Technical Architecture Brief

Deterministic Reinsurance Operations Infrastructure

For Chief Actuaries, CFOs, and Institutional Investors
Africa · Asia · Gulf

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CedeOS

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EXECUTIVE SUMMARY

The Infrastructure Gap in Reinsurance Operations

2.5%	$1.25M	4 weeks
of GWP lost to reconciliation errors	annual recovery at $50M GWP	to implement vs 12-18 months

African and Asian insurers lose an average of **2.5% of gross written premium** every quarter to reinsurance reconciliation errors — errors that are systematic, predictable, and fully preventable with the right infrastructure.

The root cause is not negligence. It is architecture. The tools available to these markets were built for London's Lloyd's syndicate model, not for treaty reinsurance in regulatory environments governed by IRA Kenya, NAICOM Nigeria, FSCA South Africa, SAMA Saudi Arabia, or IFRS 17.

CedeOS is the first reinsurance operations platform built natively for these markets. It is not a reporting tool. It is not a BI dashboard. It is the **infrastructure layer between the cedant bordereaux and the reinsurance treaty** — a deterministic validation and reconciliation engine that applies rules with mathematical precision, produces a full audit trail, and satisfies eight regulatory frameworks without manual intervention.

> ***"At $50M GWP, the quantified annual benefit is $1.25M in recovered leakage and $61,250 in recaptured analyst time — before regulatory risk mitigation."***
>
> — CedeOS ROI Model, 2026

SECTION 1

The Reinsurance Data Problem

What a Bordereaux Is

A bordereaux is the periodic data submission from a cedant to its reinsurer, listing every policy, premium, and loss in the reinsurance arrangement. It is the primary instrument of financial settlement between cedant and reinsurer.

In African and Asian markets, a single insurer may have 4-12 cedants submitting bordereaux monthly or quarterly. Each cedant uses a different format. Each treaty has different retention limits, reinstatement conditions, exclusions, and aggregate caps. Each regulatory jurisdiction requires specific calculations and submission formats.

The Five Error Categories

These five error types account for the overwhelming majority of reinsurance leakage across Africa and Asia:

#01	**Cession Rate Misclassification** Wrong treaty class applied — wrong cession rate	**KES 10M** per quarter on 200 misclassified policies
#02	**Reinstatement Premium Miscalculation** Calculated against wrong limit after XL trigger	**KES 110K** per trigger event, invisible without row-level validation
#03	**Wrong-Date Currency Conversion** Booking date used instead of settlement date	**USD 34K** per quarter on 300 USD-denominated policies
#04	**Aggregate Retention Breach Undetected** No system monitoring cumulative ceded losses vs. treaty limits	**KES 4M** unrecovered per undetected breach
#05	**Cancelled Policies on Bordereaux** Cancelled policies trigger multi-week actuary disputes	**$30K** per dispute at $250/hr actuary billing rate

Why This Persists

- **VIPR** (dominant reinsurance platform, founded 2009) was built for Lloyd's delegated authority — not treaty reinsurance. Stores data on Snowflake (US/EU cloud), violating POPIA and SAMA data residency requirements. Zero Africa/MENA presence.
- **Excel** has no audit trail, no validation layer, no treaty awareness, and no regulatory submission capability.
- **Custom in-house builds** cost $500K-$2M, take 12-18 months, and require 3-5 engineers to maintain.

SECTION 2

Platform Architecture

Architecture Principle: Deterministic, Not Probabilistic

Every decision made by CedeOS is deterministic and explainable.

The validation engine does not use machine learning for financial calculations. It uses a rule table — treaty-specific, regulation-specific, and market-specific rules applied to each bordereaux row in sequence. Every rule application is logged with: row identifier, rule applied, expected value, actual value, delta, severity, timestamp, and operator ID.

Accuracy on deterministic rule application: 99.x%

Ingestion Engine — Five Channels

Channel	Mechanism	Use Case
Excel / CSV	Direct file upload	Most cedant submissions
REST API	JSON or CSV payload, system-to-system	Cedants with existing systems
PDF	Layout recognition, bounding box + column inference	Legacy cedants
Email attachment	Mailbox polling, automatic extraction	High-volume cedants
SFTP	Scheduled pull from cedant SFTP server	Enterprise cedants

Column Normalisation — 40+ Naming Conventions Mapped

Source headers in any format or language are automatically mapped to a canonical schema:

Source Header (any format)	Canonical Field
`PREM_AMT / Gross Premium (LCY) / GWP / PREMIUM_AMOUNT_LOCAL`	`premium_amount / gross_written_premium`
`Risk_Comm_Rate / COMMISSION_% / Comm_Rate`	`commission_rate`
`MUDARABA_POOL / WAKALA_CONTRIBUTION`	`takaful_mudaraba_pool`

Validation Engine — Five Rule Categories

1	**Treaty Compliance** Each row matched against applicable treaty clause: layer, class, territory, inception date. Violations flagged before submission.
2	**Cession Rate Accuracy** Correct rate per policy class per treaty schedule. Misclassified policies identified. Correct amount calculated. This is arithmetic, not inference.
3	**Currency Conversion Integrity** All conversions at treaty-specified settlement date using applicable central bank rate. Every conversion logged with rate source and date.
4	**Aggregate Monitoring** Running total of ceded losses by treaty layer. Alert at 80% of aggregate limit. Prevents undetected retention breaches.
5	**Data Integrity** Cancelled policies, duplicates, missing fields, and out-of-range values identified before submission, classified by severity with remediation path specified.

SECTION 3

Compliance Module — Eight Regulatory Frameworks

IFRS 17 compliance is native, not bolted on. The system calculates CSM and Loss Component at the contract level, maintains the fulfilment cash flow schedule, and produces the audit trail required for external auditor sign-off on the reinsurance assets section of the balance sheet.

Framework	Jurisdiction	Key Requirements
IRA Kenya	Kenya	Quarterly XML submission, solvency ratio, reinsurance arrangement disclosure
CBK Kenya	Kenya	Quarterly submissions, reinsurance rate floors by class
NAICOM Nigeria	Nigeria	40% minimum retention, quarterly filing, prior treaty approval
FSCA South Africa	South Africa	POPIA compliance, IFRS 17 audit trail, in-country processing
SAMA Saudi Arabia	Saudi Arabia	In-country processing, Takaful Wakala/Mudaraba oversight
SECP Pakistan	Pakistan	Takaful compliance, Wakala and Mudaraba ledger separation
DIFC UAE	UAE	Financial services compliance, ILS reinsurance documentation
IFRS 17 (Global)	Global	Native CSM/Loss Component calculation, prior period restatement prevention

IFRS 17 — Why This Is Now a Board-Level Issue

- Under IFRS 17, the Contractual Service Margin (CSM) for a group of contracts is calculated directly from premium and claims data. If ceded premium figures are wrong, the CSM is wrong.
- A CSM error persisting across two reporting periods may require a prior period restatement — triggering audit review, regulatory notification, and potential restatement of published financials.
- The cost of restatement — auditor fees, regulatory interaction, management time — can exceed ten times the value of the original leakage that caused it.

> ***"Bordereaux accuracy is no longer an operational inconvenience. Under IFRS 17, it is a board-level financial reporting risk."***
>
> — CedeOS Technical Brief, 2026

SECTION 4

Infrastructure & Data Residency

Runtime Architecture

- **Application layer:** Google Cloud Run (managed, serverless containers). Current deployment: europe-west1 (Belgium). Container-native, stateless, 12-factor architecture.
- **Container registry:** Google Artifact Registry. Images are immutable, versioned, and auditable.
- **Path to GKE:** Architecture is container-native and portable. Full migration to GKE in af-south-1 (Johannesburg) is the next infrastructure milestone for insurers requiring full in-region compute.

Data Residency — Architectural Constraint, Not Configuration

No cedant data crosses regional boundaries by default.

Cross-border transfer requires explicit contract-level opt-in with the transfer mechanism documented for regulatory review. This is enforced at the infrastructure layer, not the application layer.

Market	Data Region	Cloud	Regulatory Basis
Kenya, Nigeria, South Africa	af-south-1 (Johannesburg)	Supabase / GCP	POPIA: in-country processing required
Saudi Arabia, UAE, Gulf	me-central-1 (Bahrain)	Supabase / GCP	SAMA: in-country required; DIFC: UAE jurisdiction
Pakistan, India, South Asia	ap-south-1 (Mumbai)	Supabase / GCP	Local regulatory requirement

Total Cost of Ownership

Scale	Configuration	Monthly Cost
Pilot (1-2 insurers)	Cloud Run + Supabase Pro	$25-75
Growth (5-10 insurers)	Cloud Run + Supabase Team	$200-400
Enterprise (20+ insurers)	GKE af-south-1 + Supabase Enterprise	$1,500-3,000

Sovereign (air-gapped)	On-premise Kubernetes + managed Postgres	$5,000-15,000 setup + $500/mo ops

SECTION 5

Security Posture

Control	Implementation
Encryption at rest	AES-256 (GCP/Supabase default, all volumes)
Encryption in transit	TLS 1.3 (all API traffic, no TLS 1.2 fallback)
Authentication	TOTP + password (operator); JWT RS256 (API)
Data isolation	Single-tenant deployment available — dedicated infrastructure per client
Audit logging	Every transformation, access, and export — timestamped, immutable, append-only
Data residency	In-country by architecture — not configurable post-deployment
POPIA compliance	af-south-1 in-country storage + processing; no cross-border transfer default
SAMA compliance	me-central-1 in-country storage + processing
SOC 2 roadmap	Type I target: Q4 2026 (post-Series A)

SECTION 6

Return on Investment

Premium Leakage Recovery

Formula: Annual GWP x 2.5% leakage rate x recovery rate

Gross Written Premium	Annual Leakage Recovered
$10M GWP	$250,000 / year
$50M GWP	$1,250,000 / year
$100M GWP	$2,500,000 / year
$500M GWP	$12,500,000 / year

Operations Time Recovery

- Analyst time recaptured: 35 hours/week (MGA operations baseline)
- Fully-loaded analyst cost: $70,000/year = $35/hour
- **Annual recovery: 35 x 50 x $35 = $61,250**

Regulatory Risk Mitigation

Risk	Quantified Cost	CedeOS Mitigation
NAICOM late filing fine	Up to 50% of treaty premium	Automated quarterly filing preparation
IFRS 17 prior period restatement	$50K-500K audit + restatement cost	Native CSM calculation, no reclassification
POPIA data breach fine	Up to ZAR 10M (~$540K)	In-country residency, no cross-border transfer
SAMA compliance failure	Reinsurance arrangement suspension	In-country processing, Takaful native

SECTION 7

Competitive Positioning

Dimension	CedeOS	VIPR	Excel
Primary market	**Africa, Asia, Gulf**	Lloyd's / London	Universal
Deal type	**Treaty reinsurance**	Delegated authority	Both
Data residency	**In-country by architecture**	US/EU Snowflake	Uncontrolled
IFRS 17	**Native CSM/LC calculations**	Not supported	Manual
Regulatory frameworks	**8 native (Africa/Gulf)**	None Africa/Gulf	None
Takaful support	**Wakala/Mudaraba native**	None	Manual
Audit trail	**Row-level, immutable**	Basic logging	None
Implementation	**4 weeks**	6-12 months	Immediate (zero value)
Year 1 cost	**$15K-45K**	$150K-500K	$0 (leakage unquantified)

"VIPR was built for Lloyd's. CedeOS was built for Africa and Asia."

SECTION 8

Pilot Program — 90 Days, Defined Deliverables

No long-term commitment required. Success criteria defined upfront in writing. If the pilot does not deliver the agreed outcomes, no commercial obligation.

Week	Deliverable
Weeks 1-2	Data ingestion configured — your bordereaux formats mapped, column conventions set
Weeks 3-4	Treaty uploaded — rule set extracted and reviewed with your Chief Actuary
Month 2	First validated bordereaux — most recent quarterly submission run through the engine
Month 3	Leakage analysis — prior 4 quarters quantified; one regulatory submission prepared

Investment Thesis

- **Market:** $350B+ global reinsurance premium. Africa + Asia: $40B+ growing at 8-12%/year. VIPR has zero Africa/MENA presence.
- **Revenue model:** SaaS subscription per insurer, priced as percentage of GWP managed (0.05-0.15%). At $50M GWP: $25,000-75,000/year. Gross margin target: 80%+ at scale.
- **Moat:** Regulatory compliance. Each new framework integrated is a barrier to competitive entry. Eight frameworks live. Each additional framework widens the moat and creates switching costs.
- **Path to revenue:** 5 pilot insurers → 2 paying customers → Series A → 50 customers → $2.5M-7.5M ARR.

Book a 30-Minute Architecture Demo

No sales slides. We review your specific operation — your bordereaux formats, your treaties, your regulatory requirements.

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Live deployment: cedeos.co
Phase 1 markets: Kenya · Nigeria · South Africa · Saudi Arabia · UAE
Phase 2 markets: Pakistan · Bangladesh · India · Egypt · Morocco

Advisory Board

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