Skies Without Limits: The Impact of Agentic AI for Modern Aviation

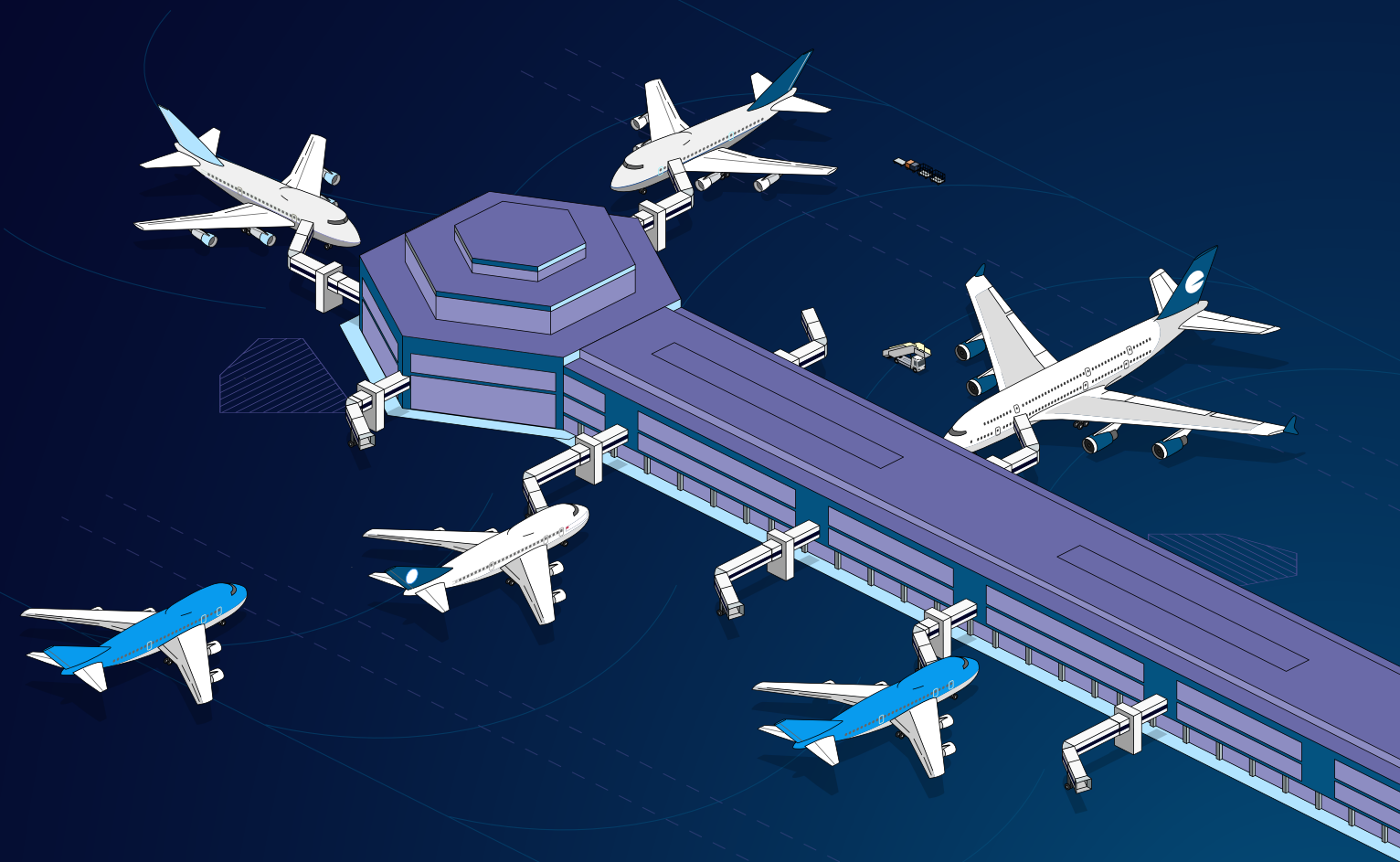# Table of Contents

striim

The Future of Flight

Running an airline or aviation business in 2025 is no mean feat. While the industry has bounced back from the disruption of the global pandemic, profitability remains a significant hurdle. In a challenging 2024, narrow margins, equipment shortages, and slowed growth meant only 41% of airlines created positive value (McKinsey). And in the face of growing economic uncertainty, airlines must find ways to innovate if they are to survive further fiscal headwinds.

If there's one silver lining in the clouds, it's the revolutionary potential of artificial intelligence (AI). Across almost every process: from the booking experience, to aircraft maintenance, fuel efficiency, and ground operations, AI is transforming how airlines increase efficiency and deliver for customers. The sector has long benefited from vast amounts of data, but now intelligent systems have the capability to transform that data into actionable insights and operational efficiencies.

To capitalize on AI-enabled intelligence, the next frontier of aviation—airlines and aviation organizations need not only a solid data foundation, but a dataset that integrates with operational systems. This requires a fundamental shift in data strategy, a point echoed by experts at McKinsey:

Airlines should look for ways to create dynamic and interconnected systems to close data gaps and enable continuous learning—particularly around underlying operating constraints and interactions.

Success for airlines in 2025 and beyond therefore hinges not just on AI models, but on the real-time, trusted data that fuels them. This whitepaper will explore the transformational benefits that are made possible when airlines can pair robust data infrastructure with real-time intelligence. We'll outline what it takes for aviation firms to become AI-ready, and look at examples of leading organizations whose operations have taken flight, thanks to the power of real-time intelligence.

Filling the Tank: Fuel Efficiency with Real-Time AI

Fuel is one of the largest and most volatile expenses for any airline. With a projected global spend of $248 billion in 2025, fuel will account for over 26% of all operating costs (IATA). Getting a handle on fuel consumption is difficult.

Dozens of factors are at play every second of the flight—from the flight path and altitude to shifting weather conditions and the aircraft's weight. Traditionally, airlines have leaned on standardized flight plans based on historical data. But this static approach leaves huge savings on the table because it can't react to dynamic flight conditions. This isn't just about inflated costs; it also makes it much harder to meet critical environmental sustainability goals.

Did you know?
Every minute wasted in the sky hits the bottom line. A single minute of extra flight time on a long-haul commercial jet can burn through more than **$130** in fuel. (Haisen Global).

The true potential for optimized fuel efficiency lies in moving from static plans to dynamic decision-making. This is where agentic systems come in: intelligent agents can analyze vast, real-time data streams that were previously too complex to connect in flight.

Course Corrected

Imagine an AI agent capable of processing live aircraft sensor data, up-to-the-minute weather patterns, air traffic control updates, and flight schedules concurrently. By correlating these sources, the agent could continuously identify the most fuel-efficient route at any given moment and provide pilots and ground crews with precise recommendations.

The result is real-time, in-flight optimization, with up-to-the-minute guidance based on ideal speed, altitude, and engine thrust. Instead of being locked into pre-flight estimates, airlines can adjust to changing conditions instantly, unlocking significant gains in both efficiency, costs, and sustainability.

How it Works: The AI-Ready Data Foundation

Even the most advanced AI is only as reliable as the data it receives. This is where Striim comes in, acting as the connective tissue between fragmented data sources and the intelligent systems that need them.

Striim uses a combination of real-time data integration techniques to create a continuous, unified data stream. For structured data in flight operations databases, Striim's non-intrusive Change Data Capture (CDC) technology streams every insert, update, and delete the moment it occurs. For external and onboard

Why do airlines struggle with fuel efficiency?

Limited Access to Live Data

Suboptimal Flight Paths

Excessive Weight Management

How Real-Time Data Boosts Fuel Efficiency

**Live Fuel
Consumption
Tracking**

**Route Optimization
with Real-Time
Insights**

**Weight and
Balance
Optimization**

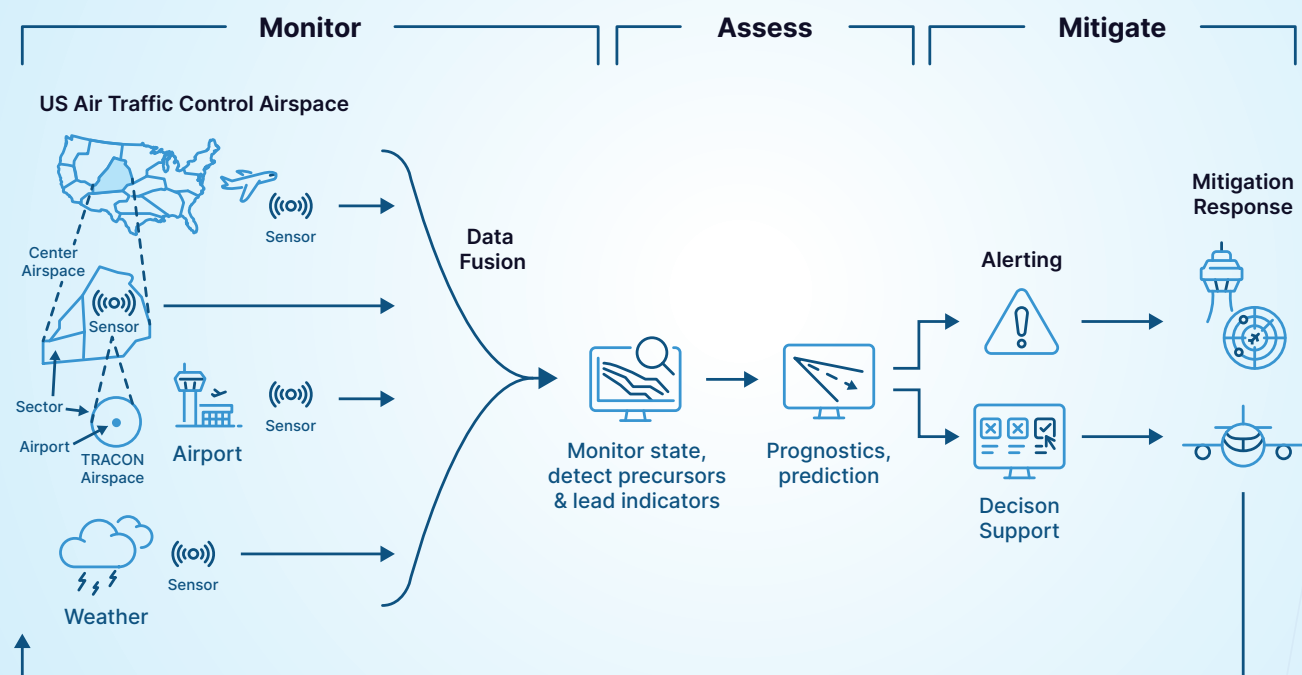**Anomaly
Detection for
Reliability**

**Compliance with
Fuel Efficiency
Standards**

systems, Striim uses a broad array of connectors to ingest live data from aircraft telemetry systems (ACARS), streaming weather APIs, and air traffic control feeds.

As this data flows, Striim's in-memory stream processing engine unifies, cleans, and enriches it mid-flight. For example, it can correlate an aircraft's real-time position with incoming weather data, enriching the telemetry stream with contextual information before delivering it to the AI model. This ensures that a clean, transformed, and analytics-ready data stream arrives at the AI platform with sub-second latency, ready for agentic systems to act on.

With a constant flow of trusted, real-time data, AI-powered systems can deliver accurate, in-flight recommendations with the potential to save millions in annual fuel costs. This improves the bottom line, drives efficiency, and empowers airlines to meet crucial sustainability targets for a greener future.

Monitor — **Assess** — **Mitigate**

US Air Traffic Control Airspace

Center
Airspace

Sensor

Sensor

Sector

Airport   TRACON
Airspace

Airport   Sensor

Weather   Sensor

**Data
Fusion**

Monitor state,
detect precursors
& lead indicators

Prognostics,
prediction

Alerting

**Decison
Support**

**Mitigation
Response**

Smarter Skies: Predictive Maintenance with Real-Time AI

Nothing disrupts an airline's schedule quite like an unexpected maintenance issue. An Aircraft on Ground (AOG) event doesn't just mean a delayed or canceled flight. It can trigger a cascade of problems, from passenger re-bookings to crew rescheduling.

Beyond the operational disruption, the costs mount up. Delays cost airlines billions in revenue each year, with some estimates showing flight delays can cost an average of $100 per minute (Airlines for America).

Scheduled to fail

The traditional approach to aircraft maintenance is safe but incredibly inefficient. For years, the industry standard has been scheduled maintenance, where parts are replaced based on a fixed timeline, regardless of their actual condition.

> **Did you know?**
> Aircraft maintenance can amount to over 10% of airline revenue. (IATA)

As a result, airlines spend millions replacing components that may have hundreds of hours of life left in them, simply due to a schedule. This is a system based on estimates, not evidence.

If It's Not Broken...

What if airlines could shift to maintenance workflows that only flags maintenance operations at the point that they're required? Some are doing exactly that.

By adopting predictive maintenance, powered by AI, airlines get a much more efficient, data-informed approach to aircraft repair. In effect, modern aircraft become flying data centers: home to thousands of sensors generating constant updates on the health of engines, landing gear, and avionics. By feeding this telemetry into AI models, airlines can detect subtle performance anomalies that are invisible to the human eye but signal a potential failure on the horizon.

How it Works: Connecting the Aircraft to Agentic AI

Raw data from an aircraft isn't automatically ready for an AI model. Striim provides the real-time data infrastructure to bridge this gap. The platform taps directly into numerous data sources, using real-time connectors for streaming sensor data from Aircraft Condition Monitoring Systems (ACMS) and Quick Access Recorders (QAR). Simultaneously, it uses Change Data Capture (CDC) to stream every change from the transactional databases that house maintenance logs and parts inventory systems.

This disparate data is then unified and contextualized in flight. Striim's stream processing capabilities can, for instance, join live engine vibration data with that specific engine's historical maintenance record and the current inventory level for a required spare part. This creates a rich, analytics-ready data stream, ensuring the AI model receives not just raw telemetry, but a complete operational picture. This contextualized data is then delivered with sub-second latency to the intelligent systems where predictive models are running.

With Striim connecting the aircraft to agentic intelligence, airlines can move from a costly, calendar-based maintenance schedule to a smarter, condition-based model. The result is a dramatic reduction in AOG events, which means fewer delays, increased revenue, and much happier passengers. It also means lower maintenance costs, longer component lifecycles, and a massive improvement in overall fleet reliability.

Challenges in Implementing Predictive Maintenance in Aviation

Data Integration & Management	Data Quality & Consistency	Aging Fleets	Complexity of Modern Aircraft Systems	Cost & Resource Constraints	Regulatory Compliance

Wheels Up Faster, for Real-Time Turnarounds

Time is money, particularly in the aviation industry where any aircraft not in the air is a silent cost sink.

This is why the turnaround: the window between landing and takeoff, is so critical. The turnaround is a delicate choreography of ground operations involving deplaning, baggage handling, refueling, catering, and boarding.

A delay or disruption in any one of these steps can create a domino effect, leading to late departures, missed connections, and frustrated passengers. For airlines operating on razor-thin margins, optimizing every minute of this process is an economic necessity.

Did you know?
A single turnaround typically consists of hundreds of individual tasks, involving more than 75 different people and entities. (OAG)

What's Happening On the Ground?

Typically, the turnaround process is managed through a combination of radio chatter, paper checklists, and siloed departmental software, making it nearly impossible to get a single, unified view of the entire operation. But what if ground crews had a real-time, intelligent dashboard showing the status of every single task?

With AI, this is eminently feasible. AI systems can ingest live data from baggage scanners, fuel sensors, catering trucks, and gate sensors to create a complete picture of the turnaround. A system like this could not only track progress but also to predict bottlenecks before they

happen. If baggage loading is falling behind schedule, AI agents could proactively step in and alert ground managers, or even suggest reallocating staff from a less critical task to get back on track.

How it Works: Connecting the Dots on the Ground

A turnaround is not a singular activity but a series of connected events happening in parallel. Striim unifies the data from these events into a single, intelligent pipeline. The platform uses a suite of real-time connectors to ingest streaming data from IoT sensors on baggage carts, fuel trucks, and gate systems. At the same time, it applies non-intrusive Change Data Capture (CDC) to stream every update from the core operational databases that manage baggage manifests, catering orders, and crew assignments.

As these different data streams converge in Striim's processing engine, they are correlated and contextualized. For example, a real-time event from a baggage scanner can be instantly joined with the flight's passenger manifest from the booking database. This creates a complete, enriched data stream that is delivered with millisecond latency to AI-powered dashboards, giving ground crews a live, comprehensive view of the entire turnaround operation.

The result is a transformation from chaos to coordination. Airlines can dramatically reduce turnaround times, leading to more on-time departures, higher fleet utilization, and a smoother, less stressful experience for passengers.

Real-Time Airline TechOps with Striim Cloud

Image source: **modelcontextprotocol.io/docs/learn/architecture**

From Booking to Boarding:
Personalized Passenger Experiences

In an age where personalization is the norm—from tailored TV show recommendations to individualized social media feeds—passengers have come to expect the same from air travel. For airlines, this is both a huge opportunity and a significant data challenge. Delivering a truly personalized experience means understanding each passenger's travel history, preferences, and real-time context, from the moment they book a ticket to the second they step off the plane.

Top Flight Customer Service

Agentic AI makes personalization not only possible, but a real-time reality. Let's imagine a passenger's connecting flight is delayed. Instead of leaving them to find out at the gate, an AI agent can proactively rebook them on the next available flight, send a new digital boarding pass to their phone, and even push a meal voucher to their loyalty app to apologize for the inconvenience. Performing these complex, multi-step actions on an individual level was previously unthinkable. Today, it's reality for modern aviation firms.
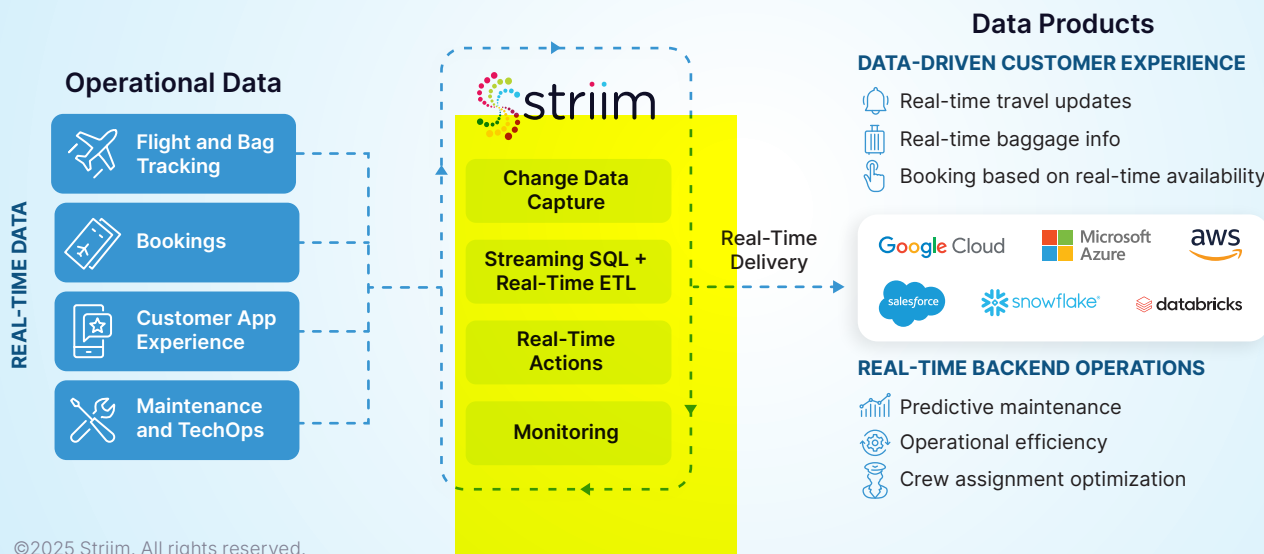
A revenue opportunity:
One airline pilot project for AI-driven personalization led to sales increases of over $10 million. (Source: Journal of Revenue and Pricing Management)

How it Works:
Turning Data into Delight

This level of personalization requires a complete, 360-degree view of the passenger, but this data is often scattered across different systems: CRMs, booking platforms, loyalty program databases, and mobile apps. Striim acts as the central data fabric, unifying these silos in real time.

Using non-intrusive Change Data Capture (CDC), Striim streams every new booking, update, or loyalty transaction from core databases the moment it happens. Simultaneously, it ingests streaming data from web and mobile app interactions. In Striim's processing engine, this data is unified. For example, a real-time flight status change (from an operational database) can be instantly correlated with the passenger manifest (from the booking system) and each traveler's loyalty status (from the CRM). This creates a continuously updated, context-rich profile for every passenger, which is then delivered in real-time to AI-powered personalization engines.

With a complete, up-to-the-minute picture of every passenger, airlines can move beyond cookie-cutter services. The prize at hand is not just a dramatic boost in customer satisfaction and loyalty but also new opportunities for revenue growth through timely, relevant offers.

Operational Data

REAL-TIME DATA

- Flight and Bag Tracking
- Bookings
- Customer App Experience
- Maintenance and TechOps

Striim
- Change Data Capture
- Streaming SQL + Real-Time ETL
- Real-Time Actions
- Monitoring

Real-Time Delivery

Data Products

DATA-DRIVEN CUSTOMER EXPERIENCE
- Real-time travel updates
- Real-time baggage info
- Booking based on real-time availability

Google Cloud · Microsoft Azure · aws · salesforce · snowflake · databricks

REAL-TIME BACKEND OPERATIONS
- Predictive maintenance
- Operational efficiency
- Crew assignment optimization

Enterprises in Flight

The principles of real-time AI are not just theoretical. They are being put into practice by leading aviation companies today. By building a solid, AI-ready data foundation, these forward-thinking airlines are moving from AI ambition to execution, transforming their operations and delivering superior passenger experiences. Here's a look at how American Airlines leverages real-time agentic AI to take flight.

American Airlines

For a major carrier like American Airlines, managing operational disruptions is a monumental task. The airline struggled with siloed data across flight operations, maintenance, and customer service, making it difficult to respond to delays proactively.

When a flight was delayed, the information would be trapped in one system, while passenger data was in another, and crew scheduling in a third. This fragmentation made it impossible for operational teams to make fast, informed decisions, leading to cascading delays and a frustrating passenger experience.

By deploying Striim, American Airlines was able to build a real-time operational data fabric, streaming and unifying these disparate data sources into a single, cohesive view. Using Change Data Capture (CDC), Striim continuously pulls updates from core operational databases and joins that information with live data from maintenance and customer-facing systems. The business impact was immediate and significant.

- **A Single Source of Truth:** Operational teams gained a unified dashboard to monitor flights, optimize crew scheduling, and personalize passenger communications during disruptions in real time.

- **Improved On-Time Performance:** With a complete operational picture, the airline could proactively manage resources and mitigate the domino effect of delays, resulting in an 8% improvement in on-time performance.

- **Enhanced Customer Satisfaction:** By sending timely, personalized updates and rebooking options to affected passengers, the airline was able to dramatically improve the travel experience, leading to a 15% reduction in passenger complaints.

> "Striim is a fully managed service that reduces our total cost of ownership while providing a simple drag and drop UI. There's no maintenance overhead for American Airlines to maintain the infrastructure."
>
> *Ganesh Deivarayan*
> *Sr. Manager at American Airlines*

A Path to AI-Ready Aviation

The aviation industry is at a pivotal moment. The opportunities to enhance efficiency, reduce costs, and elevate the passenger experience with AI are immense. From optimizing fuel consumption and predicting maintenance needs to accelerating ground turnarounds and personalizing every step of the passenger journey, intelligent systems are redefining what's possible.

Yet, as we've seen, the success of any AI initiative hinges on one critical element: real-time, trusted, and accessible data. Without a modern data foundation to break down legacy silos and feed AI models with the continuous stream of information they need, even the most ambitious projects will remain grounded.

Striim provides the unified data integration and intelligence platform that bridges the gap between AI ambition and execution. By delivering an AI-ready data foundation, we empower airlines to harness the full potential of their data, transforming operations and taking flight into a new era of intelligent aviation.

Learn how Striim can help your organization modernize its data infrastructure for the age of AI

Schedule a demo today.

About Striim

Striim powers real-time intelligence for enterprise AI with intelligent data integration and event-driven streaming that operationalizes AI at scale. The platform delivers high-quality, decision-ready data for real-time inference, contextual reasoning in RAG, and event-driven agentic automation— processing over 100 billion events daily with industry-leading CDC, in-stream transformations, and sub-second latency. Its fully managed SaaS unifies data across clouds, applications, and databases with enterprise-grade availability and elastic scalability. With MCP-ready AgentLink, Striim provides continuous, cleansed replicas in safe, compliant zones so agents get fresh, accurate data without exposing production systems. Intelligence is embedded directly into the stream, with AI agents generating vector embeddings, detecting anomalies, governing sensitive data, and validating pipelines for audit readiness. To learn more, visit **www.striim.com**.