Elements of DeFi

https://web3.princeton.edu/elements-of-defi/

Professor Pramod Viswanath

Princeton University

Lecture 19

Open Hedge Funds

Last lecture: DAOs and Governance

- When are DAOs needed?
  - Examples of various use cases to gather funds, allocate capital
  - Run corporations and DeFi protocols
  - Are they truly decentralized today?
- DAO structure
  - Who can propose? Who can vote?
  - Different voting rules that are used
  - Downsides of different voting rules and insider trading
  - Attacks on DAOs : the Vampire attack
- DAO – Real World interaction
  - Legislation on DAOs

This Lecture: Open Hedge Funds

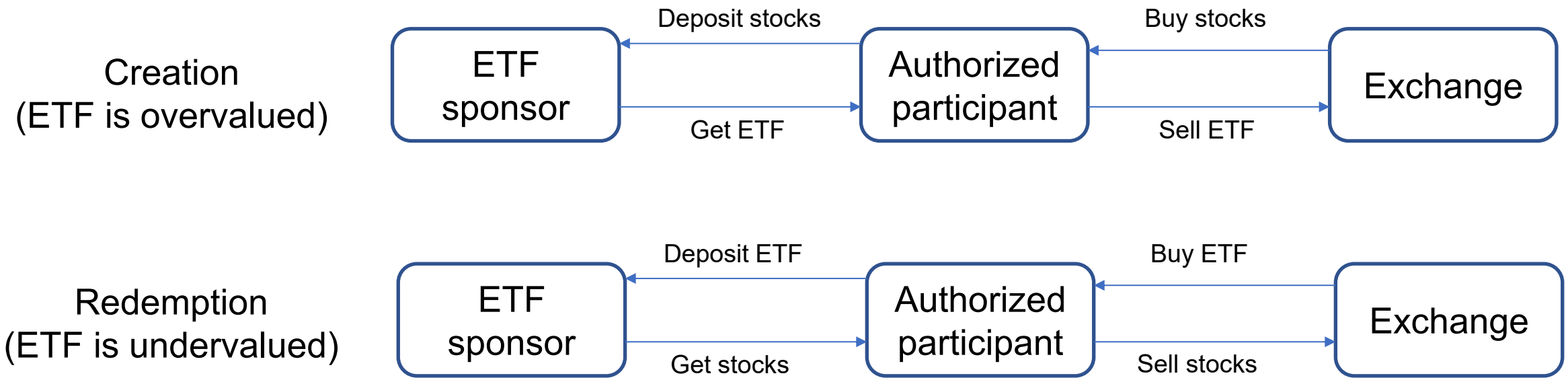
- Fund management in TradFi
  - Passive management - ETFs
  - Active management - Hedge funds, PE, Mutual funds
  - Limitations – strategy limits, gatekeeping entry to high net worth investors
- Fund management in DeFi
  - Passive management - Indices in DeFi (Set protocol)
  - Actively management – Open Hedge Funds
- Crowdsourced fund management models
  - NumerAI - incentive alignment

Passive management in TradFi

- Passive Fund management – Rules set in advance – Eg. Buy AAPL stock in proportion to it's market share
- Exchange Traded Funds (ETFs) are a popular method of passive asset management
- Similar to a stock
- Premium: Difference between the Value of the assets backing an ETF and its value on the market

ETF

- Price maintained by Creation redemption mechanism
- Only authorized investors can profit by arbitrage
- ETF sponsor is trusted to maintain assets and mint ETFs



Active management in TradFi – Hedge funds

- Active Fund management – Dynamic strategy set by fund managers based on real-time data

- Examples:
  - Hedge funds – Sophisticated, levered strategies with narrow focus – Emerging markets, market neutral, etc.
  - Private Equity, Venture Capital – Limited Partners commit capital

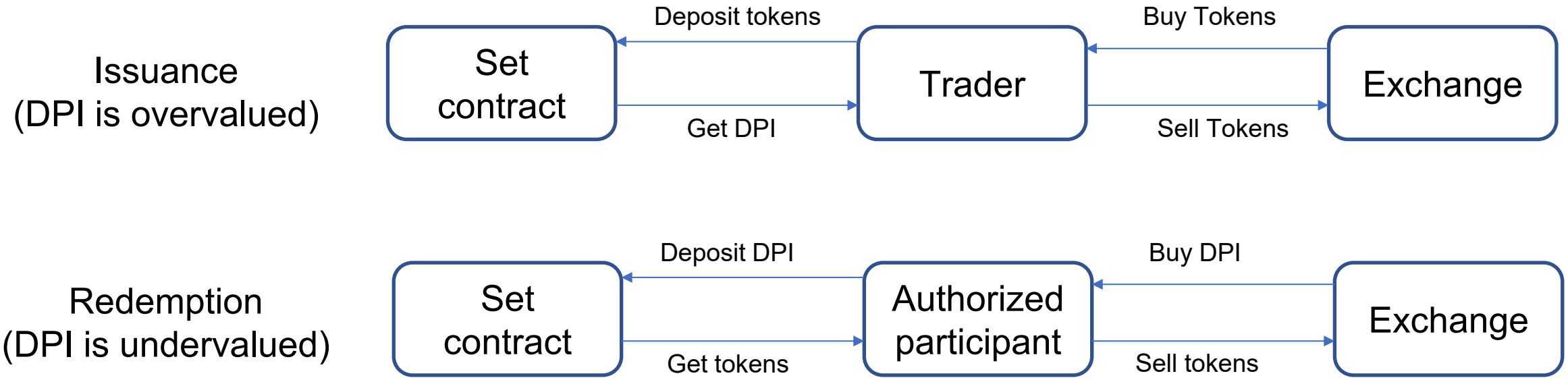
- Managers have access to privileged data and skills

Limitations of fund management in TradFi

- Hard to regulate due to relaxed disclosure requirements – Access limited to high-net-worth investors
- Trust is required in the fund manager – since the strategy is a secret
- Liquidity risks – Investor funds may be locked in illiquid assets
- High friction due to need for trust: Having a good strategy is not enough

Passive Fund management in DeFi

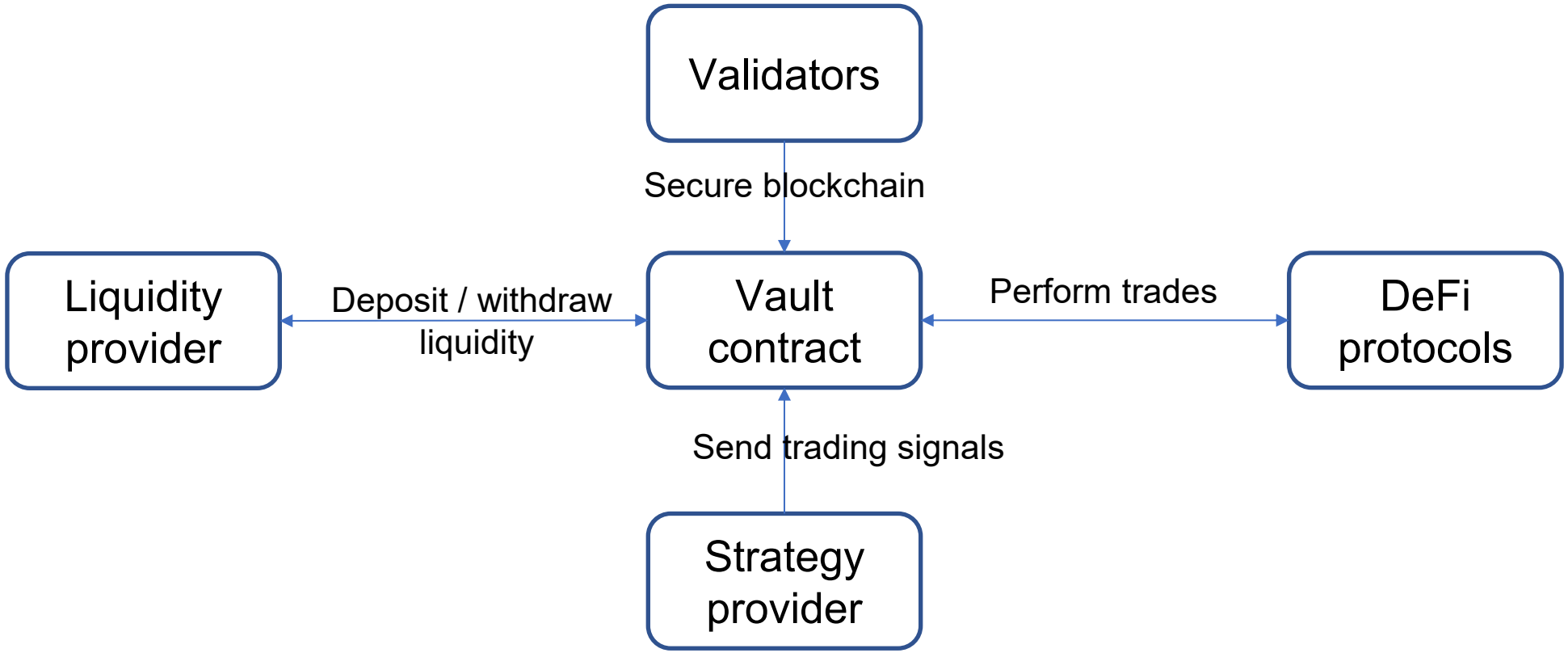
- Indices (like DeFi Pulse index) – Set protocol
- Price peg mechanism similar to ETFs, however no need for APs, anyone can profit from an arbitrage
- Index sponsor is a contract, no trust required



Active Fund management in DeFi

- Dominated by Open hedge fund protocols
- Open Hedge funds – Allow anyone to deposit money and anyone to deploy a strategy utilizing those funds
- Fund providers (LPs) select the strategy provider who they want to manage their funds
- LPs manage the custody of the assets – they can exit anytime

Open Hedge fund participants



OHF – Vault contract

- What stops Strategy provider to transfer all funds from the vault to its own account?
  - Vault contract has a constraint on the types of actions it can perform, typically encoded within the OHF protocol
  - OHF transaction whitelist can vary between vaults based on the trust assumptions on the strategy provider
- Each Vault has an assigned strategy provider

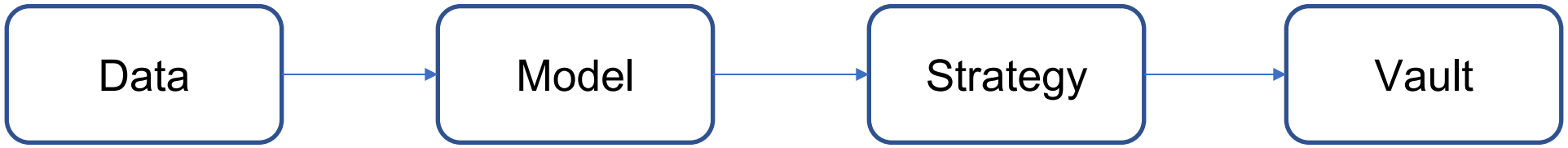
OHF vault custody

- Vaults have an encoded redemption mechanism that makes sure LPs maintain custody of their assets

- Redemption mechanism depends on the type of assets currently under investment
- Redeeming fungible assets is as simple as transferring tokens
- Redeeming non-fungible assets such as UniV3 LP tokens involves rebalancing

OHF – Strategy provider

- Strategy provider may use on-chain and off-chain data to generate its strategy
- Anyone can be a strategy provider and open a vault, competition across strategy providers ensures the ecosystem is healthy
- Strategy provider may be an individual provider or a decentralized protocol



Centralized strategy provider

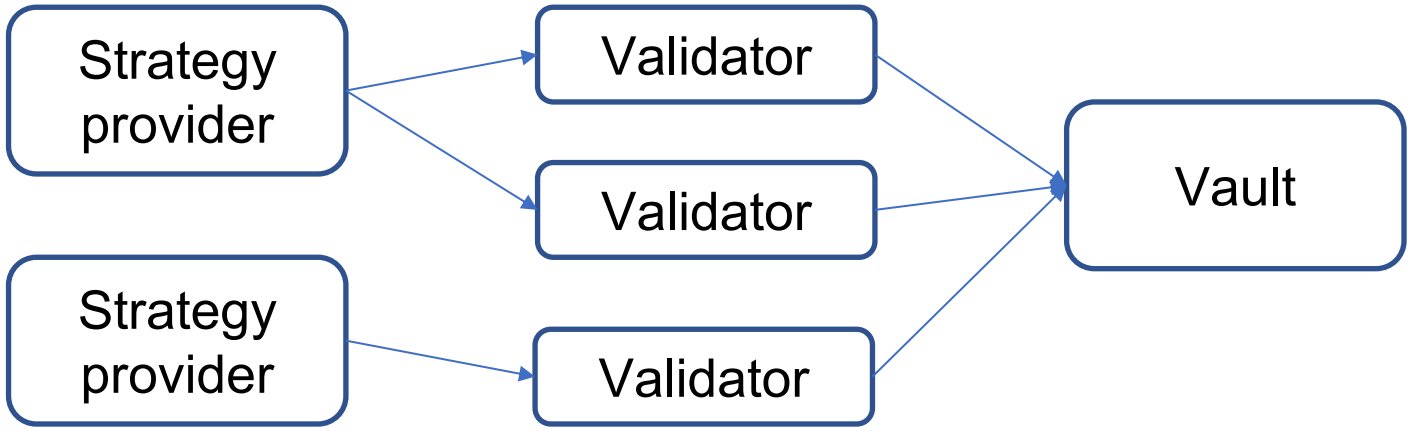
- Implemented on Enzyme finance, Gamma finance
- Constrained by whitelisted trades on the vault contract
- Example: Uniswap V3 pool
  - Vault can only provide liquidity to Uniswap V3 ETH-USDC pool
  - SP is allowed to modify the liquidity profile – Set lower and upper tick on the provided liquidity
- Subject to misaligned incentive attacks if AUM is large

Centralized SP incentive misalignment

- May allocate assets such that it profits a third party – deposit in a borrow/lending pool to lower borrow interest rates for shorting
- Loss for OHF LPs
- Can SP be decentralized and run an agreed upon strategy?

Decentralized Strategy providers

- Implemented by Sommelier
- Strategy is backtested by the OHF foundation
- Backtesting results (Eg. 15% yield on past data) are published for a strategy (Trust needed for integrity of results)
- Vault subscribes to a set of Strategy validators instead of a strategy provider



Decentralized Strategy providers

- Validators are rewarded if they voted for a profit-making move – exact implementation varies by vault
- Validators will switch their strategy provider is an alternate SP can prove they can offer better yields
- Validators perform sanity checks before sending signal to vault
- Strategy providers and staked validators can be merged into one – Aera finance

Ideal properties of Active hedge funds

- LP custody – SP should not have custody of LP funds, enables LP to leave the protocol when desired

- Strategy secrecy – SP invests a lot of resources on designing their strategy, making it open to public can lead to a lot of duplicate strategies or strategies that are designed to attack/frontrun it.

- Verifiability of backtested strategy – Ensure that the executed strategy relies on the similar model on which the backtested results were published

Limitations of Open Hedge funds

- Protocols trade off between strategy secrecy and strategy verifiability
- Strategy secrecy – Enzyme, Gamma
  - Relies on some form of trust on SP
  - Attack space increases if AUM is large
  - AUM limitations reduce the fee revenue for SP, limiting R&D
- Strategy verifiability – Sommelier (partial)
  - Strategy is revealed to foundation for backtesting
  - Centralized of trust
- Cannot perform arbitrary trades due to whitelist constraints on vaults

Alternate architecture: Open strategy tournaments - NumerAI

- Data science tournament : Crowdsourced predictions
- Participants get a dataset of financial data with regularized data points and obfuscated feature labels

id	era	feature1	. . .	feature310	target
n2b2e3dd163cb422	era1	0.75	. . .	0.00	0.25
n177021a571c94c8	era1	1.00	. . .	0.25	0.75
n7830fa4c0cd8466	era1	0.25	. . .	1.00	0.00
nc584a184cee941b	era1	0.25	. . .	0.00	1.00
nc5ab8667901946a	era1	0.75	. . .	0.25	0.25
n84e624e4714a7ca	era1	0.00	. . .	0.75	1.00

Open strategy tournament - NumerAI

- Participants train their model on this data
- NumerAI launches new data (without targets) generated from historical financial data
- Participants submit their predictions on this data, score is generated by NumerAI based on the performance metrics of the predictions – Correlation, etc.
- Participants declare their commitment to the protocol by staking NMR tokens

Open strategy tournaments - NumerAI

- Each participant’s prediction is taken into a meta model weighted by their stake
- Scoring mechanism = f(stake, performance scores)
- Rewards are distributed back as a function of the score
- Stake increases or decreases based on performance
- May not be secure if the value of stake is too low compared to AUM

DAO Treasury management - Aera

TradFi

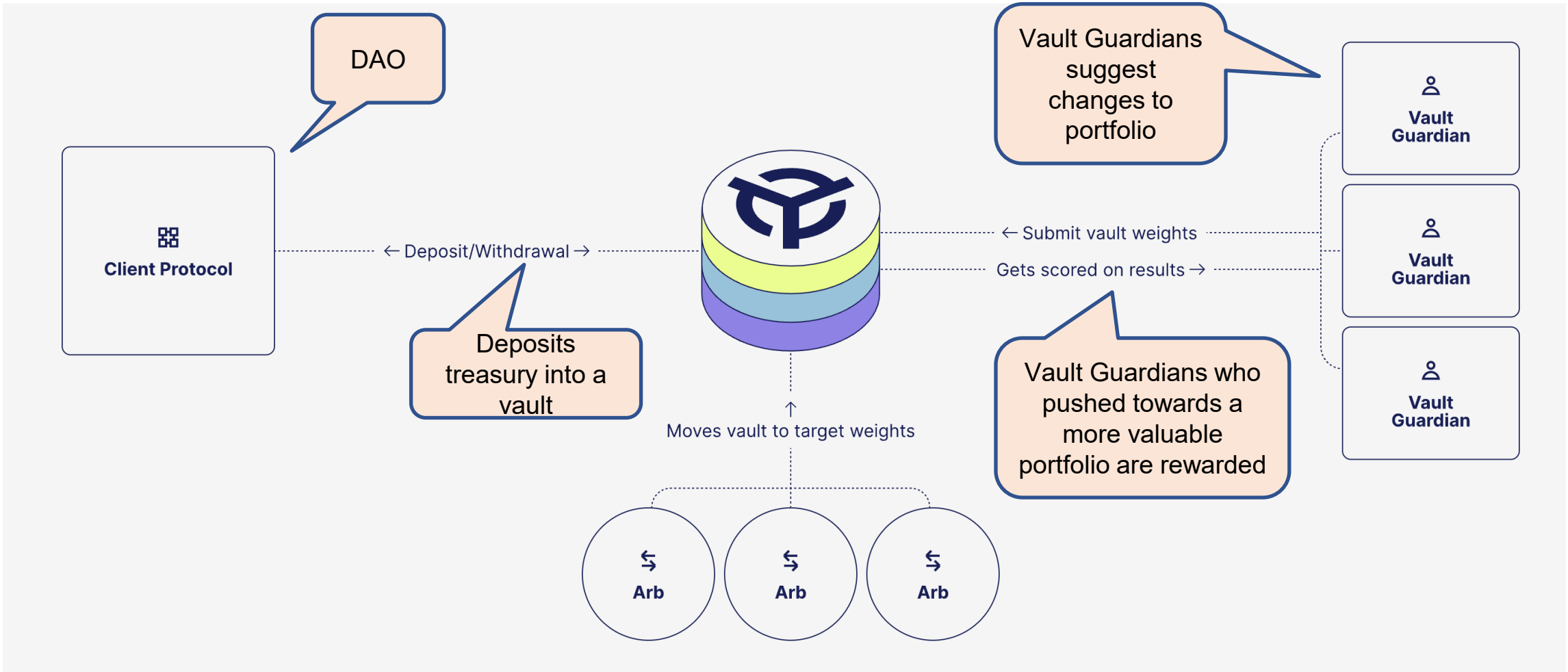
- Another role that investment banks play – treasury management and hedging for companies or high net-worth individuals
- Highly customized activity – the company has their own preferences and unique cash-flows that need to be hedged

DeFi

- Same need is present in DAOs – each of them has their own token-flow and chains they operate on
- Also, DAOs execute treasury changes on a much slower timescale than the market – this makes those changes reactive rather than pro-active

DAO Treasury management - Aera

Aera finance : architecture



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