PYCENTRIC

CRAFTING SOFTWARE SOLUTIONS WITH PRECISION

REG NO: K2024121493 (PTY) LTD

APPLIED AI, QUANTITATIVE FEASIBILITY & ENTERPRISE SOFTWARE STUDIO

Corporate Profile & Strategic Partnership Prospectus

Crafting resilient software solutions with mathematical precision. We transition growing enterprises from fragmented operational busywork to high-velocity automated systems, production AI, and mathematically stress-tested capital decisions.

INSTITUTIONAL ENGINEERING PEDIGREE

Founded and directed by senior engineering leaders with enterprise track records delivering mission-critical cloud, quantitative risk, and fintech systems at Amazon Web Services (AWS), BMW IT Hub, and First National Bank (FNB Fintech).

PyCentric (Pty) Ltd
South Africa
https://pycentric.co.za

Annual Release Edition: 2026/2027
Classification: Commercial in Confidence

The Strategic North Star & Executive Vision

Democratizing institutional enterprise engineering pedigree to solve mission-critical operational bottlenecks, capital feasibility questions, and AI adoption deterministically.

> *"Growing businesses rarely fail due to a lack of ambition. They stall because manual busywork consumes their best people, or because capital is committed to unverified assumptions. At PyCentric, we combine the engineering discipline of global tech institutions with agile execution: delivering quantitative feasibility studies, automated workflows, resilient cross-platform software, and production AI & machine learning that provide measurable leverage from Day 1."*
>
> **Vhutali Tshavhungwe**
> **Founder & Chief Executive, PyCentric (Pty) Ltd**

90 Days	100%	10,000+	Fixed Fee
FREE DEFECT WARRANTY	IP & SOURCE TRANSFER	MONTE CARLO SCENARIOS	MILESTONE CERTAINTY

Our Vision

To be the premier software engineering, quantitative simulation, and applied AI studio across South Africa and the African continent, empowering forward-thinking enterprises globally with uncompromised architectural excellence, pragmatic innovation, and high-velocity digital infrastructure.

Our Mission

To engineer resilient, cost-effective software architectures, stochastic feasibility models, mobile ecosystems, and applied AI & MLOps systems by combining reusable proprietary scaffolding with bespoke craftsmanship, backed by rigorous automated testing and a 3-month comprehensive warranty.

The PyCentric Executive Approach

We reject the traditional agency model of speculative consulting, inflated hourly invoices, and opaque handoffs. Every engagement is executed under single RACI executive accountability, validated through Test-Driven Development (TDD) with automated verification, and protected by enterprise encryption standards.

The PyCentric Moat: Five Non-Negotiable Guarantees

We de-risk technology investments for our enterprise partners through contractual transparency, guaranteed deliverables, and unyielding quality bars.

1. The 90-Day Free Comprehensive Warranty

CONTRACTUAL STANDARD

Every production deployment includes a 3-month post-launch warranty at zero additional cost. PyCentric rectifies any functional defect, regression, or deviation from agreed specifications within guaranteed SLAs, ensuring you never pay for our bug fixes.

2. Fixed-Price Sprint Certainty

ZERO COST OVERRUN

We eliminate runaway hourly billing. Every milestone has a clearly defined scope, explicit acceptance criteria, and a fixed milestone investment corridor. What we quote is what you invest.

3. Agile Scope Swapping ("Give-Get" Protocol)

DYNAMIC AGILITY

Business requirements evolve during development. If commercial priorities shift mid-sprint, pending features may be swapped for equivalent-effort requirements without contract renegotiations or change penalty fees.

4. 100% IP Sovereignty & The "Project Exit Kit"

FULL OWNERSHIP

Upon milestone settlement, 100% of custom source code, schemas, and assets transfer to your repositories. We provide a turnkey Project Exit Kit including automated deployment configs, architecture runbooks, and credentials with zero vendor lock-in.

5. Hybrid AI Architecture & POPIA Compliance

ENTERPRISE PRIVACY

We deploy frontier commercial models (Claude, Gemini, GPT-4o) via zero-retention enterprise endpoints alongside self-hosted local models (Ollama, Llama, Mistral, Qwen) for sensitive internal workloads, ensuring strict South African POPIA Section 22 data governance.

Quality Verification Standard: All software is governed by automated CI pipelines enforcing ≥ 90% backend domain test coverage, zero high-severity SAST vulnerabilities (via Bandit), and container supply chain security scanning.

Six Core Engineering & Advisory Practice Areas

End-to-end capabilities spanning applied AI, classical machine learning & MLOps, quantitative feasibility simulation, workflow automation, cross-platform apps, and turnkey business infrastructure.

01. Applied AI, Conversational Agents & Hybrid RAG

Deterministic, schema-validated AI agents and private document intelligence with zero hallucination tolerance.

- 24/7 WhatsApp Business & Web AI agents with instant human escalation
- Hybrid RAG over PDFs, contracts, manuals & ERPs (pgvector + rerankers)
- Frontier LLMs (Claude, Gemini, GPT-4o) + local open-weight (Llama, Mistral, Qwen)
- Automated quoting, booking, intent dispatch & POPIA zero-egress privacy

02. Classical Machine Learning, MLOps & Metaheuristics

High-ROI predictive modeling, mathematical optimization, and self-healing production MLOps pipelines.

- Tabular Gradient Boosting (XGBoost, LightGBM, CatBoost) for churn, credit & fraud
- Explainable AI (SHAP / TreeSHAP) feature attribution for regulatory audits
- Metaheuristic solvers (PSO, Differential Evolution, Genetic & Ant Colony)
- Point-in-Time Feature Stores, sub-15ms ONNX serving & drift observability

03. Quantitative Feasibility Studies & Simulation

Bankable, falsifiable capital stress-testing before you commit funds to new ventures, sites, or platforms.

- 10,000+ iteration Monte Carlo stochastic risk & cash-flow survival modeling
- Agent-Based Modeling (ABM) & SimPy discrete-event queue/line simulation
- Huff Gravity Model spatial catchment, drive-time isochrones & cannibalization
- 3-statement financial & TCO models + bankable DFI/lender Go/No-Go packs

04. Workflow Automation & Operational Engines

Eliminating repetitive manual busywork across sales, billing, CRM, ERP, and customer onboarding.

- Event-driven workflow engines (n8n, Celery, Redis Streams, Temporal)
- Automated SA payment reconciliations (PayFast, Ozow, Yoco, Peach, Stripe)
- Real-time PDF invoice/quote generation, CRM/ERP sync (Xero, Sage, HubSpot)
- Automated WhatsApp notifications, approval gates & audit trails

05. Custom Cloud, Web & Cross-Platform Flutter Apps

Unified single-codebase Flutter frontends and modular high-concurrency backend microservices.

- Flutter 60fps multi-target apps (iOS, Android, Web, Desktop) with offline sync
- Modern Python (FastAPI, Pydantic) & Go microservices (REST, gRPC, Kafka)
- PostgreSQL 16 (ACID ledgers), DuckDB/Polars analytics & Redis 7 caching
- Full WCAG 2.1 AA accessibility & responsive mobile/tablet/desktop layouts

06. The Growth Stack, E-Sign Suite & DevSecOps

Turnkey digital foundation & interactive E-Form stationery for growing SMEs paired with cloud governance.

- Brand Book, Digital Signature/Seal Kit & Interactive AcroForm PDF Contracts/Letterheads
- Google/Zoho Workspace + MX, SPF, DKIM & DMARC email security + SSO/LDAP
- Rootless Podman, Docker & Kubernetes with automated CI/CD quality gates
- OpenTelemetry, Prometheus, Grafana & Loki observability + Fractional CTO

The PyCentric "Golden Path" Technology Stack

Frontend & Portals: Flutter (Dart), Streamlit, Dash, Marimo & Modern Web; **APIs & Streaming:** FastAPI (Python 3.14), Go, gRPC, Kafka & RabbitMQ; **Data & AI/ML:** PostgreSQL 16, pgvector, DuckDB, Polars, XGBoost, LightGBM, CatBoost, PyTorch, SimPy & ONNX; **Observability & Ops:** Rootless Podman, Docker, Kubernetes, Prometheus, Grafana & OpenTelemetry.

Applied AI, Machine Learning & Quantitative Feasibility

Where institutional quantitative rigor meets production engineering: deterministic AI systems, explainable tabular ML, metaheuristic optimization, and stochastic capital stress-testing.

A. APPLIED AI, CLASSICAL MACHINE LEARNING & PRODUCTION MLOPS

SUB-15MS INFERENCE & POPIA COMPLIANT

Conversational AI & Sovereign Hybrid RAG

24/7 WhatsApp & Web Autopilot: Answers customer inquiries in seconds, qualifies leads, books appointments, generates PDF quotes, and escalates sensitive threads to human staff with full context.
Private Knowledge Retrieval: Hybrid semantic + lexical RAG (pgvector + cross-encoder reranking) grounded strictly in your policies, contracts, and manuals, running via zero-retention cloud APIs or air-gapped local open-weight LLMs (Llama, Mistral, Qwen).

Tabular Gradient Boosting & Explainable AI (SHAP)

Structured Enterprise Data: For credit underwriting, customer churn, demand forecasting, dynamic pricing, and fraud detection, we deploy calibrated **XGBoost, LightGBM, CatBoost, and Scikit-Learn** ensembles that outperform LLMs at a fraction of compute cost.
Audit-Ready Glass-Box ML: Every prediction ships with **SHAP / TreeSHAP** feature-attribution explanations and out-of-time validation metrics.

Nature-Inspired Metaheuristic Optimization

When multi-constraint routing, staff rostering, warehouse slotting, or capital allocation problems exceed linear solvers, we deploy **Particle Swarm Optimization (PSO)**, **Differential Evolution (DE)**, **Genetic Algorithms (GA)**, and **Ant Colony Optimization (ACO)** to discover Pareto-optimal schedules under hard business constraints.

Automated MLOps, Feature Stores & Drift Guards

Zero Training-Serving Skew: Point-in-time correct feature pipelines validated via **Great Expectations** and **Pydantic**, versioned with **DVC & MLflow**.
Self-Healing Serving: Sub-15ms containerized **ONNX Runtime / FastAPI** endpoints monitored by **Evidently & Prometheus** (PSI / KS drift alerts + champion/challenger retraining).

B. QUANTITATIVE FEASIBILITY STUDIES, SPATIAL INTELLIGENCE & DYNAMIC SIMULATION

BANKABLE DFI, IDC & BOARD DEFENSE PACKS

Why Static Spreadsheets Fail: Single-line Excel projections hide variance, queue bottlenecks, competitor retaliation, and working-capital troughs. PyCentric replaces optimistic guesswork with a falsifiable 4-stage mathematical simulation pipeline before you sign leases, procure machinery, or commit development capital.

Stage 01 : Spatial & Market Equilibrium Audit

Huff Gravity Model spatial interaction probability mapping, real-road drive-time catchment isochrones, multi-site cannibalization heatmaps, and **Nash game-theoretic equilibrium** pricing against incumbent competitors.

Stage 02 : 3-Statement Financial & TCO Engine

Driver-based 60-month **Income Statement, Balance Sheet & Cash Flow Statement**, multi-year Total Cost of Ownership (TCO), unit-economics contribution margins, working-capital trough sizing, and **NPV, IRR & Payback Period**.

Stage 03 : Monte Carlo, ABM & SimPy Stress-Testing

10,000+ Monte Carlo iterations (Latin Hypercube Sampling, Cholesky-correlated shocks, VaR / CVaR, P10/P50/P90 survival bands), **Agent-Based Modeling (ABM)**, **SimPy discrete-event line simulation**, and **Taylor Series** sensitivity Tornado charts.

Stage 04 : Falsifiable Go / No-Go & Bankable Pack

Unbiased decision gate (**GO, CONDITIONAL GO, or NO-GO** if P50 NPV < 0 or ruin probability exceeds tolerance) delivered with an auditable executive report, reproducible Python/Excel models, and DFI/commercial lender defense annexures.

Proprietary Products Lab & Operating Code

We build tools we use in production. Our open-source and proprietary systems solve real engineering problems, while our operating code guarantees deterministic execution.

PYCENTRIC SOFTWARE LABORATORY

Cadence — PROPRIETARY

Internal workflow orchestration and delivery platform providing real-time sprint visibility, milestone tracking, and automated delivery gates.

pummel — OPEN SOURCE (RUST)

Protocol-agnostic load generator bridging Taurus YAML with the Rust Goose engine. Benchmarks HTTP, WebSocket, and dynamic gRPC without JVM overhead.

tea — TEST AUTOMATION

Multi-protocol integration test engine validating HTTP, gRPC, WebSocket, Kafka, Redis, MongoDB, and OpenSearch workflows via declarative scenarios.

lazypod — OPEN SOURCE

Rootless container and pod management TUI providing clean network namespaces and automated health probes for local and staging microservices.

vigil — OBSERVABILITY

Distributed infrastructure telemetry and service-level objective (SLO) tracker delivering real-time incident alerting and error budget enforcement.

budget_app — FINTECH / FLUTTER

Cross-platform personal and SME cash-flow forecasting application featuring offline-first local encryption and automated ledger categorization.

THE SEVEN PILLARS OF THE OPERATING CODE

01 Ground Truth Over Hype
Deploying working containers to staging in 5 days beats speculative theoretical architectures and AI buzzwords.

02 Rule of Three (Radical Focus)
Prioritizing the top 3 high-impact deliverables per sprint, ruthlessly eliminating low-value distraction.

03 Craftsmanship with Deadlines
Enterprise architectural rigor paired with strict milestone commitments and delivery velocity.

04 Radical Candor, Zero Ego
Honest, direct communication with clients and teammates; we flag risks early and issue No-Go verdicts when warranted.

05 Security by Architecture
Universal encryption at rest and in transit, Argon2id credential hashing, and zero high-severity SAST defects.

06 Transparent Value & Licensing
Fixed-price sprint certainty, 100% IP sovereignty, and unambiguous source code transfer terms.

07 Golden Paths & Pragmatic Stacks
Standardized, battle-tested modern technology stacks (Python 3.14/FastAPI, Flutter, XGBoost/LightGBM, SimPy, PostgreSQL, Redis, Podman) that eliminate operational friction and technical debt.

Commercial Engagement & Next Steps

Structured engagement tiers designed for clarity, rapid value realization, and long-term partnership scale.

ENGAGEMENT MODEL	TIMELINE	CORE DELIVERABLES	COMMERCIAL STRUCTURE
Quantitative Feasibility & Discovery Sprint	48 Hrs to 2 Weeks	Monte Carlo / SimPy / Huff Gravity feasibility model, architecture blueprint, interactive UI prototype & Go/ No-Go pack	Fixed Fee (Credited to Build)
The Growth Stack & E-Sign Brand Suite	1 to 2 Weeks	Google/Zoho Workspace, MX/SPF/DKIM/DMARC, Brand Book, Digital Seal & Fillable AcroForm Contracts/Letterheads	Fixed Turnkey Package
Bespoke Turnkey Software & AI Build	4 to 16 Weeks	End-to-end production web/Flutter apps, workflow automation, RAG/MLOps pipelines & 90-day free warranty	Milestone Invoicing (Fixed Corridor)
Engineering & Fractional Advisor Retainer	Monthly (Flexible)	Dedicated engineering squad capacity, MLOps drift monitoring, Fractional CTO advisory & priority SLA support	Fixed Monthly Retainer

Initiate a Strategic Partnership Discussion

We invite prospective enterprise partners, founders, and operations leaders to schedule a direct 30-minute discovery call with our leadership.

FOUNDER & CHIEF EXECUTIVE
Vhutali Tshavhungwe

DIRECT EXECUTIVE WHATSAPP
+27 67 018 8217 (@pycentric)

CLIENT & PARTNERSHIPS DESK
hello@pycentric.co.za

EXECUTIVE DIRECT EMAIL
vhutali@pycentric.net

WHATSAPP: @PYCENTRIC

Corporate Governance & Statutory Identification

Legal Entity: PyCentric (Pty) Ltd
Registration Number: K2024121493
Statutory Framework: Companies Act 71 of 2008

Headquarters: Pretoria, Gauteng, South Africa
Compliance: POPIA Section 22 Operator Compliant
Web Portal: https://pycentric.co.za

© 2026 PyCentric (Pty) Ltd. All rights reserved.