

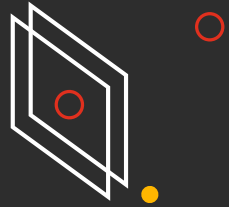


Anomaly Detection Platform

June 2022



Anomaly detection and transaction monitoring is a complex business problem



Challenges

1 Data barriers

2 Manual control mechanism

3 Obsolete techniques

4 Rising compliance cost



Challenges

Data barriers

1

- Data integration challenges due to multiple, **siload sources** with different data types and data quality issues, leading to increase in complexity
- Manual checking not able to keep up with **rising transaction volumes** and makes **only sample testing** possible, leading to leakages of anomalies

Manual control mechanism

2

- **Turnaround time (TAT)** breaches/closure in delays due to manual tracking and **lack of audit trails and holistic visibility**
- **High full-time equivalent (FTE) involvement and costs due to manual processes** with more time being spent on identifying anomalies and less on resolving them

Obsolete techniques

3

- Anomaly patterns keep changing, making **static business rules/supervised models obsolete** in a short span of time
- Key anomalies not being tagged as validation done only on **known risks/patterns with dated predefined rules**

Rising compliance cost

4

- **Lack of flexibility** in existing monitoring systems to keep pace with the increasing regulatory focus on governance and controls
- Increased compliance cost as audit observations lead to key stakeholder involvement for **post-facto remediation**

Are your business, risk and
compliance teams ...



...keeping pace with today's
dynamic needs?

Introducing...



Anomaly Detection Platform



Artificial intelligence (AI) driven digital platform



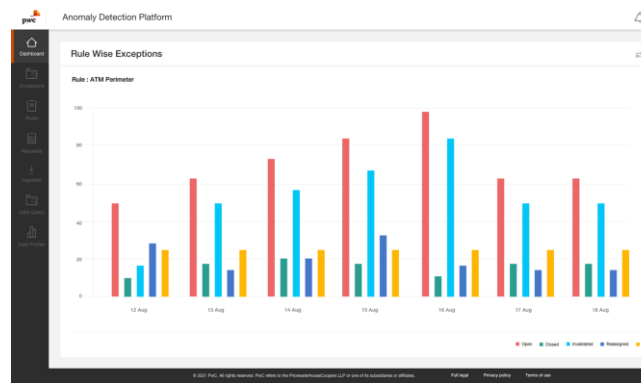
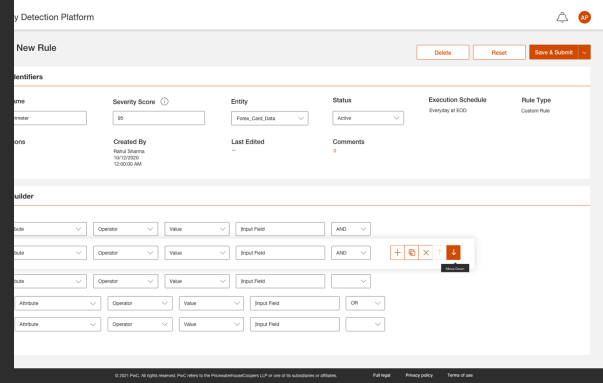
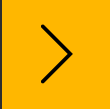
Detecting and preventing anomalies



Continuous transaction monitoring



Uncovering unknown patterns and risks using unsupervised machine learning (ML) methods



Empower your teams with our
one-stop, fully automated platform

Platform features



01 Data ingestor

Process any structured and unstructured data through seamless integration with multiple data source types using our built-in API connectors

Data Ingestion

Reset Data Profiler Ingest

Set Up

Ingestion Method: File Import Entity Name: ATM_Transaction Data

File Upload: File Name_003_980K File Type: CSV Header List: Default: First Row of file Description (Optional): Data imported from ATM transaction file

Preview

Jml. No	Bgl. No	BGL Acc. Name	Cash Enabling Req	System Narration	Tran Date	Branch	Amount	Account Owner Unit	Account Risk Class	Account Status	Account Ownership
1445077	98080102012	Imps Charge Back ...	No	Chargeback Raise To...	10/12/2020	10201	25000	CCU	Medium	Active	Shikha Kuikami
1445077	98080102012	Imps Charge Back ...	No	Chargeback Raise To...	10/12/2020	10201	25000	CCU	Medium	Active	Shikha Kuikami
1445077	98080102012	Imps Charge Back ...	No	Chargeback Raise To...	10/12/2020	10201	25000	CCU	Medium	Active	Shikha Kuikami
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1445077	98080102012	Imps Charge Back ...	No	Chargeback Raise To...	10/12/2020	10201	25000	CCU	Medium	Active	Shikha Kuikami

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Platform features

02 Heuristic rules engine with ML module

Tackle both known and unknown risks with our pre-built rules libraries and unsupervised ML models respectively, via a business-friendly user interface (UI) for rules configuration

The screenshot displays the 'Create New Rule' interface of the Anomaly Detection Platform. The interface is divided into several sections:

- Rule Identifiers:** A table with columns for Rule Name, Severity Score, Entity, Status, Execution Schedule, and Rule Type. The current rule is named 'ATM Perimeter' with a severity score of 95, entity 'Forex_Card_Data', status 'Active', and execution schedule 'Everyday at EOD'.
- Exceptions:** A table with columns for Exceptions, Created By, Last Edited, and Comments. The current rule has 0 exceptions, was created by 'Rahul Sharma' on '10/12/2020' at '12:00:00 AM', and has no last edited date or comments.
- Rule Builder:** A section for building the rule logic using a visual builder. It consists of multiple rows of fields for 'Attribute', 'Operator', 'Value', and 'Input Field', connected by logical operators like 'AND' and 'OR'. A 'More Data' button is visible on the right side of the builder.

At the bottom of the interface, there is a footer with the following text: '© 2021 PwC. All rights reserved. PwC refers to the PricewaterhouseCoopers LLP or one of its subsidiaries or affiliates. Full legal Privacy policy Terms of use'.

Platform features

03 Workflow manager

Seize full control of exception management with our customisable workflow manager with real-time user notifications, contextual nudges, audit logs and feedback loops

The screenshot displays the 'Anomaly Detection Platform' interface. The main content area is titled 'Exception Details' and includes a sidebar with navigation options: Dashboard, Exceptions, Rules, Requests, Ingestion, Data Query, and Data Profile. The 'Exception Details' section contains a table with columns: Rule, Status, Audit Trail, JRNL. No., BGL No., BGL A/C Name, and Cash_Enabling_Req. Below this is another table with columns: System Narration, System Narration, Branch, Amount, A/C Owner Unit, Account Status, and Risk Category (Optional). The 'Audit Trail' section shows a timeline of events with columns: Date & Time, User, Status, Comments, Documents, and Document Description. The 'Supporting Notes' section includes a 'Comment' field and a 'Document (Optional)' field. The footer contains copyright information: © 2021 PwC. All rights reserved. PwC refers to the PricewaterhouseCoopers LLP or one of its subsidiaries or affiliates. Full legal Privacy policy Terms of use.

Rule	Status	Audit Trail	JRNL. No.	BGL No.	BGL A/C Name	Cash_Enabling_Req
Rule_Score>BGL_MTR_TXN_CashEntry_Chck->100	Open	12	1445077	98080102012	Imps Charge Back Payable A/C	No

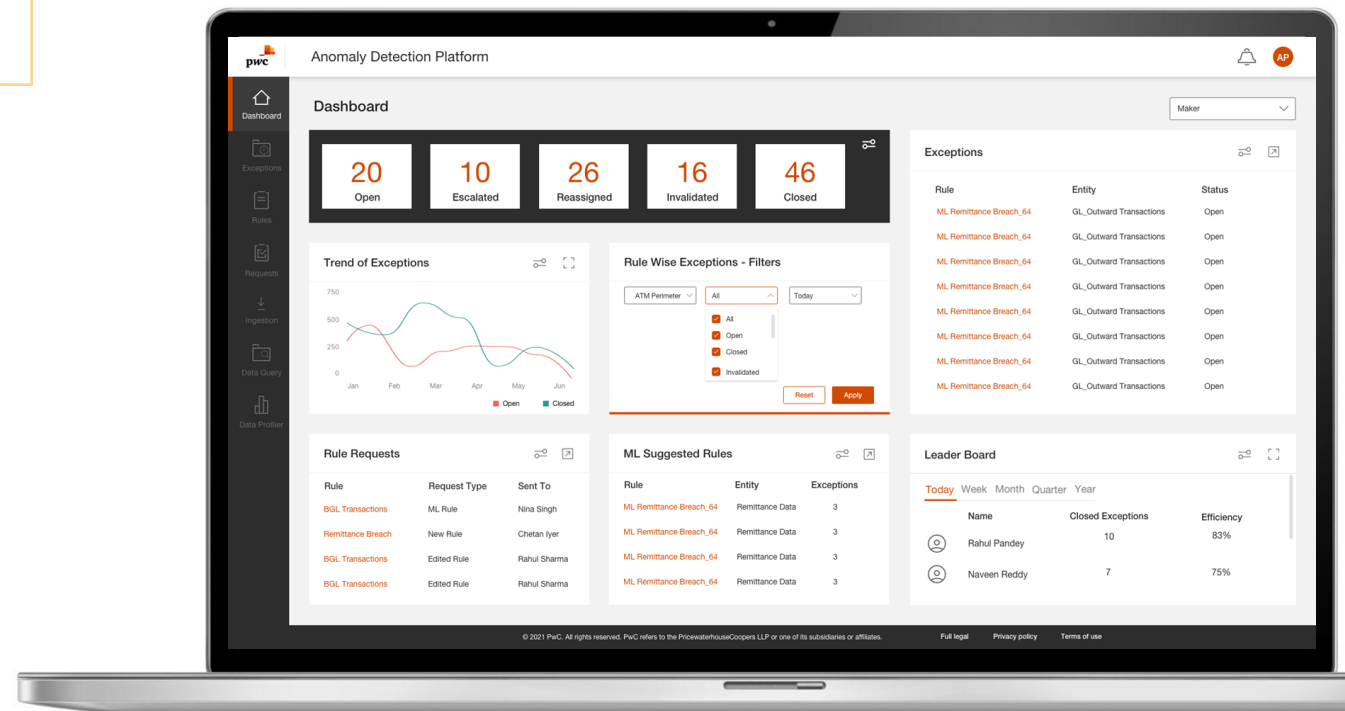
System Narration	System Narration	Branch	Amount	A/C Owner Unit	Account Status	Risk Category (Optional)
Chargeback Raise To Cash/ SYB/028216590778/08102020	10/12/2020 12:00:00 AM	10201	25000	CCU	Active	--

Date & Time	User	Status	Comments	Documents	Document Description
14/08/2020 4:00:00 PM	Naveen Kumar	Reassigned	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Cras ac metus ac lorem.		
14/08/2020 4:00:00 PM	Naveen Kumar	Reassigned	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Cras ac metus ac lorem.		
14/08/2020 4:00:00 PM	Deepam Iyer	Reassigned	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Cras ac metus ac lorem.		
14/08/2020 4:00:00 PM	Deepam Iyer	Reassigned	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Cras ac metus ac lorem.	Document 01	Lorem ipsum dolor sit amet, consectetur adipiscing elit.
				Document 02	Lorem ipsum dolor sit amet, consectetur adipiscing elit.
				Document	Lorem ipsum dolor sit amet, consectetur adipiscing elit.
14/08/2020 4:00:00 PM	Nina Singh	Open	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Cras ac metus ac lorem.		

Platform features

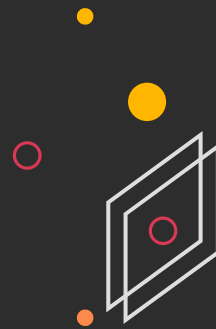
04 Dashboard and insights

Deliver insights via our personalised and action-oriented dashboards aimed at all levels, including analysts and CxOs to drive always-on monitoring of exceptions



Streamlined processes, proactive remediation and seamless compliance

Platform benefits



01 Realise full data coverage

Analyse complete data for improved anomaly detection and transaction monitoring by eliminating reliance on sample data

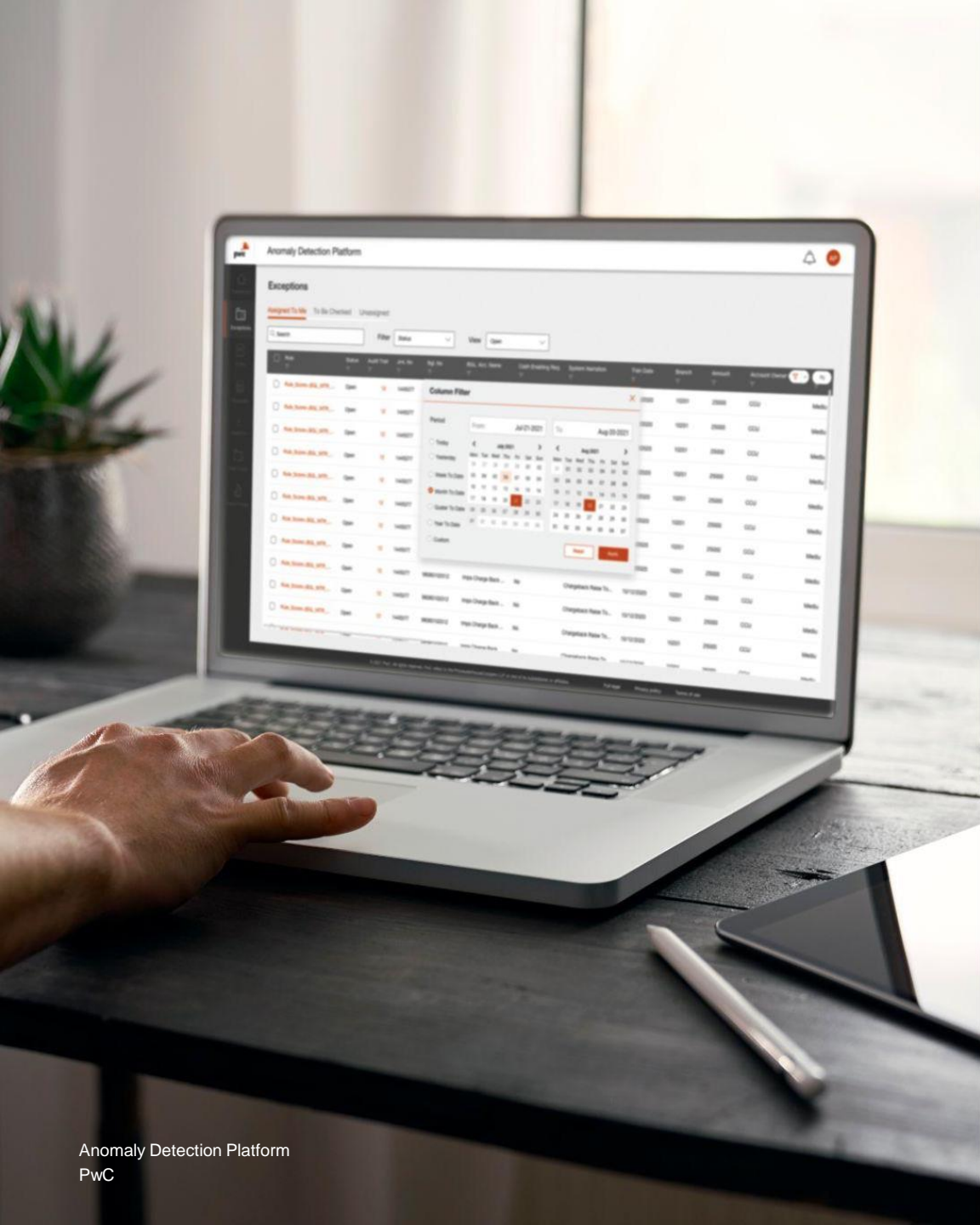
02 Uncover unknown patterns

Use unsupervised ML methods to discover elusive outliers in any dataset without pre-labelling its data beforehand

03 Empower your organisation

Equip non-ML users to utilise ML via our platform's easy-to-use, explainable ML features for deriving smarter insights





Platform benefits

04 Drive holistic visibility

Power continuous monitoring with workflows, real-time alerts and dashboards for effective exception management

05 Elevate operational efficiency

Improve lead times and decrease FTE hours by focusing on exception resolution rather than manual exception identification

06 Demonstrate compliance seamlessly

Harness our platform's powerful audit trails and custom reports to demonstrate compliance to internal and external stakeholders

A platform with a difference

Deep domain know-how

1

- PwC has deep domain knowledge and **local regulatory and compliance expertise** necessary for solving anomaly detection and transaction monitoring
- Our solution is built on the insights from PwC professionals across AI/ML, risk, compliance and RegTech teams, and will help you **remain informed of the ever-evolving risks**

Explainable ML model

2

- Our ML models have been designed with 'explainability' as a central pillar to **empower even non-ML users** to derive insights and use them meaningfully
- This ability to **signify the rationale of ML outputs to both internal and external stakeholders** is key to driving successful ML adoption for business benefits

Platform extensibility

3

- Our platform, with its open architecture, can be **easily integrated with existing systems and applications**, and tailored to cater to **multiple business use cases at a low cost**, making this a sustainable solution
- Moreover, our **flexible deployment option**, either via **cloud or on premise**, makes for rapid deployment



Illustrative use cases

**Manufacturing (with
online/offline retailing)**



Production

- Machine health – flagging irregular behaviours
- Overall equipment effectiveness (OEE) – drilled down monitoring
- Condition monitoring using power data



Product quality

- Early warning signals – manufacturing quality
- Warranty analytics – fraudulent claims flagging



Sales management

- Distribution/channel partner onboarding
- Spotting bugs in online portals (mispriced items, etc.)
- Early detection of online frauds (coupon misuse, declined transactions, etc.)
- Data quality and assurance



Supply chain

- Inventory threshold monitoring at warehouse and store level



Finance

- Bank reconciliation
- Account receivable reconciliation (AR)
- Vendor invoice reconciliation (AP)
- GST reconciliation
- Intercompany reconciliation



Illustrative use cases

FMCG



Production

- Early warning signals – manufacturing quality
- Predictive maintenance – flagging irregular behaviours
- Overall equipment effectiveness (OEE) – drilled down monitoring



Supply chain

- Inventory reconciliation and threshold monitoring
- Distributor discount – commission model checks
- Fraud risk management



Finance

- Bank reconciliation
- Accounts receivable reconciliation (AR)
- Vendor invoice reconciliation (AP)
- GST reconciliation



Sales management

- Channel partner onboarding
- Data quality and assurance
- Detecting sudden surge/decline in online/offline shopping
- Spotting bugs in online portals (mispriced items, etc.)
- Early detection of online frauds (coupon misuse, declined transactions, etc.)



Illustrative use cases

Banking and non-banking financial companies (NBFCs)



Customer management

- Unrelated parties identification check for leads
- Leads and customer (KYC check)
- AML alerts and monitoring
- Data quality and assurance (control checks)



Finance

- GL transaction monitoring and reconciliation
- Account receivable reconciliation (AR)
- Vendor invoice reconciliation (AP)
- Commission variance reconciliation



Operations

- ATM perimeter monitoring
- SWIFT reconciliation
- Capital markets reconciliation
- Investment portfolio monitoring and reconciliation
- Digital payments reconciliation



Audit

- Transaction level checks w.r.t concurrent audit (including rate reasonability, deal confirmation)
- Loans evergreening monitoring
- Branch audit checks



Risk

- Portfolio monitoring
- Monitoring of suspicious transactions at branch level
- Monitoring of suspicious customer deposits



Illustrative use cases

General insurance



Customer management

- Uncovering application fraud by customers/agents
- Pre-policy issuance checks (incorrect disclosures)
- Leads and customers (KYC and unrelated parties check)
- Data quality and assurance (controls)



Underwriting

- Predictive risk scoring for intelligent underwriting
- Risk assessment using wearables data
- Enhanced underwriting via cognitive capture



Claims management

- Medical service provider collusion – billing checks
- Padded claims detection for motor insurance
- Organised fraud, including staged collisions
- Policyholder profile, claims history, and location-based triggers
- Subrogation case detection



Finance

- General ledger reconciliation
- Inter-company reconciliation
- Premium collection reconciliation
- Commission payout reconciliation
- Accounts receivable reconciliation (AR)
- Accounts payable reconciliation (AP)



Operations

- Persistency monitoring
- AML alerts and monitoring
- Investment portfolio monitoring and reconciliation



Illustrative use cases

Life insurance



Customer management

- Uncovering application fraud by customers/agents
- Pre-policy issuance checks (incorrect disclosures)
- Leads and customers (KYC and unrelated parties check)
- Data quality and assurance (controls)



Underwriting

- Predictive risk scoring for intelligent underwriting
- Risk assessment using wearables data
- Enhanced underwriting via cognitive capture



Claims management

- Payout optimisation and settlement
- Fraud detection using predictive analytics
- Litigation prevention via text analytics
- Fraud detection using predictive analytics



Finance

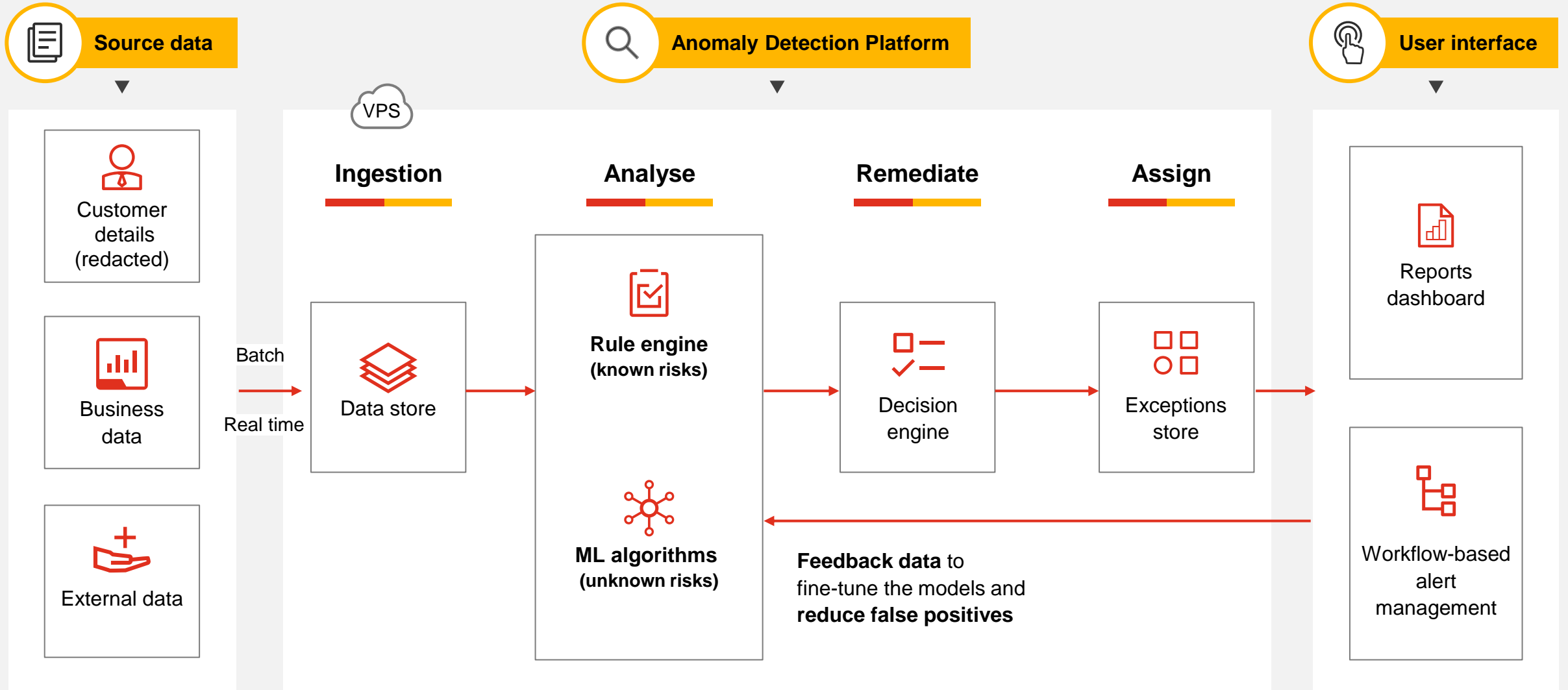
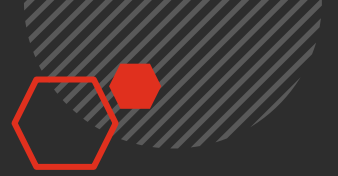
- General ledger reconciliation
- Inter-company reconciliation
- Premium collection reconciliation
- Commission payout reconciliation
- Accounts receivable reconciliation (AR)
- Accounts payable reconciliation (AP)



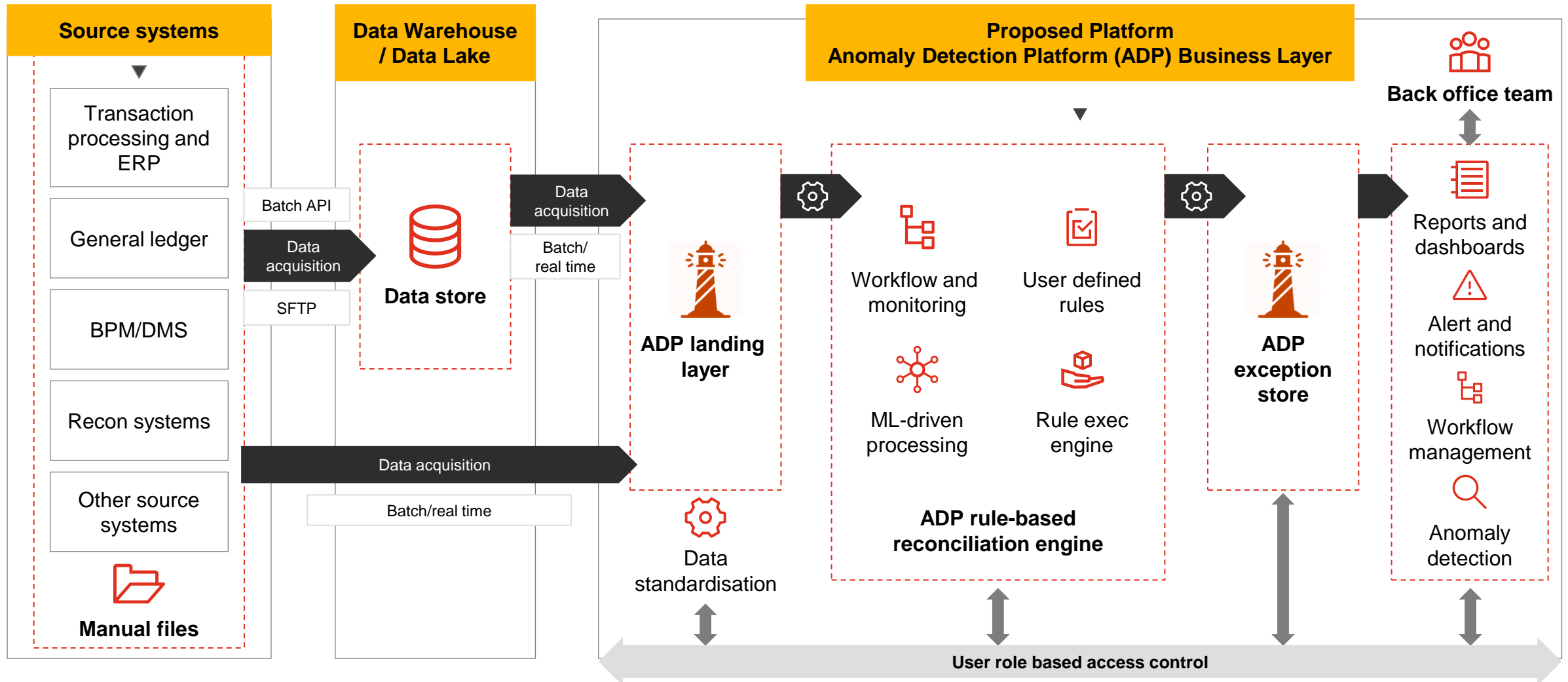
Operations

- Persistency monitoring
- AML alerts and monitoring
- Investment portfolio monitoring and reconciliation

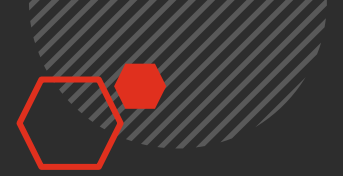
Platform architecture



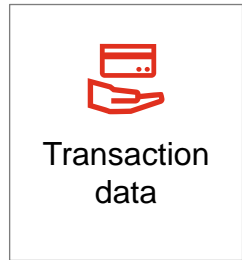
Overall solution architecture (illustrative)



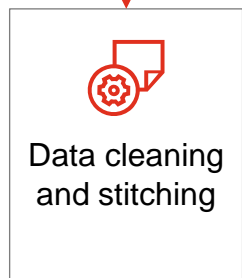
Process flow



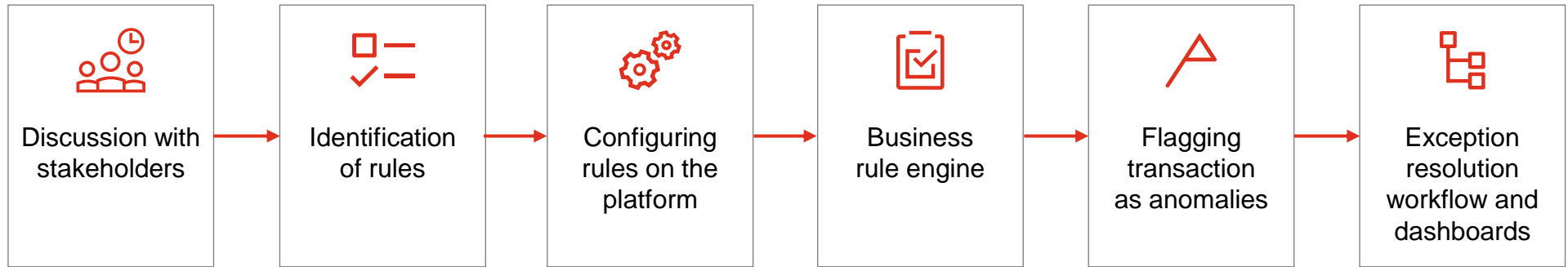
Configuration of known business rules to cover known exception patterns



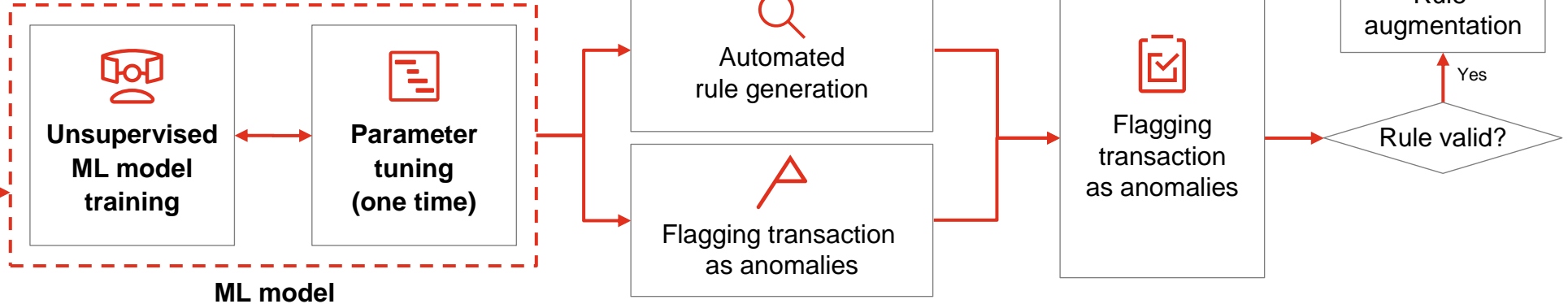
Transaction data



Data cleaning and stitching



ML-based identification of anomalous transactions and corresponding augmentation of business rules to cover unknown exception patterns



Case study 1

Client profile

A leading Indian private bank

Critical client issues



- Revenue leakage due to mismatch between expected registrar and transfer agents (RTAs) commission payout vs actual commission payout by the bank
- Requirement of an automated tool for evaluating the effectiveness of the existing commission-calculation framework to assist the bank in comparing RTA commission vis-à-vis system calculated commission

Our approach



- Used PwC's Anomaly Detection to recalculate the commission by leveraging on existing reports and calculation logics using 100% data
- Developed models to identify anomalistic scenarios in commission mismatches
- Provide a report documenting the reasons of the commission variances by analysing the material differences

What we delivered



- Automated controls
- Review of variance
- Platform build
- Dashboard visualisation
- End-to-end automation

Impact



- The recalculation resulted in **savings worth more than INR 25 crore** for FY 2018–19

Case study 2

Client profile

A leading Indian private bank

Critical client issues



- Multiple, siloed recon systems and general ledger (GL) applications in the existing system landscape
- TAT breaches due to manual, non-streamlined GL anomaly handling processes
- Missing out on unknown patterns due to reliance on pre-defined static rules
- Lack of recon visibility due to poor audit trail

Our approach



- Automate and streamline the monitoring of all GL anomalies via configurable business rule library, action-oriented alerts and proactive notifications
- Provide visibility into open anomalies with their ageing and priority tagging basis the TAT for various GLs, with detailed audit trails
- Power ML-pattern analysis to recognise mismatching patterns over time and recommend proactive remediation
- Enable timely reports and dashboards for helping with audits and tracking key operational metrics

What we delivered



- Flexible rule engine with pre-built rule libraries
- Customisable exception workflow manager
- Intelligent ML pattern analyser
- Intuitive dashboards for analysts and CFOs

Impact



- Our platform will help the client improve its GL anomaly detection and monitoring process, thereby reducing their overall compliance cost

Case study 3

Client profile

One of India's largest FMCG companies

Critical client issues



- Risks of invoice fraud and duplicate payments due to a large volume of invoices
- High costs due to manual anomaly handling process, poor audit trails and exception status visibility
- Omitted unknown patterns since only known invoice risks/patterns considered
- Higher compliance cost due to stakeholder involvement for post-facto remediation

Our approach



- Provide an integrated, digital platform on Azure for vendor invoice – anomaly detection and monitoring with built-in exception handling workflows
- Automate and streamline the vendor invoice monitoring process via configurable business rule library, action-oriented alerts, proactive notifications and audit trails
- Power ML-pattern analysis to capture unknown risks and recommend proactive remediation
- Build the solution as a flexible, extensible platform with a capability to drive future insights via configurable dashboards

What we delivered



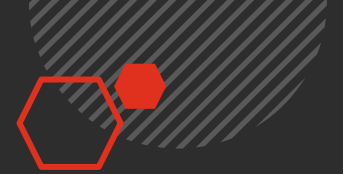
- Heuristic rules engine with pre-built rule libraries
- Intelligent ML pattern analyser
- Automated data ingestor
- Customisable workflow manager
- Configurable dashboards for key stakeholders

Impact



- Our solution will help the client future-proof their vendor payment process by making it more robust, scalable and error free with the use of advanced analytics augmented features
- Client can also launch other AI/ML use cases through this platform in the future

Contact us



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