

Project Rapier

Programmable Funds for Prediction Markets

An open-source reference framework for fund operations,
agent-managed strategies, tokenized ownership, and secondary liquidity

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Abstract

Project Rapier is an open-source reference framework for representing an investment fund as a programmable system. Its first domain is prediction markets, where capital is allocated to claims on future events and performance can be measured both financially and probabilistically. The framework treats subscriptions, valuations, fees, redemptions, distributions, risk limits, and reports as transitions in a shared, event-sourced fund state. Human managers or AI agents may propose trades; explicit policy rules govern authority and capital movement. Fund ownership may itself be represented by transferable digital stakes, enabling eligible investors to exchange interests without forcing the fund to liquidate unresolved positions. Project Rapier therefore joins three markets: the market for future events, the market for investment management, and a secondary market for ownership of the fund. The result is a model for software-defined, auditable, and potentially more liquid investment vehicles. This paper describes the conceptual design and the intended scope of an initial open-source release.

1. Introduction

Investment funds are coordination systems. Investors contribute capital, managers allocate it, administrators maintain records, and participants receive reports, redemptions, and distributions according to agreed rules. In traditional finance these functions are spread across legal documents, custodians, brokers, administrators, spreadsheets, and internal software. The result can work reliably, but it is costly, fragmented, and difficult to inspect as a complete system.

Crypto networks introduced programmable ownership and settlement. Prediction markets add a second primitive: uncertain beliefs can be expressed as prices and traded as claims on future events. AI agents add a third: research and forecasting can be performed continuously and translated into proposed actions. Project Rapier asks what an investment fund would look like if its operations, mandate, and ownership were designed as software from the beginning.

The goal is not to remove law, governance, or professional judgment. It is to make the operational substrate of a fund explicit: what capital exists, who owns it, what actions are permitted, how value is calculated, and how changes are recorded.

2. Fund Operations as State

A trading strategy is not a fund. A fund must maintain a coherent state across capital contributions, trades, positions, valuations, expenses, fees, redemptions, distributions, and ownership changes. Each event changes the economic relationship among the fund, its investors, and its manager.

Project Rapier models the fund as a state machine. The current state is derived from an ordered history of verifiable events. If the same history and rules are replayed, the same balances, ownership, and reports should result. This creates a common operational ledger from which net asset value, capital accounts, realized and unrealized gains, risk exposures, and investor entitlements can be derived.

Some rules may be enforced by smart contracts; others may be expressed in deterministic operational software or governed by approved human processes. The unifying principle is not that every operation must be on-chain, but that every material operation should be defined, attributable, and reconcilable.

3. Prediction Markets as the Native Domain

Prediction markets are the natural first domain because they reduce investment judgment to probabilistic claims. A market price can be interpreted as a crowd-implied probability. A manager or AI agent can form an independent probability estimate and act when the difference is sufficient to compensate for fees, liquidity, uncertainty, and resolution risk.

This creates a transparent operating loop: observe a market, estimate probability, compare belief to price, propose a trade, apply risk controls, execute if permitted, and compare the forecast with the eventual outcome. The same record that explains the trade can evaluate the forecaster. A fund can therefore measure not only return and drawdown, but also calibration, informational edge, and the quality of its decision process.

Prediction markets also create distinctive operational needs. Capital may remain tied to unresolved events. A position may be economically valuable but difficult to liquidate. Market wording and resolution rules may matter as much as the underlying event. These characteristics make prediction-market funds a useful test case for programmable valuation, risk, and liquidity design.

4. Agents, Managers, and Bounded Authority

In Project Rapier, an AI agent is not assumed to own or control the fund. It is a proposer within a governed system. An agent may research an event, estimate a probability, and recommend a position. A human manager, committee, DAO, or rules-based process may play the same role.

Authority is bounded by the fund's mandate. Rules may restrict markets, position sizes, categories, liquidity, concentration, or drawdown. Actions beyond a threshold may require additional approval. This separates intelligence from custody: an agent can act quickly without receiving unlimited discretion over capital. The promise is not blind autonomy. It is constrained autonomy, where the rules visible to investors are the same rules that govern the manager.

5. Modular Architecture

Project Rapier is designed as a layered reference system rather than a monolithic protocol:

Core operations layer. Event-sourced ledger, capital accounts, valuation engine, fee calculation, redemption and distribution logic, risk limits, and report generation. This layer is intended to be asset-class agnostic.

Policy engine. Explicit, inspectable rules that evaluate proposed actions (markets, size, concentration, liquidity, drawdown, approval thresholds) before they become executable.

Prediction-market adapter. Normalization of market data, positions, fills, resolution outcomes, and agent trade intents specific to event contracts.

Ownership layer. Representation of investor stakes, contribution and redemption accounting, and transfer rules.

This separation is intentional. A fund should be able to replace its trading strategy or venue adapter without rewriting its accounting system. An AI agent should be replaceable by a human trader or a rules-based strategy. The operating substrate of the fund should outlive any single strategy, agent, exchange, or blockchain.

6. Tokenized Fund Stakes and Secondary Liquidity

Project Rapier extends programmability from the portfolio to the ownership of the fund. An investor's stake may be represented by a digital share that carries defined economic rights to the fund's net assets, distributions, and other entitlements. Contributions create stakes, redemptions retire them, and transfers change the ownership ledger.

Tokenization can make fund ownership easier to verify, transfer, divide, and integrate with other software. It can also encode restrictions: only approved participants may hold or receive a stake, different share classes may have different rights, and unresolved or illiquid assets may be represented separately when necessary. The token is not merely a speculative proxy; its purpose is to represent the actual fund interest recognized by the fund's governing

structure.

A tokenized stake creates the possibility of a secondary market. Instead of redeeming from the fund, an investor may sell the stake to another eligible investor. The buyer provides liquidity to the seller; the fund's portfolio remains intact. This distinction is especially important for prediction-market funds, where capital may be locked in unresolved events. A conventional redemption could force the manager to close positions at unfavorable prices or impose gates. A secondary transfer allows ownership to change without disturbing the underlying forecasts.

The secondary-market price need not equal reported net asset value. It may trade at a premium or discount reflecting liquidity, duration, manager quality, fees, concentration, valuation confidence, or resolution risk. Rapier therefore supports two forms of price discovery: prediction markets price future events, while the stake market prices ownership of the fund that trades them. Transfer rules may remain programmable and permissioned where legal or contractual obligations require them.

7. Trust-Minimized Infrastructure

Project Rapier does not require every component to be decentralized. Funds may continue to rely on legal entities, administrators, custodians, data providers, signers, and regulated venues. The objective is trust minimization: make rules inspectable, records replayable, calculations reproducible, and deviations detectable.

Open-source code allows managers, investors, auditors, and developers to examine the operational logic rather than rely entirely on opaque systems. Smart contracts can govern ownership and settlement where appropriate. Operational software can reconcile off-chain markets and calculate fund economics. Human governance can remain where judgment and law require it.

8. Scope of the Initial Open-Source Release

Project Rapier is intentionally scoped as a reference framework rather than a live fund or production protocol. The first public release is planned to include:

- A core event-sourced ledger and capital-account model expressed in deterministic code.
- A policy evaluation interface for bounding agent or manager proposals.
- Basic prediction-market position and valuation primitives suitable for unresolved event contracts.
- Documentation of the event schema, state transitions, and intended extension points.
- Example configurations and tests that demonstrate replayability of fund state from event history.

Ownership tokenization, secondary-market mechanics, full smart-contract deployments, production-grade visualization, and live venue integrations are treated as subsequent layers. The initial release prioritizes clarity of the operational model over completeness of every possible feature.

9. Related Work

On-chain asset management infrastructure already exists. Enzyme Finance provides a mature protocol for creating and managing investment vaults with policy controls. RigoBlock offers non-custodial smart pools. ERC-4626 and related standards supply widely adopted primitives for tokenized vaults. Other systems address strategy vaults, automated portfolio management, or tokenized fund shares.

Project Rapier is not intended as a direct competitor to these systems. Its emphasis differs in three respects: (1) an event-sourced, fully replayable operations layer treated as the primary artifact; (2) prediction markets as the native first domain, with explicit support for probabilistic performance measurement and unresolved-position economics; and (3) a reference library posture focused on modular, auditable building blocks rather than a single production protocol or token. Existing vault and policy infrastructure can serve as settlement or ownership substrates on which a Rapier-style operations layer sits.

10. Boundary and Limitations

Project Rapier is software infrastructure. It does not create a legal investment fund, register an adviser, satisfy securities or commodities laws, provide tax advice, or authorize anyone to manage outside capital. Legal structures, regulatory obligations, venue rules, custody decisions, investor eligibility, and compliance programs remain external responsibilities of any user.

Tokenization of fund stakes and any secondary market for those stakes raise additional legal and regulatory considerations. Nothing in this framework constitutes an offer of securities or a recommendation to structure a fund in any particular way. Users remain solely responsible for formation, compliance, custody, taxation, and investor protection.

11. Conclusion

Bitcoin represented money as peer-to-peer software. Ethereum represented financial rules as programmable contracts. Prediction markets represent beliefs about the future as prices. AI agents can generate and update forecasts at machine speed. Tokenized fund stakes can represent ownership and allow that ownership to move without requiring the underlying portfolio to unwind.

Project Rapier joins these ideas into a single model. The fund trades prediction markets. Its operations are derived from explicit rules and a common history. Its managers or agents act within bounded authority. Its ownership may be represented as programmable stakes. Its investors may obtain liquidity through a secondary market distinct from the fund's own trading activity.

The central claim is simple: both fund operations and fund ownership can be expressed as code. If that code is open, modular, auditable, and connected to prediction markets, it can become a foundation for a new class of software-defined investment vehicles. Project Rapier is an open-source reference framework for fund operations and ownership as code, beginning with prediction-market strategies.

This document is a design paper for an open-source project. It is not an offer, solicitation, or advice of any kind.