

# DAO Treasury Goals

A well-managed treasury is the key to the sustainability and growth of a DAO, ensuring that there are sufficient funds to support ongoing operations, to invest in growth opportunities, and to navigate challenging market conditions. Treasury management is accomplished primarily through investment, which for most DAOs involves spending on initiatives that aim to generate substantial value in the future. As long as the amount spent is less than the value accrued, the investment is generally a good one.

For a DAO to be sustainable, it must have a strategic approach to planning for future projects in the long term, while ensuring that there are enough readily-available funds in the short term to support ongoing initiatives. Effective long-term planning involves forecasting future expenses and revenues, and assessing the risks of unforeseen costs or market moves. To ensure the DAO can continue to operate over the short term, it needs to be able to spend or liquidate assets from its treasury with sufficiently good execution to reliably cover immediate costs. In order to be set up for long term success, DAOs need to manage risk and adjust to changes in market prices (e.g. by dynamic rebalancing) and volatility (e.g. by volatility targeting).

In both cases, DAOs need tooling that is responsive to prevailing market conditions. Most DAOs would also prefer a process that is onchain, transparent, and non-custodial, to ensure alignment with community and broader DeFi objectives. In theory, this could be done by running a full governance vote every time a treasury decision is needed. However, in practice, the duration and operational overhead of governance cycles would severely limit the strategies these DAOs would be able to implement. Aera provides a DeFi-native treasury solution that ensures alignment with the DAOs community objectives, while also being highly responsive to market conditions in real time.

## Effective Spending

Issuing grant awards and distributing incentives in ARB do not directly cause the price of ARB to move. It is only when award recipients seek to sell their ARB that price impact occurs. Award recipients can be urged to try to minimize their price impact when they eventually sell their ARB (e.g., using limit orders, splitting large orders up, spreading their trading out over time, etc.). However, once the tokens are distributed to the recipients, they can be sold at any time and for any reason. Furthermore, there is a compounding effect when a grant is issued to many recipients simultaneously, since they will likely seek to swap their ARB at around the same time, leading to greater price impact.

To keep this report focused, we are commenting exclusively on how to think about treasury management and price impact, while avoiding general discussions on how to optimize token distribution.

## Financing Spend via ARB

The current approach toward financing grants and incentive programs is to directly utilize ARB as a form of payment. This means that recipients are free to sell their ARB as they see fit. First, we will examine the status quo of treasury management and then present ways in which it may be improved.

## Benefits of Limit Orders

To begin, we look at DEX trading in ARB to get a sense for how efficient the market is. Since the [Uniswap V3 ETH/ARB 0.05% pool](#) has the most liquidity onchain at the time of this writing, we will focus mostly on this specific pool. The behavior of other onchain DEX pools where ARB is traded is broadly similar. In the following chart, the orange line shows the 6-hour average, while each blue dot represents a single swap. We have restricted the y-axis to only show slippage between 0.05% and 0.12%, as there are many swaps that far exceed these values.

There are periods of time where the average slippage increases by quite a bit. One of those is Sept 2023. If we line up some additional charts, we can see that this increase in average slippage does not actually line up closely with price, volume, or average swap size.

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In fact, we can see that the large slippage around Sept 11 was incurred after

the price had already fallen. Furthermore, when the price rebounded toward the end of September in similarly violent moves with increased volume, the average slippage was relatively unchanged at 5.5 bps. In short, this seems to suggest that patience is an appropriate response to high slippage.

We can also see that for each hour, it is regularly the case that individual swaps incur significantly larger slippage than the average 5.5bps—some swaps even incur an order of magnitude more than average!

All of this should be evidence that there are plenty of individuals who are executing swaps sub-optimally. The simple use of limit orders (setting a minimum expected amount out for a swap on a DEX) would significantly mitigate much of this slippage. Additionally, if any of these swaps are time-insensitive, the swappers could also leverage a TWAP algorithm or simply wait until the average slippage is closer to the usual 5.5 bps.

## Liquidity

However, even with limit orders, liquidity conditions can still vary greatly. Here is a snapshot from Uniswap showing the liquidity distribution for the [ETH/ARB 0.05% Uniswap V3 Pool](#) on Dec 15, 2023:

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Screenshot\_2023-12-15\_at\_11.42.55\_AM

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This shows that selling ARB would incur much more slippage than buying because there is less liquidity in that price range (selling ARB would execute against liquidity to the left of the red line). Shown below is the same chart on Jan 4, 2024, after a relatively large rally in the ARB/ETH price has occurred over the previous few weeks.

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Even for savvy traders who know to look at the liquidity conditions, these charts can be tricky to interpret since they are not drawn to scale. It turns out that significantly more ARB could actually have been sold on Dec 15 (750k ARB) than could have been sold on Jan 4 (190k ARB), before hitting a 2% slippage threshold. Looking at this data historically shows that the liquidity fluctuates quite frequently:

In September 2023, a swap as small as 113k ARB could have moved the price down by more than 2%, whereas a month later, you could have sold 1M ARB and not moved the market nearly as much. Not only do liquidity conditions vary month to month, but they vary day to day. If ARB recipients are unaware that these differences can exist, they could very easily sell when the liquidity conditions are poor and not only achieve a worse outcome for themselves, but also for other ARB holders.

## CEX vs DEX

Since the data so far has focused on DEXs, one may argue that the full picture of liquidity is more stable if we include centralized exchanges. While some participants may prefer not to use CEXs or have limited access to them, we acknowledge that they may be a compelling alternative in some cases. For users that can choose whether to trade on a DEX or CEX, slippage may be somewhat mitigated by the fact that they can execute on multiple venues. The liquidity in Binance's ARB/USDT market is generally much better than on DEXs.

However, we note that the benefit of CEX liquidity depends on where price discovery occurs. If price discovery occurs on the CEX and is transmitted to DEXs via arbitrage, the deeper liquidity of the CEX can help mitigate slippage. On the other hand, if CEX liquidity tends to follow the DEX price, the benefit is less clear since the seemingly plentiful CEX liquidity could move at a moment's notice in response to a price change on a DEX.

While we did not have the ability to do a deep dive into Binance's trade feed, we were able to review swaps in Uniswap's v3 ETH/ARB 0.05% pool. Given that we are primarily interested in how grant and airdrop recipients liquidate their ARB, we attempted to focus solely on swaps that were unlikely to be bots. To accomplish this, we only considered swaps that had a single swap in their block and that were separated from the previous swap by at least 10s. Furthermore, given that a large rally in ARB/ETH began on Dec 22 (and is still ongoing), we separated the analysis in pre and post Dec 22.

## Typical Market Conditions

The ARB/ETH market between April 2023 and Dec 2023 was generally flat or trending downwards as can be seen from this screenshot taken from CoinMarketCap:

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Screenshot 2024-01-11 at 10.55.42 AM

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One would expect that large sells during this time period would impact the price. And in fact, that does appear to be the case.

To begin the analysis, we'll first look at sell of 1000 ARB for ETH by an airdrop recipient ([Arbiscan tx](#)).

The 'x' highlights the current spot price of the Uniswap pool and the red triangle shows the effective price of the swap. The slippage incurred by this trade is ~5.2 bps. While the price didn't react much immediately following the trade, the price did move down over the next 10 minutes.

Now that we have our bearings, we can look at what happens to the price on average for all swaps with a notional size  $\geq$  1000 ARB:

The spot price at the time of the trade is denoted by the 'x' markers and the effective execution price is centered at the (Trade, 0) point. Note that we're showing both ARB buys and sells on this chart. We also show the average path across all trades to show that there is a very slight downward trend to the prices over this time period (April 2023 - Dec 2023).

There are two main points to take away: first, there is no momentum to these larger trades. Recall that the trade's effective price is at a relative price of 0. The buys (sells) happen roughly 6 bps higher (lower) than the market price, and then the market adjusts to this price over the next few minutes, and then doesn't really deviate from it (we show the average price paths over the next hour to confirm that there isn't a delayed reaction).

Second, the lack of mean reversion suggests that these trades actually move the market. If they didn't then there would be an arbitrage opportunity between the CEX liquidity and this DEX liquidity, and we would expect the price to revert back to its original price. Instead, the instantaneous slippage becomes the longer-term price impact.

Put another way, a grant recipient who receives 1000+ ARB and who decides to sell that ARB on Uniswap will on average move the entire market down by 5.5bps with their sale. Given that ARB's circulating supply is roughly 1.3B, that's quite the move. This is all the more reason for the Arbitrum DAO to own more of its ARB execution (we discuss this in more detail in the Protocol-Owned Execution).

## During a Market Rally

We were lucky to experience a shift in market regimes in ARB during the period of this grant. Starting Dec 22, 2023, the price of ARB/ETH has seen explosive growth:

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Given that it's transpired over a few weeks, this provides us with enough data to be able to make some statistical conclusions.

If we look at the same chart as before (but restrict ourselves to only looking at data on or after 22 Dec 2023), we see a very different situation.

As can clearly be seen, ARB has been appreciating at a significant rate. If the goal were to minimize market impact, one might naturally think that this is a great time to sell ARB. However, looking at the price impact relative to the average market movement tells a different story:

This shows the price trajectory relative to the baseline upward trend (the green line in the previous graph). Not only do large sells move the price down immediately, but there is momentum to the sale. In other words, not only is the price impacted at the time of the swap, but the entire market's rally is diminished over the next several hours. During this period, swaps of 1000+ ARB slowed the rally by 12-20bps on average for each swap! Surprisingly, this is a much greater impact on a relative basis than when the ARB/ETH market was slowly trending downwards over time.

## Downsides of Financing via ARB

All of these market nuances should be considered when the DAO is considering setting budgets for programs and specific grants. However, even with excellent historical analysis, it can be difficult to predict what the market conditions will be

several weeks into the future. If a budget is set based on historical estimates (as was suggested [here](#)), then the allotted amount could just as easily overwhelm the available liquidity, or conversely, be an undersizing of what could have been deployed. The high variability of market liquidity conditions and likely suboptimal execution of uncoordinated ARB sales make financing via ARB an inefficient solution. This is especially true if the liquidation of ARB is left to award recipients. When ARB is distributed as the default form of funding, the vast majority of tokens will end up in the open market at some point, but with no predictability or optimization of their impact.

## Improving the Spending Model

A natural question to ask (and indeed, the question that was posed by the [Arbitrum Treasury Working Group](#)) is “How can we minimize the price impact due to grant issuance?” under the implicit assumption that many ARB recipients will seek to liquidate their tokens relatively quickly to finance their own personal needs. There are three critical factors that should be considered:

- The timing of distribution
- Execution quality
- The inherent utility of the token itself

### Distribution Timing

While CFMMs used to be path independent, Uniswap V3 has introduced concentrated liquidity provisioning that allows liquidity providers (LPs) to provide liquidity in specified price ranges. After large price movements, if LPs haven’t adjusted their liquidity, the price may be much more sensitive to swaps. Given enough time, the liquidity eventually adjusts to follow the price.

In general, the longer the period of time over which tokens are sold, the lower the price impact will be. This is due to a simple argument: if the ecosystem continues to grow, then selling 1 ARB tomorrow will have less impact on the market than selling 1 ARB today due to there being greater demand and more token holders.

Adjusting how grants are distributed is also a useful lever. Staggering the release of ARB over strategic intervals can prevent market flooding, which leads to a decrease in price. Implementing a well-planned schedule that considers market conditions can significantly reduce negative price impacts. There are several ways for the DAO to achieve this, but they generally all involve introducing restrictions:

- Gradual Distribution:

Distributing rewards in smaller amounts at more frequent intervals is better than delivering a single larger amount (either at the beginning or at the end of a grant period). Much like dollar-cost averaging in investment strategies, this approach can reduce the impact of large liquidations.

- Avoiding Synchronization:

If an airdrop is announced and all eligible wallets can claim at the same time, then it is likely that the market will be flooded with sells. Much better would be to spread this distribution out over time. Here are some ideas for accomplishing this: \*

Staged Unlock:

Releasing \$ARB to different addresses at different times.

- Continuous Unlocks:

Releasing \$ARB continuously over a period of time. For example, if tokens are released only once per month, then there would be a large group of sellers all seeking to sell their tokens at the same time. Much better would be to spread the distribution out over the entire month. Eligible recipients could claim whenever they would like, but they would only be able to claim a pro-rated reward. They would be able to claim their entire reward only after the distribution period is complete.

- Market Dependent:

Only distributing \$ARB to holders when the current price, volatility, and liquidity meet certain criteria.

- Outcome Dependent:

If the \$ARB being delivered to grant award recipients, it is better to set milestones and deliver \$ARB at their completion than at the beginning or end of the grant time period.

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- Lock-Up:

Recipients can agree to lock up their tokens for a particular amount of time. Similar to staking, they can be eligible to receive greater awards if they are willing to lock up their tokens for longer.

Great care needs to be taken with these methodologies since imposing restrictions can greatly reduce the perceived value of the locked-up portion of the grant. According to Gauntlet's research, the implied discount associated with locked tokens is not compensated by a meaningful increase in long-term token holding behavior (see [here](#)).

## Execution Quality

A second area where the treasury management process can be improved relates to the quality of execution. When ARB is exchanged for other tokens, either by the DAO or by grant recipients, execution relates to maximizing the amount of value realized per unit of ARB. We also consider some ways to improve execution and thus enhance the efficiency of treasury spending:

- Own the Execution:

If the belief is that ARB will be sold for ETH or a stablecoin, then it could benefit Arbitrum to manage that execution itself and to instead offer payouts in ETH or a stablecoin. This would require a governance vote, but a large block of ARB could be sold in an OTC transaction to a private investor or via an algorithm (e.g., TWAP through CoWswap, an order on Milkman, or an auction on UniswapX). The challenge here is that a vote is needed on execution parameters for every trade. Given that it can take several weeks for a governance proposal to be approved, it is important to be able to do the execution onchain in a transparent and market-aware way.

- Market Maker Partnerships:

Arbitrum could incentivize market makers to provide liquidity both on- and off-chain to stabilize the price during large distribution periods. Market makers specialize in providing on-demand liquidity and being able to unwind accumulated positions at appropriate points in time. As long as there was sufficient liquidity present in the current price range for the duration of a month, a market maker could be rewarded by token incentives.

- Community Engagement:

Ensuring that the community understands the best approaches for liquidating their tokens via public communications and marketing campaigns.

- Limit Orders:

a market sell order seeks to sell a particular quantity now at the current best available price. A limit sell order, however, seeks to sell a particular quantity at a particular price at some point in the future.

## Utility

The final class of strategies for minimizing price impact due to token releases is to improve the utility of the token. This is somewhat obvious, and is something that DAOs and organizations are constantly doing. Nevertheless, it is useful to discuss here due to its influence on hold times. In general, if a token has utility, then recipients are more likely to directly use it within the ecosystem or hold onto it than to immediately seek to sell it. Efforts to bolster the token's utility, demand, and overall market perception can contribute to a more resilient price structure. Here are some potential approaches to consider:

- Staking:

If participants can generate yield on \$ARB, then they become more likely to stake and less likely to immediately sell. Of course, staking rewards come at a cost and should generate value for the ecosystem in excess of the tokens spent. The implementation of a specific staking program is a strategic mechanism design problem that is outside of the scope of this

analysis.

- Public Leaderboard:

A public leaderboard can be effective at encouraging behavior. For instance, ranking holders based on how long they've held onto their distributions or on overall market impact that their tokens have had on \$ARB based on LP and swap activity. This approach has been used with NFTs, but just as easily can apply to ERC-20 token ownership.

- Social Media Recognition:

Regularly feature long-term holders on social media platforms or community forums, providing them with recognition and status within the community.

- Token Holder Rewards:

Reward long-term holders via airdrops or by issuing NFTs for owning a minimum amount of \$ARB for certain milestones. These NFTs could then grant special status within the ecosystem (e.g., access to discord channels, early access to articles, free educational content, discounts for events, etc). Voting in governance proposals could even be weighted by how long users have held their tokens.

Despite the options mentioned above, there are still significant challenges associated with each one. Restricting distribution reduces the perceived award value, enhancing the execution quality involves education initiatives and DAO coordination, and improving utility is something that should always be pursued.

## Protocol-Owned Execution

Furthermore, no matter the environment, it seems reasonable to assume that there will always be ARB recipients who are not fully aware of the nuances of market microstructure or how best to liquidate their ARB. While the Arbitrum Foundation and DAO can endeavor to educate recipients and provide guidance on optimally liquidating ARB, it is important to acknowledge that recipients are under no obligation to follow such suggestions and strategies.

A more favorable scenario might be achieved if the DAO could also finance its grants with other tokens in addition to ARB. Note that this does not change the final token ownership distribution. The DAO is still distributing the same amount of ARB to the community. However, by owning the execution, the Arbitrum DAO is better able to control the price impact of the grant or award program. Furthermore, the users acquiring ARB during this distribution are doing so voluntarily in the open market, as opposed to ARB going to recipients who likely will seek to liquidate it to get capital to finance their grant's mandate.

In short, the DAO should diversify its funding sources to include not only ARB but also ETH and stablecoins, and use all of these tokens to directly finance their grants. In so doing, the resulting price impact on ARB could be significantly mitigated.

To understand this better, consider that the DAO, in theory, could mimic the actions of less informed recipients by selling ARB in an indiscriminate manner. However, if the DAO strategically limited its sales to times when minimum thresholds for liquidity, volatility, and volume were met, it could markedly enhance the quality of execution. Furthermore, instead of selling ARB in an arbitrary, but restricted, time period, the DAO could anticipate ETH and stablecoin spends and proactively trade into those positions well before the assets are needed. This strategic approach could lead to more stable market conditions and potentially better financial outcomes for all parties involved.

## Treasury Management Strategies

With any portfolio management strategy, there's a certain amount of risk associated. While risk is often seen as a negative, higher risk can carry the opportunity for larger gains. The goal, then, is not to avoid risk entirely, but to make sure it is managed properly and that the amount of risk aligns with the goals for the portfolio. If funds are needed in the short term, a low risk strategy can preserve capital. If the funds are a long-term investment, a higher risk strategy can allow for more growth over time.

Since the risk of an asset isn't directly measurable, we must estimate it using something we can directly measure. Intuitively, if the price of an asset is unpredictable and can change significantly from moment to moment (e.g., as is the case with ETH), then we think of it as riskier. If, on the other hand, the price of an asset is predictable and doesn't change much (e.g., as is the case with stablecoins), then we think of it as safer. It seems reasonable that the volatility of the price, therefore, both acts as a good proxy for risk and can be directly observed.

The main difficulty with using volatility as a measure of risk is while we know what the volatility of the asset's price was, we don't know what it will be. A simple model is to assume that if an asset was volatile or stable in the past, it will continue to be so in the future.

We can calculate this historical volatility by computing the standard deviation of an asset's daily returns:

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Note: we have applied a standard bias correction when calculating the standard deviation

This calculation will generally be a decent prediction of the magnitude of tomorrow's returns. The observant reader will immediately see that this value changes from day to day. This is actually a desirable property. Even though one can speak of assets as generally being safe or risky, they may not always remain that way in the future. For intuition's sake, here are 90-day (i.e.,  $n=90$ ) historical volatility ranges for some well-known assets:

- 30-Year US Treasury Bonds: 5-15% (generally conservative)
- SP500: 10-30% (aggressive)
- ETH: 50-200% (very aggressive)

Just as an asset has volatility, so does a portfolio. If a portfolio consists of perfectly correlated assets, then we can just add the individual assets' risks together to get the risk of the portfolio. However, if any of the assets are uncorrelated (or even anti-correlated), then the addition of these assets can actually reduce the portfolio's risk. In short, the less correlated the assets are, the less overall risk.

## Managing Risk

A simple treasury management strategy would be to hold everything in a single asset. This strategy exposes the treasury to the full risk of that asset, as the entire value is tied to that asset's price. As contrived as this example seems, many DAO treasuries exclusively (or predominantly) carry just their native governance token. Arbitrum (\$7.8B), Optimism (\$3.3B), Uniswap (\$2.7B), ENS (\$1.6B), and Cardano (\$840M) are all prominent examples of DAOs with large treasuries that (according to defillama) consist almost entirely of gov tokens.

A slightly more sophisticated strategy is to maintain a fixed allocation of assets. For instance, the DAO could target a fixed allocation of 90% ARB and 10% ETH. [Balancer](#) pools are well-suited for accomplishing these types of strategies. As prices change, arbitrageurs trade with the pool to maintain the notional balances. Over time though, the level of risk can vary as the volatility of each asset changes. For instance, if the volatility of ETH were to skyrocket, then what once was seen as a prudent allocation may now seem much too risky.

In order to more directly achieve this kind of control over risk, the DAO can opt instead for a volatility-targeting strategy. Instead of targeting a constant allocation of notional percentages, volatility targeting aims for a constant allocation of risk. While this may sound more complicated, in practice, the approach is straightforward and allows for a clear, intent-based approach to portfolio management. The intent is to maintain a steady amount of risk so the portfolio can grow while keeping assets available.

For instance, assume you have a portfolio of 100M dollars that needs to cover your runway for 3 months. You want to earn some yield on this money, but you also need to be able to cover any expenses along the way. If, after allocating these funds, the asset volatilities increased and prices started varying wildly, you'd probably want to move to more stable assets for safety. On the other hand, if the asset prices became more stable and risk went down, you might want to allocate more to seek controlled growth. Volatility targeting allows you to do this with a robust methodology.

## Volatility Targeting

For a volatility targeting strategy, the approach can be simple:

1. Define the target risk level:

Define the desired level of risk in terms of a target volatility. While we are often asked what a "good" target risk level is, each use case is different and can only be determined by the owner of the funds. That being said, we have generally seen DAOs seek portfolio allocations that target between 5% and 20% annualized volatility for the non-governance token portion of their portfolio.

1. Estimate the current portfolio volatility:

Calculate the volatility of each asset and the correlations between them, then weight them by the current portfolio allocation.

1. Adjust the portfolio allocation

: Once the target and current volatility levels have been established, the asset allocation can be changed to match the target.

1. Monitor and rebalance:

Monitor the portfolio's volatility on an ongoing basis and rebalance as necessary to maintain the target level of risk.

## Experimental Results

For concreteness, we present some results for a hypothetical DAO that is targeting 20% annualized volatility for a portfolio of ETH and DAI. Per above, this level of volatility is similar to that of the S&P500.

Since both the volatility and the prices of assets change over time, the portfolio needs to be constantly monitored and adjusted. Shown below are the weights produced by our algorithm that leverages historical volatility to predict the future volatility:

As can be seen, the weights change quite frequently. While the allocation to ETH is generally in the 20-40% range, there are times where ETH was riskier than average and only 5% of the portfolio was allocated to ETH. There also were times where ETH prices were relatively quiescent, and over 80% of the portfolio was allocated to ETH. This variation might seem risky, but it turns out that it does a pretty good job of controlling a portfolio's risk even though ETH's volatility frequently was in excess of 100%.

Lastly, we can also see this qualitatively by looking at the historical returns. Not only is the volatility greatly reduced, but the average returns are comparable (at least for this period of time):

In terms of actual returns, while the portfolio underperformed being fully in ETH when prices rose rapidly (2021-2022), it also protected against losses when ETH dropped (2018-2021). The net result is that this strategy can still achieve exposure to a desirable risky asset without putting too much of its assets at risk.

For completeness, these are the portfolio returns associated with different volatility targets. As the target volatility increases, both the losses and gains do as well. However, the risk-adjusted returns (and the associated Sharpe ratio) for the volatility-targeted strategy can be much higher than a fixed notional allocation (which includes 100% ETH). Put another way, the returns achieved by a volatility-targeted portfolio can be higher per unit risk.

## How Aera Supports Treasury Management

As the DAO treasury management landscape continues to evolve we have seen the solution space roughly fall into 3 buckets:

- One time treasury diversification - a static and point in time approach to treasury management that covers immediate needs of the DAO but doesn't have a long term approach to treasury sustainability. This is a principled approach, but doesn't evolve over time
- Centralized treasury management - where the DAO elects a treasury manager who has some restrictions on what they can do via smart contracts, but otherwise has broad remit on what asset class choices and investment strategies they can employ. This breaks a lot of the properties that DAOs seek to achieve like credible neutrality, limiting points of failure and others.
- Inaction by democracy - where the DAO makes large reallocation decisions based on voting. This is hindered by misaligned incentives from DAO members and apathetic/uninterested voters. In the worst case the DAO takes no action, and in the best case the DAO compromises to achieve consensus amongst voters.

From this we can see 3 pillars of a perceived treasury management trilemma: decentralization, principled allocation, and effective allocation.

Faced with three choices that are fundamentally unappealing, DAOs choose to keep their capital largely unallocated.

## Breaking the Treasury Management Trilemma

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Aera is a solution that achieves all three desirable properties: trustless, principled & responsive treasury management. Here's how that works:

Aera achieves responsiveness and efficacy by using off-chain guardians

Guardians are able to build complicated data pipelines and strategies to ensure that treasuries are managed using best



available market instruments, are risk-aware, liquidity-aware and otherwise responsive to market conditions. Allowing for offchain logic means that the strategy space is much wider and not limited to strategies that can only be computed onchain (which is often very small due to computational constraints).

Aera achieves trustlessness by limiting what guardians can do at the protocol level

A comprehensive hooks contract is used in each vault that limits the types of actions that a guardian can take and how they can impact the vault, bounding possible loss. Every action a guardian takes happens with assets that are approved by the DAO, with actions that are whitelisted and with consequences that are within the approved parameters of the treasury owner. Safety first. Trustlessness will further improve as the initial permissioned model will evolve to a permissionless implementation with progressive decentralization. Unlike other solutions for treasury management, Aera strikes a balance on trust and responsiveness by constraining the actions a guardian can take while still holding them to a clear objective and success criteria.

Aera achieves principled strategies through the use of a custom objective function for each treasury

The stated objective function serves as a point of alignment between the DAOs objectives and the guardians' actions. Guardians are incentivized to act only in ways that improve the objective function of the vault and not limited to simple strategies like seeking yield without consideration of insolvency or other risk vectors. Complex objectives necessitate using multiple strategies together, and Aera can decompose this into a set of strategies that work in tandem (see the Case Study below for an example of this in practice).

## Aera in more detail

Aera is a 2-sided protocol: Depositors like DAOs who are Owners of the vault and Guardians who optimize the vault according to the Owners objective function.

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](<https://global.discourse-cdn.com/standard17/uploads/arbitrum1/original/2X/8/809bbf88920985206c59924aa78bdc54655aacbc.png>)

An Owner initially deposits into the vault, selects the objective function (i.e. a Risk managed portfolio via Volatility targeting, a Yield strategy to generate ETH yield via leverage, Asset diversification using onchain exchanges etc.), the set of assets that the vault is allowed to trade, DeFi protocols it's allowed to interact with. Additionally the Owner can set more constraints on the vault via a customizable hooks module. Some example hooks could be: the vault is not allowed to lose more than 3% of its portfolio value in notional terms in a given day, or the vault must always contain 10,000 of a given token at all times.

Once the Owner deposits into the vault the Guardian begins to optimize it against the objective function prescribed by the DAO.

As above Guardians can implement whatever offchain logic and additional modeling they want to achieve the DAOs goal, in the case of the DAO choosing a Risk strategy via volatility targeting, the guardian may build ETLs and models to fetch asset price data and compute volatility. They could extend this to fetch implied volatility from deribit or other centralized venues if this is helpful for achieving the DAOs objective.

From here on, the Guardian submits rebalance operations against the vault on a regular cadence (i.e. daily, weekly) in a continuous optimization process.

The Guardian is limited in what it can do at a smart contract level. The Guardian is not able to withdraw assets from the vault or do anything that will break the invariants set up in the vault via the hooks module. All operations must happen onchain and leverage other DeFi protocols making Aera strongly transparent. Critically, the constraints of the Vault prescribed in the smart contract logic, means that Guardians need to strongly automate their strategies. This limits the discretion that the Guardian has and gives the Treasury Owner stronger guarantees and confidence around achieving the objective, while minimizing the surface area for mistakes and other risks. Automation drives consistency and removes logistical overhead for the DAO.

Due to this blend of onchain constraints and offchain logic, Owners using Aera get a system that is non-custodial, transparent, and efficient at achieving their goal. In summary, Aera is a robust and composable protocol that can support a variety of objectives for DAOs:

- Treasury Diversification
- Risk Managed Portfolio Management (via volatility targeting)
- Runway management

- Yield generation

# Achieving Diversification through Intent-Based Governance

Ultimately, this discussion boils down to diversifying the treasury and improving execution quality. There have been recent [discussions](#) on investing in real-world assets (RWAs) such as US Treasury Notes and Bonds. This is certainly valuable, and we strongly encourage continuing this discussion. However, there is no reason to restrict the diversification to RWAs. Even the straightforward approach of purchasing and holding a more optimized mix of assets such as ETH and stablecoins can be beneficial to a DAO.

The ENS DAO's Treasury ([wallet.ensdao.eth](https://wallet.ensdao.eth)) is a great example of strategic treasury management. Their treasury regularly holds ENS, ETH, and USDC and finances the DAO's activities with a mix of tokens. For instance, the following [proposal](#) funds the ENS Meta-Governance Working Group for 2024 Q1 with all three assets. ENS DAO has revenue streams denominated in ETH (similar to Arbitrum DAO's sequencer revenue). They sold a large block of ETH for USDC via CoW Swap (see [EP3.3](#) for the discussion). While this can work for a liquid pair at a trade size of 10k ETH (\$13M USD notional at the time), it would likely be much more difficult to accomplish this same feat using larger amounts of less liquid assets (e.g., financing the Arbitrum DAO for a quarter by selling \$100M worth of ARB). All things considered, the ENS DAO's treasury has made substantial progress in managing reserves strategically, despite relying on a fully governance-driven strategy.

However, it is also very inefficient to implement any kind of dynamic strategy entirely via governance due to proposals generally being subjected to discussion periods, temperature checks, on-chain votes, and lockup periods (See [Lifecycle of an AIP](#)). By the time a proposed transaction is actually executed, the market conditions could be fairly different than the original conditions during which the original proposal was being discussed.

Arbitrum DAO can delegate this process to a committee that is responsible for managing grants programs via multisigs (e.g., similar to the Arbitrum Grants structure [here](#)). This streamlines the decision-making, but it still requires the DAO to trust the signers, is subject to human error, reduces the security of the allocated funds, and can still be slow to react to market events (because ultimately, human beings still need to be informed and coordinated).

Another challenge is that even though these grants programs are being funded with ARB, proposal amounts are actually denominated in USD. Specifically, the [proposal](#) funding the Arbitrum Grants project as well as the actual Questbook grant proposals are all denominated in USD. However, the payment is actually funded with an equivalent amount of ARB. Not only does this create friction for the actual process, but it introduces price risk due to the timing delay between when the payment is proposed to the multisig and when it is finally executed.

For instance, [this grant](#) intended to send 5500 USD for one of its payments. At the time of proposing this transaction in the multisig, 4,166.67 ARB was worth roughly 5500 USD. However, at the time of the transfer's [execution](#) nearly two days later, it was worth 6233.70 USD, a whopping 13% premium that the Arbitrum DAO paid. In this case, the recipient received more ARB than they were entitled to, which is unlikely to cause complaint, but this just as easily could have gone the other way.

A much better solution would be for the Arbitrum DAO to leverage automated tooling (such as the tooling that Aera is currently building) that would effectively allow the DAO to vote on intentions such as keeping the treasury well-balanced and diversified while ensuring funding is available for grants programs.

For instance, a proposal could be made to allocate 85% of the treasury to ARB, 5% to RWAs, 5% to ETH staking, and 5% to yield-generating stablecoins. These allocations could be notional percentages or risk percentages (to learn more about volatility targeting strategies, see the [earlier section](#) on them). A proposal could similarly be made to ensure that there are sufficient assets available to fund the upcoming quarter. The automated tooling would then be responsible for the actual logistics of achieving the intent (i.e., swapping into the desired amounts over time). Independent of what the actual allocation is, diversifying and automating at least a portion of the treasury management leads to the following benefits:

1. Reduction of market risk (through diversification)
2. Additional yield (through RWAs, staking, and lending)
3. Ability to finance DAO operations and programs with greater flexibility and lower market impact
4. Increased liquidity and stability of ARB (by dynamically maintaining a strategic buffer, the DAO could opportunistically both sell and buy back ARB based on market conditions)
5. Lastly, and most importantly, Arbitrum DAO is able to spend its time focusing on higher-level concerns such as what

to spend on as opposed to lower-level implementation and execution details.

## Appendix - Aera Case Study

## Background

Threshold DAO partnered with Aera V2 to enhance its treasury management. The goal was straightforward: diversify Threshold's treasury assets and manage the proceeds in a risk aware manner.

### Strategy: Focusing on Volatility Management

The core strategy involved allocating \$250K of T tokens to an Aera Vault, with a focus on volatility management. Threshold DAO chose a volatility-targeting strategy to mitigate risk and stabilize returns. This approach is helpful to control for risk, ensuring that while diversifying into assets like ETH and USDC, the portfolio's volatility remained around 15%. This strategy helped Threshold maintain a steady growth trajectory without excessive risk exposure.

### Diversification and Market Dynamics

The diversification process achieved less than 0.5% slippage, and did not affect the T token's market price. We were able to diversify out of the initial allocation over the course of 6 weeks. We observed this low market impact due to offchain arbitrageurs coming in to rebalance the onchain DEXes.

### Yield Generation: Utilizing Aera's Versatile Architecture

Aera's platform, capable of integrating any ERC20 or ERC4626 asset, made it easy to generate yield on the vault holdings. These protocol features enabled efficient use of idle ETH and USDC. By incorporating wstETH, Threshold maximized yield on Ethereum holdings, and through Aave USDC, they effectively utilized the USDC proceeds. Aera's system provided a straightforward and effective approach to enhancing asset productivity within the DeFi ecosystem. Currently the vault is generating 5.16% APY with a high of 6.27% APY

### Operational Excellence and Results

Aera made all this possible by removing the overhead from the Treasury Guild to think through execution of the strategy. After selecting the initial volatility target and diversification criteria, the Treasury Guild did not need to take further action to drive the execution of the strategy. Since the vault's inception 2 months ago Aera has rebalanced the vault 74 times to achieve the Guilds selected goals. The ability to efficiently manage and rebalance the assets has been critical in DeFi's rapidly changing market.

### Security and Safety: Enhanced Protection and Verified Trust

Aera prioritizes the security of its protocol and the safety of user funds. Owners of Aera vaults can rest assured of the protection against unauthorized access, as the system is non-custodial and guards against misappropriation and malicious actions by Guardians. The protocol offers customized security measures, enabling clients like Threshold DAO to establish specific, tailored constraints for their vaults. This adaptability facilitates bespoke risk management strategies, and gives granular control to the Owner over allowed Assets, Exchanges, and DeFi Protocols. A key constraint is the vault value check, a mechanism designed to cap daily loss to a maximum of 3%, thereby shielding against potential guardian malfeasance.

Further solidifying its security posture, Aera's infrastructure has undergone a comprehensive audit by Spearbit, adding a significant layer of credibility and reassurance. This blend of customizable security measures and rigorous auditing underscores Aera's dedication to upholding the highest standards in fund safety and risk control within the realm of DeFi treasury management.

### Conclusion

The partnership between Threshold DAO and Aera V2 demonstrates the importance of a well-executed volatility management strategy in DeFi. By focusing on stable growth and leveraging the evolving onchain dynamics, Threshold was able to optimize its asset portfolio, underscoring the potential of DeFi in modern treasury management.