HSBC: CLOUD-BASED FINANCIAL CRIME DETECTION AT SCALE

Celent Model Risk Manager of the Year 2023

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EXECUTIVE SUMMARY

FINANCIAL INSTITUTION	HSBC
INITIATIVE	Dynamic Risk Assessment (DRA)
SYNOPSIS	HSBC is making the innovative move, for a global bank, of partnering with Google Cloud to adopt a cloud-based machine-learning (ML) powered solution as its primary anti-money laundering (AML) transaction monitoring system. The new detection system, called Dynamic Risk Assessment (DRA), uses Google Cloud's AML AI, an AI-based risk detection product, at the core of DRA. HSBC leverages its extensive domain expertise in financial crime compliance and data assets to help train and fine-tune models created by AML AI. The scalability and high-performance computing power of the cloud enables the solution to significantly reduce batch processing time for HSBC's large customer base and drive advanced models to improve detection capability and deliver more accurate results.

TIMELINES

- **2019:** Cloud proof-of-concept
- **2020 2H:** Machine learning models generate first detection results
- **2021 2H:** In production at HSBC UK
- **2022 2H:** In production at HSBC Mexico and HSBC Singapore

KEY BENEFITS

- **Faster processing.** DRA has reduced the cycle time for 24-month lookbacks in HSBC's UK market from about one month to a few days.
- **Enhanced detection capability.** DRA identifies new typologies and suspicious networks, delivering more detailed insights for investigators.
- **Greater efficiency.** Achieves a material improvement in the number of alerts and in Suspicious Activity Report (SAR) conversion.

KEY VENDORS   Google Cloud

CELENT PERSPECTIVE

HSBC took the innovative step, for a G-SIB, of putting its primary AML transaction monitoring solution natively on the cloud.

HSBC, in partnership with Google Cloud, implemented a cloud-native, AI-based transaction monitoring platform for anti-money laundering in general production across the bank. Celent sees this as a game changer in how large banks are approaching financial crime and a clear example of how advanced technologies are becoming the mainstream technology paradigm of the future for compliance.

The Dynamic Risk Assessment solution is a collaborative effort with Google Cloud.

HSBC partnered with Google Cloud to create the Dynamic Risk Assessment (DRA) solution. The core of DRA is Google Cloud's AML AI, an AI-based risk detection product, built with Google's proprietary technologies. HSBC leverages its extensive domain expertise in financial crime compliance and data assets to help train and fine-tune models using AML AI. Throughout, customer data remains securely stored in HSBC's Google Cloud project environment, where it is encrypted at-rest, in-transit with HSBC's encryption keys.

HSBC's head of DRA analytics says the bank hopes to "support others in taking advantage of the benefits of AI" for financial crime compliance. Working with Google Cloud to develop a next-generation AML solution certainly has the potential to benefit anti-financial crime efforts in the industry at large.

HSBC is getting distinct benefits from a pure AI approach to TM, as compared to a hybrid approach.

The machine learning models are able to train on data across multiple locations, and analyze transaction flows and other parameters to detect more complex typologies. Initial results from DRA have focused on uncovering money mule networks. Moreover, DRA is yielding consistent detection results across several countries where it is already in production, demonstrating effectiveness in considerably different environments.

The processing power of the cloud enables DRA to deliver its advanced analytics in a greatly reduced batch processing window compared to the bank's previous system. The system also generates less noise and delivers more accurate alerts. These capabilities contribute to reducing overhead and simplifying operations, which are key considerations for financial crime compliance at large banks.

DETAILED DESCRIPTION

> " *We're really excited to share what we've done and get the information out and hopefully support others in taking advantage of the benefits of AI.*
>
> Paula Guidorizzi Borges, Head of Dynamic Risk Assessment Analytics, HSBC

Introduction

HSBC is a top 10 global bank, with 39 million customers in 62 countries and territories worldwide.

Table 1: HSBC Snapshot

Year Founded	1865
Assets (2022)	US$3.0 trillion
Geographic Presence	HQ: London. Operates in 62 countries in Europe, Asia, the Middle East and Africa, North America and Latin America.
Employees (2022)	219,000
Other Key Metrics	39 million customers
Relevant Technologies and Vendors	Google Cloud, artificial intelligence, machine learning

Source: HSBC

HSBC is making the innovative move—for a global systemically important bank (G-SIB)—of adopting a cloud-based solution to serve as its primary AML transaction monitoring system. Moreover, the solution uses machine learning as its core detection method. Working with Google Cloud, the bank determined that the scalability and high-performance computing power of the cloud would significantly reduce batch processing time for its large customer base and drive advanced models to improve detection capability and deliver more accurate results. The new detection system, called Dynamic Risk Assessment (DRA), is the result of a collaborative effort between Google Cloud and HSBC, combining their expertise to tackle the challenge of financial crime detection. The core of DRA is Google Cloud's AML AI, an AI-based risk detection product designed to help financial institutions more effectively and efficiently detect financial crime. HSBC brings its extensive domain expertise in financial crime compliance and provides data assets to help train and fine-tune models using Google Cloud's AML AI.

DRA has yielded impressive results. In terms of detection capabilities, the system's models have demonstrated the ability to detect new typologies as well as complex networks of suspicious customers and activity. In terms of quantitative results, DRA is delivering a material improvement in the number of alerts and in Suspicious Activity Report (SAR) conversion rates, with much faster batch processing than the bank's previous transaction monitoring system.

Opportunity

Large international banks have been reluctant to use the cloud to run solutions in the highly regulated area of financial crime compliance. In part, this has been due to concerns over the security and privacy of customer data and differing regulatory stances globally on the use of cloud in financial services. To address this concern, customer data remains securely stored in HSBC's Google Cloud project environment, where it is encrypted at-rest, in-transit with HSBC's encryption keys.

Concerns about model-risk governance and explainability have also caused reluctance to adopt AI-based solutions. HSBC and Google Cloud worked through these concerns by implementing rigorous model governance and risk-score explainability to accelerate investigations.

In terms of detection technology, banks are increasingly augmenting their legacy rules-based systems with machine learning routines in a so-called hybrid rules/AI approach. Particularly in their main lines of business, however, larger banks are not all-out replacing their rules-based detection systems with AI platforms.

As financial crime compliance grows in complexity and scale, legacy transaction monitoring systems are challenged to deliver accurate, focused insights in a timely manner. Fortunately, evolving AI and machine learning techniques and the high-performance capabilities of cloud computing are leading the way to meet this need for detection and scalability.

The availability of these innovative technologies is inevitably leading to change in sourcing decisions for compliance technology at large institutions. As evidence of this ongoing shift, we have HSBC's Dynamic Risk Management initiative, the first enterprise-wide use at a major global bank of an AI platform—in the cloud—as the primary financial crime detection solution.

James Russell, Compliance IT Project Manager at HSBC, laid out the reasons for upgrading financial crime compliance technology: "Methods for identifying money laundering across the financial services industry need to become faster, more efficient, and more effective. Existing detection processes are slow, can only target broad customer segments, and rely on painstaking and time-consuming manual investigations."

HSBC's new transaction monitoring solution was designed to support each of the above three imperatives: speed, detection capability, and efficiency.

Speed. The high-performance computing capabilities of the cloud enable HSBC to analyze vast amounts of customer, account, and transaction data. In its UK market, DRA completes a batch analysis in several days, compared to more than 30 days using the bank's previous behavior detection system.

Detection capability. DRA can train on data across multiple locations, leveraging transaction flows and other parameters to detect more complex typologies. Initial results from DRA have focused on uncovering networks of activity, such as money mule networks. Moreover, DRA is yielding consistent detection results across the several countries where it is already in production.

Efficiency. DRA delivers improved Suspicious Activity Report conversion rates. According to HSBC, the system also provides more granular insights from the AI system, delivered via a user interface to HSBC's compliance teams. This gives its analysts a significant head-start in their investigations, as well as the ability to pass on more specific information to law enforcement authorities.

Solution

Dynamic Risk Assessment is a cloud-native system that runs in Google Cloud leveraging its risk detection product, AML AI. Models are trained on the bank's production data and validated through a testing process. Models are then run against live and historical customer, account, and transaction data in scheduled batches.

Technology Overview

DRA leverages Google Cloud's infrastructure and uses Google Cloud's proprietary product, AML AI, built to support money laundering-related risk management capabilities. Development and deployment of the overall DRA solution utilizes open-source technologies, including open-source projects that originated at Google such as Kubernetes. The investigation interface is built using React.js and is fed by several DRA APIs as microservices.

According to the bank, DRA's cloud-native design significantly reduces the overhead and complexity of managing this large infrastructure project.

Solution Delivery

The executive sponsor for Dynamic Risk Assessment is Jen Calvery, HSBC's Group Head of Financial Crime and Group Money Laundering Reporting Officer (MLRO).

The DRA project uses DevOps and an agile development methodology aimed at increasing efficiency, speed, and quality in software development. It was one of the first projects at HSBC to adopt an agile-at-scale development approach. James Russell, Compliance IT Project Manager at HSBC, said that this approach "allows experimentation at pace. The ability to fail fast empowers us to know where to invest time and effort."

DRA's delivery team comprises approximately 170 members across business and IT. The team is organized into some 16 multi-disciplinary development teams, or PODs, which are currently based in the UK, Poland, India, and China. Each POD typically includes representatives from IT, product management, transformation, and analytics. There are no hard IT-business boundaries. The project's priorities are reviewed and aligned to business objectives on a quarterly basis.

Timeline

The Dynamic Risk Assessment detection solution is currently live in HSBC's home market of the UK, as well as Mexico and Singapore. For each of these initial markets, the solution produced immediate benefits by delivering improved hit rates for identifying financial crime.

HSBC intends to implement the solution globally. For each new market, operational testing is carried out to verify that the model outperforms the incumbent AML system. This is a requirement set by HSBC to qualify DRA for production in any given country.

DRA and Google Cloud AML AI were developed over a two-year time frame as a collaborative effort with Google Cloud for the first go-live in the UK. Key milestones in the project are shown in Figure 1.

Figure 1: HSBC Dynamic Risk Assessment Project Milestones
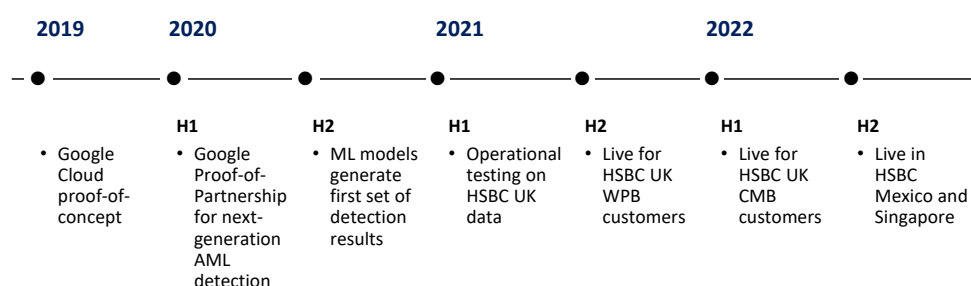
Source: HSBC

Results

The collaborative effort between HSBC and Google Cloud has proved the value of advanced AI-based financial crime detection. The bank sees numerous positive outcomes from the DRA project.

First, the processing power of the cloud makes it possible to run complex ML models across vast amounts of data, and to do this much faster than HSBC's incumbent system. In the UK market, HSBC undertakes, on a monthly basis, a 24-month look back that involves 8 billion transactions across 63 million accounts. DRA has reduced the cycle time for this analysis from about one month to a few days. Customer model results are generated in less than 12 hours.

Second, DRA is delivering an enhanced detection capability. The system's models are able to trace activity across multiple accounts and transaction flows. This ability to track relationships between customers has enabled the bank to repeatedly detect suspicious networks of customers operating together. DRA has also identified—without specific models designed to detect them—new typologies, such as misuse of business loans. DRA's ability to detect more connected individuals and broader networks of activity provides more insights for compliance analysts to work with. Ultimately, the bank is able to file richer SARs, providing law enforcement with more accurate and value-added information for their own investigations.

Third, the DRA system achieves significant quantitative improvements. DRA generates significantly fewer alerts than HSBC's incumbent system. By reducing the level of "noise" typical of rules-based systems, DRA substantially improves efficiency and provides more insightful alerts to investigation teams.

DRA alerts also have higher SAR conversion rates. The bank expects conversion rates to further improve over time through continuous feedback loops and further refinement of the system's supervised learning models.

Key Factors for Success

HSBC sees engagement by both HSBC and Google Cloud teams, and a willingness to share expertise between both sides, as contributing to the successful delivery of the Dynamic Risk Assessment solution. Additionally, the ability of the internal project team to work across organizational boundaries was crucial to the outcome. The project team also actively sought feedback from its compliance analyst users and sees these inputs as being invaluable to DRA's success.

Google Cloud was integral to the success of the project by providing reliability, scalability, advanced tooling, models from its AML AI risk detection product, and cost transparency.

Future Plans

HSBC's main objective for the project over the next two years is to roll out DRA to as many markets as possible across the bank's operating footprint of Asia-Pacific, Europe, the Middle East and North Africa, South America, and North America.

Other potential goals for DRA include:

- Expanding the range of data sources made available to Google Cloud's AML AI to further leverage the potential of ML.
- Extending the scope to include emerging risks such as crypto/digital assets and human trafficking.
- Leveraging DRA to support perpetual Know Your Customer (pKYC).
- Bringing DRA insights directly to the first lines of defense.

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MODEL RISK MANAGER CASE STUDIES

Bank of America: Virtual On-Watch
March 2023

CIBC: Centralized AI and ML Cloud Platform
March 2023

Enfuce: Card Fraud Prevention as a Service
March 2023

Fifth Third: Excelling at Climate Risk Management
March 2023

HSBC: Cloud-Based Financial Crime Detection at Scale
March 2023

Societe Generale: Automating Communications Surveillance in Capital Markets
March 2023

Truist: Locking Out Fraud With Biometrics
March 2023

VP Bank: Reducing Op Risk Through Automation
March 2023

ABN AMRO: KYC Investigations
March 2022

BNP Paribas S.A.: One KYC
March 2022

DBS Bank: Reimagining the Corporate Credit Risk Management Process
March 2022

Fincare Small Finance Bank: Centralize, Digitize, and Automate the Audit Process
March 2022

Forcht Bank: Cybersecurity Excellence through Strategic Outsourcing
March 2022

ICICI Bank: Strategic Management of Retail Debt During the Pandemic
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PNC Bank: PINACLE® Payee Account Validation
March 2022

VPBank: Regtech Compliance Transformation
March 2022

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