DETERMINISTIC RISK INFRASTRUCTURE · GOVERNMENT & SOVEREIGN · MAY 2026

ARIN22

Class-routed deterministic risk-compute kernel for central banks, sovereign wealth funds, and treasury / finance-ministry functions.

SAA Alliance builds **ARIN22** — a deterministic, class-routed risk-computation kernel for sovereign-tier institutions. Country-only subject stress validation, air-gapped deployment supported day one, hash-chained audit lineage, regulator-safe trace export. Designed for central-bank model-risk functions, sovereign-wealth-fund risk teams, and treasury / finance-ministry stress frameworks operating under regulatory or sovereignty constraints.

PRE-CLIENT · INSTITUTIONAL DILIGENCE-READY

1 Why this matters for sovereign-tier institutions

Central banks, sovereign wealth funds, and treasury / finance-ministry functions operate under three structural constraints that commodity risk tools do not address: (1) sovereignty — deployment must support air-gapped or in-tenant configuration without external-vendor dependency; (2) reproducibility — every decision must be reconstructable bit-for-bit under independent audit; (3) multi-domain coupling — sovereign risk spans macro, geopolitical, sanctions-regime, energy, supply-chain, and financial-stability cascades simultaneously. ARIN22 is built against these three constraints: CPU-portable kernel deployable air-gapped, 1-unique-hash determinism across 1,000 fresh-process repeats, operator-splitting framework for cross-domain coupling. Country-only subject-stress packs with independent subject-separation proof — no cross-country evidence leakage.

2 Differentiation

- **Air-gapped deployment day one**
  CPU-portable kernel runs without external-vendor dependency. No GPU lock-in. No mandatory cloud connectivity. NVIDIA stack (NIM, NeMo Guardrails, vLLM) consumed only at agentic narrative layer; the deterministic risk-compute kernel runs sovereign.
- **Independent subject-separation**
  Country / city / company subject-stress packs validated independently — no cross-subject evidence reuse. Manifest hash sealed per pack. Reviewer can verify each sovereign subject's stress evidence stands alone.
- **Multi-domain composite stress**
  28 stress scenarios × 6 horizons (30D – 10Y) spanning macro · geopolitical · sanctions · energy · supply-chain · cyber · financial-stability cascades. Operator-splitting couples physical and financial domains coherently.
- **Sovereign-grade audit lineage**
  HMAC verdict trail · ed25519 hash-chained ledger · regulator-safe trace export (JSON / Markdown). Bit-exact reproducibility without disclosing kernel internals — exactly what sovereign audit requires.

3 Validation status

Country pack	28 × 6	Air-gapped	58 / 58
independent subject-separation proof	stress scenarios × horizons (30D–10Y)	deployment supported day one	data-room artifacts · 0 missing

Subject-Stress Surface — 10,080 rows across company / city / country subjects · 28 scenarios × 6 horizons · 1M / 10M tier · 4-seed · PRNG / Sobol / LHS · negative controls fail-closed. Independent subject-separation proof: 3 isolated packs (Country / City / Company), manifest hash sealed, no cross-subject evidence reuse. 100M-equivalent chunked H100 campaign — 50,400 subject-scenario-horizon jobs · 0 failures · archived with SHA-256 lineage. Multi-domain composite stress includes sovereign / macro / geopolitical / sanctions / energy / supply-chain / cyber drivers. Public data room at saa-alliance.com/arin22-demo (subject to in-tenant deployment for sovereign-tier engagement).

4 Founder

The founder previously led national-scale interbank operations at PrivatBank, Ukraine's largest bank (2017–2024) — authorized bank for the National Bank of Ukraine's delegated cash reserves. Personal responsibility for sovereign-scale physical cash reserves through the wartime period including the 2022 full-scale invasion. Zero defaults on obligations under sanctions, COVID, kinetic conflict, and continuous logistical disruption.

Direct operational experience with sovereign-tier risk-and-liquidity infrastructure under conditions that test the model-design assumptions other founders only theorise about.

NATIONAL LIQUIDITY MANAGEMENT · SOVEREIGN-SCALE OPERATIONS · 7 SSRN PAPERS · CFA

5 Three sovereign-tier sub-segments — distinct buyer functions

Central-bank model-risk function
Financial-stability units · monetary-policy quant teams · supervisory model-risk. ARIN22 provides reproducible deterministic challenger for internal-model stress; air-gapped deployment satisfies sovereignty constraints. Direct operational experience with NBU authorised-bank role (delegated cash reserves) on founder side.

Sovereign wealth fund risk team
Long-horizon tail risk for multi-asset allocation, climate-financial coupling for ESG-mandated portfolios, sub-millisecond intraday risk for active-mandate tranches. 11-asset-class multi-asset wave validated. EVT overlay for long-horizon (5Y / 10Y) fat-tail estimation.

Treasury / finance-ministry stress
Multi-domain composite stress for debt-management, fiscal scenario planning, sovereign-rating sensitivity. Country-only subject-stress pack with independent subject-separation proof — no cross-country evidence contamination.

Air-gapped deployment as default
Sovereign-tier engagement defaults to in-tenant / air-gapped from day one. No mandatory connectivity to vendor cloud. Hash-chained audit trail exportable as regulator-safe JSON / Markdown without disclosing kernel internals.

6 Economic effect at sovereign-tier scale

ECONOMIC VALUE · INSTITUTION-SPECIFIC ESTIMATE · CENTRAL BANK / SWF / TREASURY

Indicative annual economic value at the scale of a single sovereign-tier institution (central bank, mid-tier sovereign wealth fund of $50B+ AUM, or major treasury / finance-ministry stress function). Each row anchored to validated evidence + explicit assumption. Production deployment requires customer-supplied jurisdiction / mandate-specific data layer.

MECHANISM	INDICATIVE RANGE	ANCHOR & ASSUMPTION
A. SWF tail-risk capture (long-horizon) Tighter 99.9 tail on long-horizon allocation; earlier hedge during regime shifts on active-mandate tranches.	**$10M – $100M / yr**	*$50B+ AUM mid-tier SWF; 5–50 bps tail-risk capture on active-mandate sleeve. Frequency mandate-specific.*
B. Treasury debt-management stress Multi-domain composite stress for debt issuance timing, sovereign-rating sensitivity, fiscal scenario planning.	**$5M – $50M / yr**	*Major-economy treasury; 1–5 bps borrowing-cost optimisation via tighter scenario stress. Sovereign-rating-specific.*
C. Central-bank financial-stability stress Independent challenger to internal-model stress for systemic-risk assessment, supervisory review.	**$2M – $15M / yr**	*Replaces parallel external-vendor stress framework; supports macroprudential decision audit trail.*
D. Audit & regulatory readiness Hash-chained audit lineage; bit-exact reproducibility for parliamentary / national-audit-office review.	**$1M – $5M / yr**	*Reduces parliamentary-audit / national-audit-office documentation overhead. HMAC + ed25519 ledger satisfies sovereign audit reproducibility.*
E. Compute cost reduction Minor opex. CPU-portable kernel runs on existing sovereign computing infrastructure.	**$0.1M – $0.5M / yr**	*Replaces overnight cloud Monte Carlo on amortised on-premise compute.*
TOTAL ANNUAL VALUE · PER INSTITUTION	**$18M – $170M+**	*Aggregate at sovereign-tier institution scale per assumptions above; dominated by SWF tail-capture which is mandate-specific.*

KEY MESSAGE

The dominant economic value of ARIN22 for a sovereign-tier institution is **tail-risk capture on long-horizon allocation** and **multi-domain composite stress accuracy** — areas where current vendor tooling cannot satisfy sovereignty + reproducibility + multi-domain coupling simultaneously. Compute savings are a minor opex line.

Disclosure discipline. *Ranges are indicative for a sovereign-tier institution profile, anchored to validated evidence + explicit assumptions — not customer-calibrated forecasts. No sovereign-tier institution currently deploys ARIN22 in production. First-pilot conversation is exactly that path. Three sub-segments (central bank · SWF · treasury) have distinct validation paths; each requires separate engagement.*

7 Where ARIN22 sits in a sovereign stack

Deployment	Air-gapped or in-tenant from day one. CPU-portable kernel runs on existing sovereign computing infrastructure. No mandatory connectivity to vendor cloud. Optional NVIDIA stack integration (NIM / NeMo / vLLM) only at agentic narrative layer.
Risk & stress	Embedded as deterministic challenger alongside existing internal-model / supervisory stress frameworks. Independent subject-separation proof. Multi-domain composite stress (macro / geopolitical / sanctions / energy / cyber / financial-stability) coherently coupled.
Audit	HMAC-signed verdict trail + ed25519 hash-chained ledger. Regulator-safe trace export (JSON / Markdown) for parliamentary audit, national audit office, supervisory review — bit-exact reproducibility without disclosing kernel internals.
Compliance frame	Architectural alignment with BCBS supervisory standards · IMF / World Bank stress frameworks · FSB systemic-risk taxonomy. Customer-side formal mapping under sovereign engagement.

8 What we are asking

First pilot · 90-day technical co-validation

A 90-day co-validation with a central-bank model-risk function, a mid-tier sovereign wealth fund risk team, or a major treasury / finance-ministry stress framework. Air-gapped or in-tenant deployment. Founder personally available for on-site engagement under appropriate confidentiality.

Sovereign-tier peer introduction

An introduction into central-bank model-risk / financial-stability function, sovereign wealth fund risk team, or treasury debt-management office. Peer-grade technical conversation, not a vendor pitch. Live walkthrough of country-pack subject-separation evidence available under appropriate confidentiality framework.

9 What is not claimed

Synthetic country-stress — no classified validation

All sovereign-tier validation is on synthetic / public-source country-pack stress. No classified / official-sector data has been used. Sovereign engagement is the first deployment.

No production sovereign deployment

No central bank, sovereign wealth fund, treasury, or finance ministry currently deploys ARIN22 in production. First-pilot conversation is the path to first sovereign engagement.

Three distinct sub-segments

Central bank · SWF · treasury / finance ministry are **three distinct buyer functions**, not one. Each requires separate validation path, separate procurement framework, separate sovereignty / classification constraint.

No regulator / supervisor endorsement

No central-bank supervisor or international standards body currently endorses ARIN22 for sovereign-tier use. BCBS / IMF / FSB architectural alignment is design intent, not formal certification.

10 Positioning note

SAA is sovereign-grade risk *infrastructure*, not an AI platform. ARIN22 is a deterministic mathematical kernel; LLM-based reasoning is layered on top only as a constrained, audited narrative — never as decision authority. For sovereign-tier institutions, this discipline is structural: monetary, fiscal, and financial-stability decisions cannot rest on probabilistic LLM output. ARIN22 is positioned as the deterministic compute layer alongside existing sovereign analytical infrastructure.

PUBLIC REFERENCES

Data room · Layer 1:	saa-alliance.com/arin22-demo — Institutional Evidence Pack, six chapters.
Methodology papers:	7 peer-reviewed SSRN papers (2025–2026); flagship distributed across 5 econometrics eJournals.
Use-case map:	saa-alliance.com/use-cases — deployment patterns by institution type.

MATH FIRST · AGENTS SECOND · GOVERNOR ALWAYS · AUDIT FOREVER

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