

Aviva plc: Transforming Insurance Operations with Scalable MLOps on AWS

Company Background

Aviva plc is a leading multinational insurance and financial services company headquartered in London. Operating in 16 countries and serving over 33 million customers worldwide, Aviva is one of the world's oldest financial institutions, with origins dating back to 1696. The company offers a diverse portfolio of products, including life and general insurance, pensions, and investment services. Guided by its purpose—*helping people protect what matters most: their health, home, family, and financial future*—Aviva has embraced digital transformation to enhance customer experience and operational efficiency. Leveraging artificial intelligence (AI) and machine learning (ML) across more than 70 active use cases, the company improves pricing accuracy, claims management, and service delivery through data-driven insights.

Business Challenge

Aviva's data scientists faced significant inefficiencies due to manual deployment processes, dedicating over half their time to operational tasks instead of innovation. Model monitoring was inconsistent, limiting scalability and performance visibility.

With approximately 400,000 insurance claims processed annually—representing around £3 billion in payouts—Aviva needed greater automation, governance, and standardization to manage its growing data and operational complexity. The lack of a unified MLOps infrastructure led to challenges in collaboration, maintenance, and scalability, mirroring an industry-wide trend where nearly half of ML projects fail to reach production.

Remedy Use Case

The **Remedy** use case—powered by 14 ML models and business rules to determine whether to repair or write off a vehicle—highlighted Aviva's need for a scalable, efficient ML infrastructure. Managing this workflow on legacy systems hindered deployment speed and consistency, prompting Aviva to adopt the **AWS Enterprise MLOps Framework** to automate, monitor, and scale its ML operations effectively.

Cloud Services and Technical Architecture

Building on the Remedy use case, Aviva implemented an end-to-end MLOps architecture aligned with the **AWS Enterprise MLOps Framework**. This framework addressed challenges related to manual deployment, scalability, and model monitoring through four core components:

1. Network Infrastructure

A new networking architecture was established across three isolated environments—Development, Staging, and Production. This structure enhances data protection, compliance, and access control while improving security and performance through VPC endpoints.

2. Amazon SageMaker Studio

Serving as the core of the new MLOps environment, SageMaker Studio provides an integrated workspace for model development, training, deployment, and monitoring. It enhances collaboration, version control, and governance while minimizing manual effort.

3. SageMaker Project Templates

Acting as the “speed driver,” project templates automate standard ML pipelines, enforce CI/CD and security best practices, and ensure consistent, repeatable, and compliant workflows across environments.

4. Seed Code

Seed code provides baseline pipeline logic and preprocessing scripts, offering teams a

production-ready starting point. This promotes code consistency, accelerates experimentation, and reduces setup time.

MLOps Architecture and Pipelines

To replace manual workflows and high operational costs, Aviva implemented a **fully automated, cyclical MLOps system** based on CI/CD principles—transforming its model lifecycle into a reproducible, governed, and scalable process.

Previous Manual Process

Data scientists manually extracted, cleaned, and processed claims data from on-premises databases, performed feature engineering, trained models, and deployed APIs by hand—a process that was time-consuming, error-prone, and difficult to scale.

Automated MLOps Pipeline

The new architecture operates across three secured AWS accounts:

- **Development Environment**

Raw claims data is ingested into Amazon S3, triggering automated SageMaker pipelines for preprocessing, model training, tuning, and evaluation. The best-performing model is automatically registered in the SageMaker Model Registry and deployed to a development endpoint for initial testing.

- **Staging Environment**

A Lead Data Scientist manually promotes the approved model from development to staging. Here, integration testing with near-production data validates model performance and monitors potential drift.

- **Production Environment**

Upon successful validation, the model is promoted to production. When a claims handler submits a request, AWS API Gateway triggers an automated workflow that transforms the data, calls the SageMaker endpoint for a prediction, applies business rules, and integrates external vehicle data. The system then returns a real-time recommendation—*repair*, *write off*, or *investigate further*. Continuous monitoring automatically triggers retraining if data drift or performance degradation is detected.

This end-to-end automation ensures each step is traceable, secure, and efficient, enabling Aviva to manage and scale models enterprise-wide.

Business Impact

By adopting AWS's MLOps platform, Aviva achieved significant operational improvements:

- **Rapid Deployment:** ML workflows can now be replicated and deployed across hundreds of use cases in weeks instead of months.
- **Operational Efficiency:** Centralized governance and automated pipelines reduced manual workload for data scientists.
- **Cost Savings:** Transitioning from on-premises infrastructure to a pay-as-you-go cloud model cut ML platform costs by **up to 90%**.
- **Improved Consistency:** Standardized workflows enhanced reliability, transparency, and compliance across the ML lifecycle.

Through the integration of scalable MLOps practices, Aviva has positioned itself as a data-driven leader in the insurance industry—delivering faster, smarter, and more consistent outcomes for both the business and its customers.