

SANTA FEDERICO

Quantitative Research Leadership · Risk Analytics and Systems · Decision-System Architecture

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PROFILE

A physicist who went to Wall Street in 1986 and has been building the analytics ever since. I created and led the quantitative research effort at Merrill Lynch, ran the quant group for global derivatives at Salomon Smith Barney and owned model validation there firm-wide, and have designed the analytical and risk systems behind every risk function I have led. Formation in physics at Princeton under P. J. E. Peebles and at École Centrale de Paris, with applied physics research at AT&T Bell Laboratories.

The current work is the same instinct at larger scale: over roughly eighteen months I specified, directed, tested and critically reviewed a substantial event-intelligence platform, then extracted a cleaner execution core from it. My lane is quantitative method, systems architecture and financial-domain authority; I do not claim deep-learning engineering, frontier-model research or MLOps.

QUANTITATIVE AND TECHNICAL REPERTOIRE

- **Dependence and stochastic modelling:** Hawkes-process maximum-likelihood estimation with spectral-radius stability projection; copula calibration by Kendall- τ inversion with PSD projection; closed-form t-copula tail dependence with bisection calibration of the degrees of freedom.
- **Portfolio and risk analytics:** factor and ridge factor models, portfolio construction and optimisation, Monte Carlo VaR and CVaR, risk and performance attribution, stress testing, MSR cashflow mathematics, online Bayesian updating.
- **Statistical learning:** PCA and systematic/idiosyncratic decomposition, logistic-regression early warning with feature selection, clustering and Louvain/Leiden community detection, anomaly and regime detection, entropy-based concentration measurement.
- **Derivatives and structured products:** credit derivatives (CDS, CDO, synthetic CDO), equity and FX derivatives, interest-rate swaps, OTC bond options, MBS and CMOs, ABS, convertibles, capital-structure arbitrage.
- **Systems:** platform architecture, formal language and compiler design, Python-based quantitative and system development, AI-directed engineering and verification; FORTRAN, C on UNIX, APL, R.

CURRENT WORK — KINDYNOS ADVISORY

Conceived and directed **EVA**, an event-intelligence and decision-support platform modelling how events propagate through assets, stakeholders and financial positions. Extensively developed and pre-commercial; not a customer-deployed service.

For difference-valued consequences on the verified firing path, the governing model is evaluated against frozen pre-event and post-event states and the reported consequence is the difference. On the tested deterministic path, complete firings replay byte-identically under the verified configuration.

Where an input is absent the engine returns UNVALUED and refuses rather than produce a number. Every result carries a completeness verdict, an execution verdict and a reliance stamp, with a typed reason code on failure. An assigned zero is a value; a missing value is never coerced to zero.

Current evidence is strongest on bounded deterministic and refusal paths. Integration, conformance and maturity vary across the wider estate.

EOS, the smaller successor core extracted from EVA, compiles worlds through a canonical intermediate representation, pins model versions so that an unavailable version refuses by name rather than substituting, and runs models under process isolation. A bounded successor core was extracted and exercised on a second machine under a defined verification protocol; verification artefacts are available for technical diligence.

THE DEFECT A GREEN TEST SUITE MISSED

In an allocating world the engine reported an allocation of +216,502.33 to a stakeholder holding a position that had lost 16.92 — wrong sign, wrong by four orders of magnitude, and stamped reliable. Every regression test passed throughout, because every anchor constrained magnitudes and none constrained attribution.

A follow-up audit found the language accepted six fields the engine partly or wholly discarded, one producing a confidently wrong number. A green suite is evidence about what was tested and nothing more.

EXPERIENCE

Kindynos Advisory · Bangkok 2025-

Founder

- Directed the architecture of a declarative modelling language with tokenizer, parser and grammar; a compiler with referential-closure checking; a verifier that refuses malformed input at the boundary; version-pinned models that fail closed; and a versioned state ledger with event-atomic commits.
- Directed AI-assisted implementation under a protocol separating the authoring and verification lane from the builder lane, with literal acceptance criteria and per-item completion gates. In one recent build sequence the protocol caught six specification errors.

EngineAI (formerly Dystematic) · London / Thailand 2022-2024

Head of Quantitative and AI Research

- **Early Warning Monitor.** Decomposed the variance of a representative bank portfolio into sector-common and institution-specific risk; the systematic share rose sharply in the years before 2007-08, read as falling diversification raising susceptibility to shock. Represented institutions as a correlation-weighted graph and tracked the evolution of its cluster structure as a signal.
- **Supply-risk prototype, 2024.** Built in one month on S&P trade data (HS 2709, 110 reporting countries, monthly, 1990-2024): entropy-based directional concentration measurement; PCA separation of systematic from idiosyncratic supply variance, where idiosyncratic kurtosis spiked well before the 2008 price spike; a supply-VaR construction off the covariance matrix; logistic-regression early-warning indicators.
- Led explainable-AI work to bring modern machine learning into portfolio and risk tooling while preserving transparency for executives, clients and regulators.

Cowen Investment Management · New York 2018-2022

Managing Director, Risk Management and Investment Advisory

- Built the quantitative framework for performance assessment and risk attribution across the firm's hedge-fund investments.
- Designed risk-based dynamic margining for prime-brokerage operations, and statistical early-warning methods for counterparty risk.

Silver Ridge Asset Management · New York / London 2014-2017

Chief Risk Officer; Head of New York Office

- Designed and implemented every analytical component of a start-up global macro fund's risk function: models, systems, reporting, policies and control, risk and performance attribution, quantitative support for trading, and proprietary method development.

Ally Financial · Perry Capital · Credit Suisse First Boston · New York 2004-2012

Chief Risk Officer / Managing Director

- Ally (2010-2012): directed model validation and risk-systems compliance alongside CCAR and Basel 2.5 work, and managed the mortgage-servicing-rights portfolio's risk.

- Perry (2005–2008): built risk-factor models, portfolio optimisation, factor-mimicking baskets, attribution separating alpha from beta, and valuation and hedging models across credit and equity derivatives, convertibles, ABS and capital-structure arbitrage.
- CSFB (2004–2005): executive oversight of firm-wide valuation models.

Smith Barney → Salomon Smith Barney → Citigroup · New York / Tokyo 1994–2001

Managing Director, Global Head of Market Risk; then Co-Head, Japan Equity Derivatives

- Hired to install risk managers, hire quants and build the trading and risk models, systems, reporting and controls for the derivatives businesses globally.
- Ran the quant group for global derivatives trading and assumed global responsibility for model validation.

Merrill Lynch Capital Markets · New York 1986–1987

Vice President, Quantitative Trading and Risk Management

- Created and led a quantitative research effort at the firm, and recruited Jan Dash out of Bell Laboratories to build it out. Dash's book credits me with the question behind his subsequent path-integral work in finance.
- Designed a firm-wide global risk report and built MBS-option and FX-option systems; took over FX and OTC bond option books under stressed conditions. Promoted from senior analyst to vice president within the first year.

AT&T Bell Laboratories · New Jersey 1984–1985

Member of Technical Staff — applied physics research

- Hired into a PhD-level position to model the effects of nuclear events on national communications infrastructure; developed methods and custom statistical software in C on UNIX, and published on electromagnetic shielding characteristics of structures.
- Concurrently, while consulting to a commodity trading adviser, implemented and traded models built on a statistical pattern-recognition system out of Carnegie Mellon — machine learning applied to markets, with real money, in the mid-1980s.

Also · New York / Los Angeles 1987–1994

Security Pacific Merchant Bank · Western Asset Management · Credit Suisse First Boston

- Built the fixed-income research and risk-management department at Security Pacific, with valuation models and trading tools for MBS, fixed income, derivatives and FX on SUN workstations. Senior portfolio manager on roughly \$8 billion at Western Asset. VP, Listed Derivatives at CSFB.

FORMATION

Princeton University A.B., Physics, 1982. Undergraduate thesis under P. J. E. Peebles, subsequently Nobel laureate in physical cosmology.

École Centrale de Paris Final year of the Diplôme d'Ingénieur, physics, 1983. High-energy physics research at C.E.A. Saclay.

PUBLICATION AND TEACHING

- A five-part series on trustworthy AI architecture in regulated decision systems: *Highways and Train Tracks* · *The Value of Information* · *Trust Before Verification* · *Provenance Over Persuasion* · *Five Worlds*. A sixth, on model-risk governance, in preparation.
- Four chapters in *Credit Derivative Strategies*, ed. Rohan Douglas, Bloomberg Press, 2007 — credit-derivative risk management, synthetic-CDO strategies, CDS and CDO valuation.
- Named in Jan Dash, *Quantitative Finance and Risk Management*, World Scientific, 2004, for the question behind his path-integral work in finance. Guest lecturer in quantitative finance, NYU Courant Institute.