

03

Ask your account team for a Data Cloud strategy workshop