

Whitepaper: Dynamic Risk Assessment & Pricing EngineReal-Time Adaptive Pricing with Sovereign Multi-Agent AI - w6

Dynamic Risk Assessment & Pricing EngineReal-Time Adaptive Pricing with Sovereign Multi-Agent AI
Singularity IO Zurich, Switzerland

EXECUTIVE SUMMARY

Insurance and reinsurance pricing has become increasingly complex due to volatile risk landscapes, climate change, cyber threats, and rising customer expectations for speed and fairness. Traditional actuarial models are too static and slow for today's dynamic markets.

This whitepaper presents a sovereign, multi-agent Dynamic Risk Assessment & Pricing Engine that delivers real-time, adaptive pricing while maintaining full regulatory compliance and data sovereignty.

Key Outcomes

- 25–40% improvement in pricing accuracy and competitiveness
- Real-time risk evaluation using live and alternative data sources
- Significant reduction in under- and over-pricing exposure
- Automated regulatory reporting and audit readiness
- Full DSG/GDPR + EU AI Act compliance by design
- Scalable across personal, commercial, and specialty lines

Built on the Singularity Agentic Platform on Exoscale SKS, this engine transforms pricing from a periodic exercise into a continuous, intelligent capability.

INTRODUCTION

Accurate and timely pricing is the cornerstone of profitable insurance operations. Yet most insurers still rely on batch-processed, rule-based models that cannot respond quickly to changing risk conditions or new data sources.

This whitepaper details a production-ready sovereign Agentic AI solution that continuously assesses risk and dynamically adjusts pricing with full transparency and regulatory alignment.

THE CHALLENGE

Insurers and reinsurers today struggle with:

- Static pricing models that fail to incorporate real-time signals
- Limited use of alternative data (IoT, satellite, behavioural, external feeds)
- Slow pricing cycles that result in lost opportunities or adverse selection

- Difficulty explaining pricing decisions to regulators and customers
- Increasing pressure from EU AI Act requirements for high-risk pricing systems
- Talent shortages in actuarial and pricing teams

A modern pricing engine must be fast, adaptive, explainable, and fully sovereign.

OUR APPROACH – THE DYNAMIC RISK & PRICING AGENTIC FRAMEWORK

The Singularity Dynamic Pricing Engine consists of collaborating autonomous agents:

- **Real-Time Risk Monitoring Agent**
- **Multi-Source Data Integration Agent**
- **Predictive Risk Modelling Agent**
- **Dynamic Pricing & Recommendation Agent**
- **Compliance & Explainability Agent**

These agents operate continuously within a stateful LangGraph orchestration, combining internal policy data, external feeds, and behavioural signals to deliver accurate, adaptive pricing in real time.

All processing occurs in isolated sovereign environments on Exoscale SKS in Switzerland.

TECHNICAL ARCHITECTURE

Core Components:

- **Orchestration:** LangGraph for stateful, multi-agent decision workflows
- **Inference:** Ollama with GPU acceleration (local sovereign models)
- **Vector Memory:** Qdrant for risk pattern recognition and historical pricing outcomes
- **Automation:** n8n for integration with policy systems, brokers, and external data providers
- **Observability:** Full audit trails with natural language explanations

Key Features:

- Continuous risk scoring with adaptive weighting
 - Explainable pricing logic for transparency
 - Configurable business rules and guardrails
 - Automated documentation for regulatory filings
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IMPLEMENTATION GUIDE

10-Week Dynamic Pricing Engine Deployment Roadmap

Phase 1: Foundation (Weeks 1–2)

- Current pricing model assessment and data audit
- Identification of high-impact lines of business

- Singularity Platform tenant setup (Enterprise tier)

Phase 2: Agent Development & Integration (Weeks 3–6)

- Build core risk monitoring and pricing agents
- Integration with core insurance systems and external data feeds
- Calibration with historical pricing and claims data

Phase 3: Pilot, Validation & Scale (Weeks 7–10)

- Parallel run with existing pricing process
- Performance measurement and model refinement
- Governance handover and underwriter training

EXPECTED BUSINESS IMPACT & ROI

Typical Results for Insurance Carriers:

	Metric	Improvement	Annual Value
1	Pricing Accuracy	+25% to +40%	Improved loss ratio
2	Cycle Time (Quote to Bind)	-50% to -70%	Higher conversion
3	Adverse Selection Reduction	Significant	Direct P&L impact
4	Manual Pricing Effort	-40–60%	Team efficiency
5	Total Expected ROI	175–245%	Payback in 5–8 months

REGULATORY COMPLIANCE & GOVERNANCE

The engine is engineered for full EU AI Act compliance (high-risk pricing systems):

- Transparent and explainable pricing decisions
- Automated technical documentation and conformity reports
- Configurable human oversight thresholds
- Bias detection and fairness monitoring
- Comprehensive audit logs for regulators

CONCLUSION AND FUTURE OUTLOOK

Dynamic, agentic risk assessment and pricing represent the future of insurance profitability. By combining real-time data, multi-agent intelligence, and sovereign infrastructure, insurers can achieve superior risk selection, faster time-to-market, and stronger regulatory standing — all while keeping critical data fully within Switzerland.