IDX Digital Assets Presents:

DeFi Risk-Weighted Index Overview

As we move into the end of 2022, crypto continues to see large growth in all sectors driven by continued development despite a selloff in price. Alternate Layer 1 and Layer 2 scaling solution have seen massive increases in user demand in this past cycle. DeFi continues to innovate and Infrasturcure forages forward.

A Look Ahead for Digital Assets:

DeFi Risk-Weighted Index Overview

Trends and innovations that could materialize in 2022

Table of Contents:

Introduction

Roughly 1.7 billion people are currently un-banked around the globe. Financial institutions have the authority to decline *risky* individuals, leaving those people with no ability to safely store their money. Some countries have seen such high inflation rates that the population is left with no other choice but an alternative money solution.

Bank wiring is expensive and takes several days to process. Blockchains are cheap and take a few minutes to seconds. (Time and cost depend on the blockchain). Banks use depositors' funds to make more money and give nothing back to the depositors. Blockchain/Crypto removes the need of a centralized, authoritative bank and gives users the right and power over their capital. There are ways to safely store cryptocurrency away from malicious activity.

Centralized companies (Facebook, Twitter, Amazon, Google) monopolize the internet, they control almost everything that takes place. Things like who can create an account, what users can post, what users can sell, what ads display, etc. This leads to uncontrolled censorship.

Blockchains

A Blockchain can be described in three main ways. First, it is a decentralized network that anybody with a connection can utilize. Secondly, it is a public database where the data cannot be altered. This immutable nature is achieved using cryptography, which is essentially the science of concealing data using algorithms. Lastly, blockchains are also computers with overhead that must be properly maintained. These computers are referred to as Nodes or Validators and can be described as servers that are connected to each other sharing the latest information published to the blockchain. Each node stores a copy of this data to ensure that all nodes are in sync with the latest information.

Solana

Co-Founded by Anatoly Yakovenko in 2017, Solana is the world's most performant state machine which aims to maximize finality time and censorship resistance.

I. "Ethereum Killer"

Solana has 8 key innovations that allow it to perform as one of the fastest, cheapest blockchains despite rising demand and usage. Solana differs from Ethereum starkly and requires a different programming language to build on. This means all new infrastructure must be developed from the ground up, something Ethereum began in 2014. In summary, these innovations allow the current state of Solana to sufficiently process 2,000+ transactions per second, without the threat of exponentially rising transaction fees.

In time, as processing chips become more advanced due to Moore's Law, the Solana network's throughput capabilities will be tenfold, allowing it to potentially achieve 50,000+ transactions per second. Solana's disruptive and innovative designs make it a top contender in today's market. Currently, many eyes are on Solana as a competitor to Ethereum's 2.0, which has taken a prolonged time to roll out. Understanding the fast-paced nature of crypto is important and properly diversifying amongst several of the top performers can help investors' portfolios.

https://idxdigitalassets.com/media-center/

Avalanche

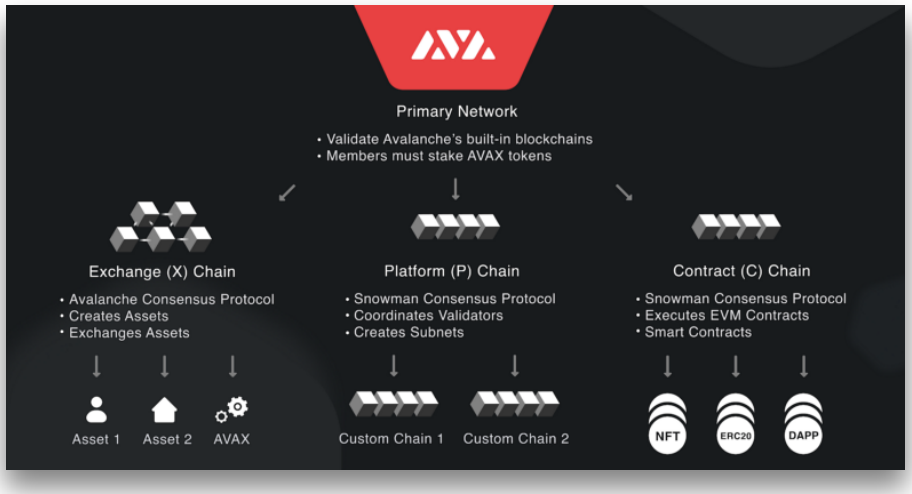
Avalanche is a high-performance, Proof-Of-Stake (PoS) blockchain with the aim of solving many of the cumbersome faults found within the current blockchain design.

II. Scale with Subnets

Avalanche developers noticed the issues on Ethereum, such as finality time, transaction costs, and inefficiency to scale rapidly with increasing demand on the network.

Subnets are extremely versatile and allow developers the scalability and throughput necessary to build the applications they want. Each Subnet is capable of processing up to 4500 transactions per second. They are appealing to developers wishing to build large scale gaming products, with many DeFi concepts built into the game. To have this amount of complexity, a flexible design is necessary to accommodate the developers' needs.

Avalanche has seen explosive growth in the past few years, seeing most of this growth during the second half of 2021. From August to December 2021, Avalanche saw a 10,000% increase in the total value of the entire network. ($200 Million - $20 Billion). It has propelled itself as one of the most active blockchains in overall wallet activity and developer activity, as well as Total Value Locked (TVL) within applications built on the Avalanche Network.



https://academy.shrimpy.io/post/what-is-avalanche-avax-the-next-defi-blockchain-explained

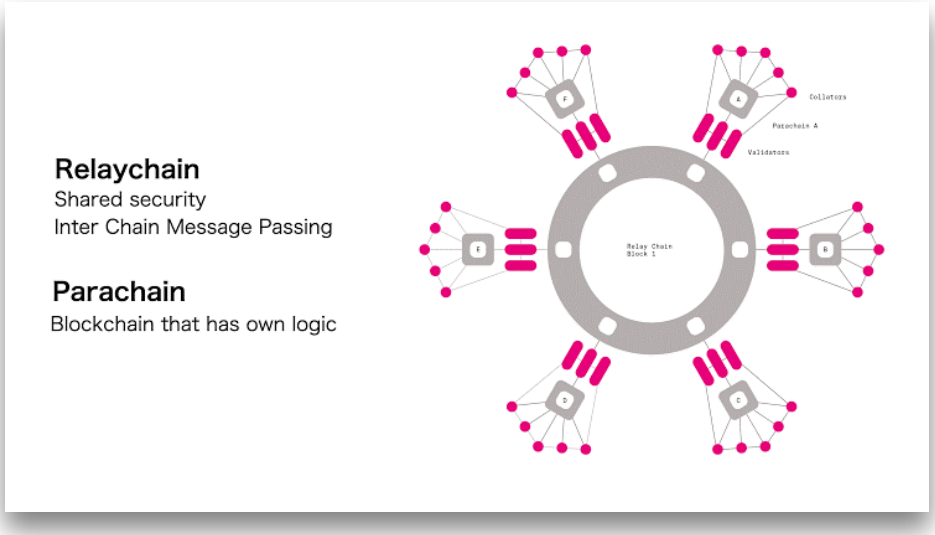
Polkadot

Introduced in 2016 by Ethereum Co-founder Gavin Woods, Polkadot was determined to solve one of the most challenging issues in blockchains, scalability.

III. Multi-Chain Framework

Polkadot is often referred to as a Layer 0 blockchain and can be thought of as a network of blockchains. Layer 0 blockchains provide the infrastructural needs for Layer 1 blockchains to exist and allow a seamless cross-chain interoperability amongst blockchains that exists within the network. At the heart of Polkadot is the relay chain, or main chain for the Polkadot ecosystem. Polkadot's relay chain serves as a security service to other parachains that exist within the Polkadot ecosystem.

Polkadot is a heterogeneous multi-chain that aims to achieve scalability without the trade off of reduced security. By multi-chain, this refers to the entire network of parachains and relay chain that exist within the Polkadot ecosystem. Parachains are their own blockchain with cross-chain interoperability with other parachains in the Polkadot ecosystem. This type of system is referred to as sharding, where it splits up the network activity amongst many different Polkadot parachains that all have high transaction speed and low transaction costs.



https://blog.redeeem.com/can-polkadot-dot-really-pass-ethereum/

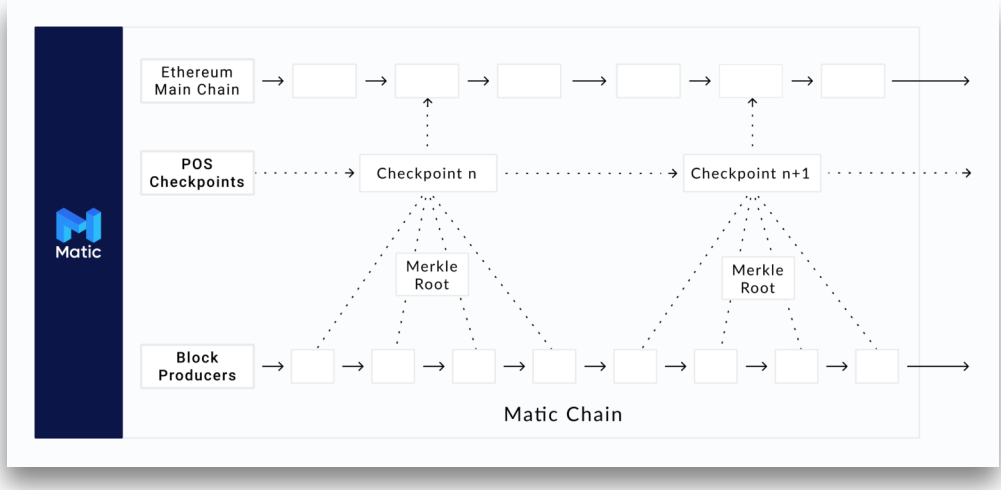
Polygon

Developed in 2017 by several experienced Ethereum Developers, Polygon aims to be a scaling solution for Ethereum and is fully compatible with existing Ethereum infrastructure and projects.

IV. Bring the World to Ethereum

Because Polygon is an Ethereum Layer 2 solution, this means applications built on Ethereum can easily deploy onto Polygon and take advantage on reduced transaction fees and increased transaction speed. By having this native adaptability with Ethereum applications, Polygon makes the on boarding process for developers and users relatively seamless from what is experienced on Ethereum.

The inner workings of Polygon are broken up into 3 main components. The first component of this system, *Plasma*, is where the deployment of staking management smart contracts on the Ethereum main network take place. This allows any individual to stake MATIC tokens and join a validator system for the Polygon network. The second component is where validation takes place. This layer is referred to as *Heimdall* and handles the validation of blocks for the network. The final component is known as *Bor*, Polygon's sidechain block producer. Sidechains are essentially *sister* chains that run and execute in parallel to a main blockchain, in this instance Ethereum.



https://coincentral.com/what-is-polygon-matic-a-guide-on-the-ethereum-layer-two-solution/

Cardano

In 2015, Charles Hoskinson established Cardano. Based on extensive academic research, Cardano is considered a third generation, Proof-of-Stake (PoS) blockchain with the aim of building a highly scalable smart contracts platform

V. Third Generation Blockchain

At the time of its development, Proof-of-Stake was a relatively new concept and was not implemented on any existing blockchains. One of the advantages to Proof-of-Stake (PoS) blockchains is that they are much more energy efficient than Proof-of-Work (PoW) blockchains, like Bitcoin. Energy intensive crypto mining rigs are not necessary for PoS blockchains, which reduces the overall amount of energy consumed by the network.

Cardano's smart contract platform hopes to provide more advanced features than current smart contract blockchains. This will be the core foundation for an enterprise level of decentralized applications (DApps) to be developed. Cardano is aiming to achieve a smart contract blockchain that can scale globally for any financial or social application. At the center of Cardano are stake pools, which ADA holders can delegate their tokens to. One of the benefits of stake pools is that they allow any level of investor to stake their ADA, whether novice or expert.

https://nocentralauthority.com/cardano-intro/

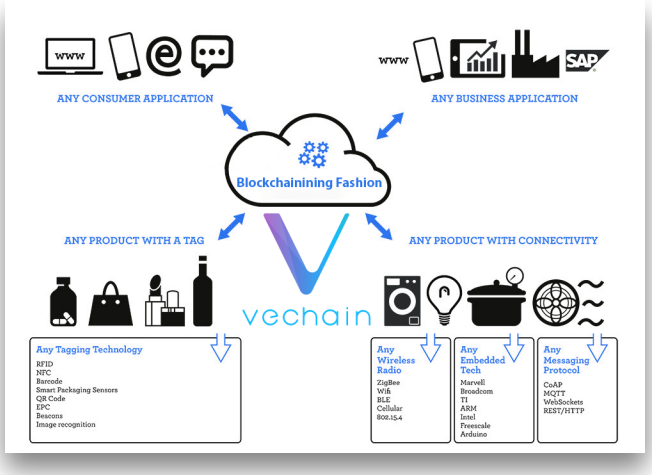
VeChain

Originally built in 2015 to help solve supply chain issues, VeChain re-branded to VeChain Thor in 2018 to become a more general-purpose blockchain that supported the development of a wide range of decentralized applications (DApps).

VI. Enterprise-Grade Blockchain

VeChain aims to help businesses launch any decentralized application and provide the proper tools to allow companies and developers to build these applications. VeChain uses a unique consensus mechanism known as Proof-of-Authority (PoA), which requires users to become "Authority Masternodes." To become an Authority Masternode, users must stake 25 million VET and submit identification proof. The PoA consensus mechanism allows large transfers of value and data rapidly but requires centralized authorities to approve Masternodes.

Voting Authority within the VeChain ecosystem is separated into three categories (Authority Masternodes, Economic X Nodes, and Economic Nodes). As previously stated, Authority Masternodes must go through the proper verification process from the VeChain Foundation, and each Authority Masternodes must hold a minimum of 25 million VET. Currently, in the VeChain Thor ecosystem, there are roughly 101 active Authority Masternodes. Each Authority Masternode is required to submit identity verification with the VeChain Foundation. Authority Masternodes receive 30% of the transaction fee of each block created. The VeChain Thor ecosystem is no longer accepting new Authority Masternodes, Economic X Nodes, and Economic Nodes.



https://cryptonews.com/coins/vechain/

DeFi

Decentralized Finance (DeFi) is one of the largest sectors within the blockchain space, having amassed nearly $100 billion in Total Value locked (TVL) as of June 2022. At market highs in November 2022, DeFi saw massive inflows and reached a top of approximately $300 billion in TVL.

Over time, the sophistication of DeFi application (dApps) has enhanced tremendously. From an AMM swapping mechanisms, to borrow/lending applications and Yield Aggregators, developers continue to forage new innovations for users.

DeFi is an experimental sector still understanding the full capabilities of blockchain technology. Tokenomics are one of the most disputed topics in crypto. Designing a sustainable economy for an application's platform has proven to be a challenge that many brilliant developers approach differently.

Synthetix

Developed by Kain Warwick, Synthetix is a financial application with the aim of helping bridge the gap between traditional finance and DeFi. Synths are similar to derivative products offered in traditional finance markets.

I. Decentralized Derivative Products

Synthetix is a decentralized application (DApp) for the issuance of synthetic assets, referred to as *synths* on the Synthetix platform. Developed by Kain Warwick, Synthetix is a financial application with the aim of helping bridge the gap between traditional finance and decentralized finance (DeFi). The issuance of synths is like derivative products offered in the traditional finance markets. However, Synthetix operates on the Ethereum blockchain and is always accessible to any DeFi trader. Synths allow traders to gain exposure to other assets without having to hold any of the underlying assets.

Oracles are smart contracts that can be used to track the price of assets represented by synths. By leveraging the technology of decentralized oracles, Synthetix can offer a wide variety of synths to give traders more flexibility within their portfolios. Oracles can track many different types of assets, including real-world commodities, fiat-currencies, as well as cryptocurrencies and cryptocurrency indices. Using synths, traders can now participate in FOREX markets without having to hold any of the different fiat currencies.

By staking(**depositing**) SNX into smart contracts and locking the collateral, users have access to borrow against this collateral to create any synth offered on Synthetix. When borrowing against SNX as collateral, traders are incurring debt with the protocol and must maintain a collateralization ratio to prevent being liquidated. Governance proposals control the threshold for liquidation events on the protocol.

https://blog.synthetix.io/soil-ioil/

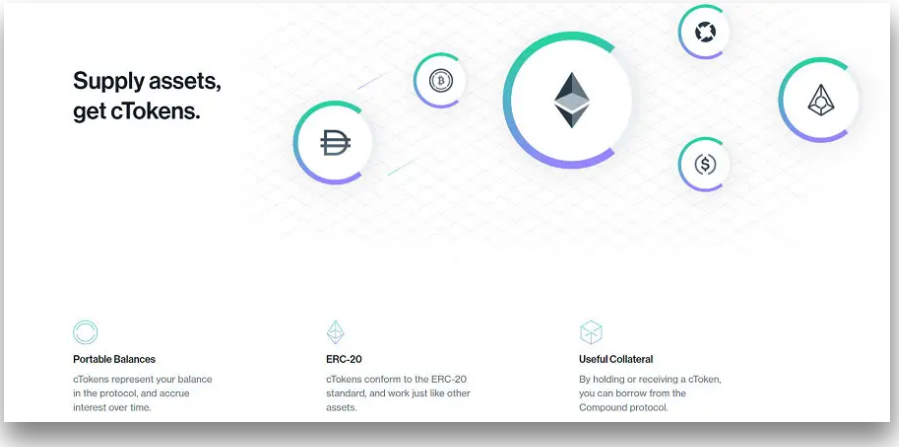
Compound

In 2017, Robert Leshner and Geoffrey Hayes released Compound Finance, an Automated Market Maker (AMM) with autonomous interest rates that adjust with the supply and demand of the liquidity pools.

II. Autonomous Interest Rates

Compound is an Automated Market Maker(**AMM**) protocol with liquidity pools that have built in interest rates that are based on the supply and demand of assets in the pool. Borrowers and suppliers directly interact with Compound's protocol and either pay or earn an interest rate, depending on whether they are a supplier or borrower. The interest rate is a floating rate that adjusts depending on the overall supply and demand of the assets within the liquidity pool. By using AMM smart contracts to mediate the borrowing, the need to negotiate interest rates, maturity, and collateral are removed. This inherently makes borrowing against your digital collateral more accessible to individuals.

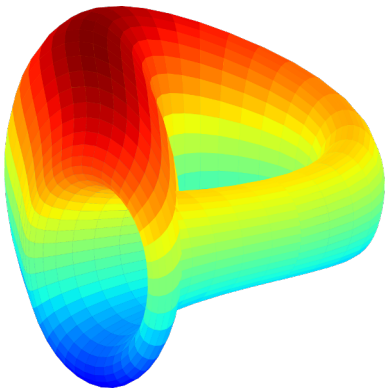
Compound makes managing a crypto portfolio more seamless for traders and holders of digital assets. Holders that are interested in long-term holdings can now generate a yield on their assets while also fulfilling loans and having their portfolio automatically re-weighted. Compound's products can also be utilized by other decentralized applications and exchanges.



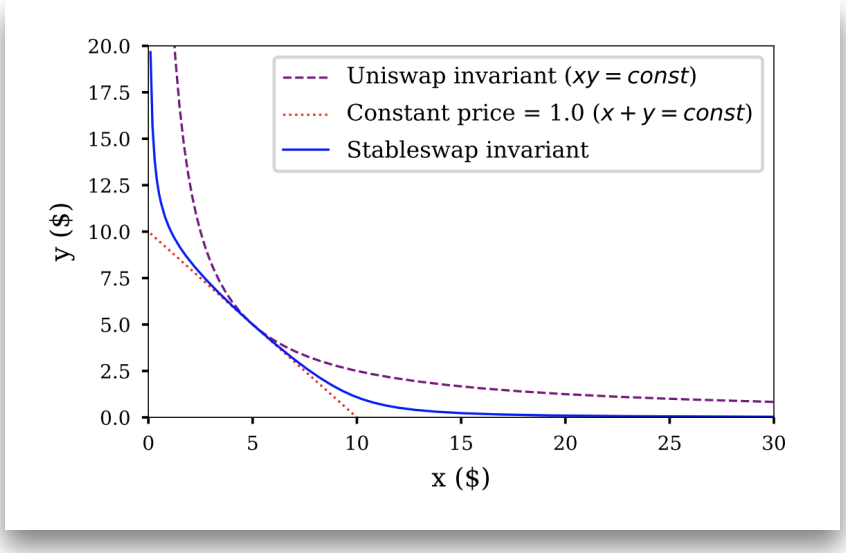
https://www.coinbureau.com/review/compound-finance-comp/

Curve

Curve Finance is a decentralized exchange on the Ethereum blockchain utilizing custom built, fully automated, market maker smart contracts. Curve built the first **StableSwap**, an exchange to swap strictly between stable pairing assets with minimal slippage and risk.



III. Heart of Stablecoin Liquidity



https://atulagarwal.dev/posts/curveamm/stableswap/

With an idiosyncratic design, Curve built the first **StableSwap**, an exchange to swap strictly between stable pairing assets with minimal slippage and risk. There are a variety of stablecoins that exists, all the with same overall purpose, providing a risk-off asset to harbor during unfavorable market activity. Tether (USDT), Circle (USDC), MakerDAO (DAI), are some of the most liquid stablecoins currently trading on the open digital markets.

Trading between stablecoins was found to be unfavorable when using the traditional AMM mathematics, so Curve innovated on this design to create a more sustainable model for swapping stablecoins. By tweaking the equations, Curve was able to significantly lower the amount of slippage when exchanging between stablecoin assets. Not only did Curve improve the swapping experience, but they also developed the first multi-token liquidity pools, where more than two tokens composed each liquidity pools.

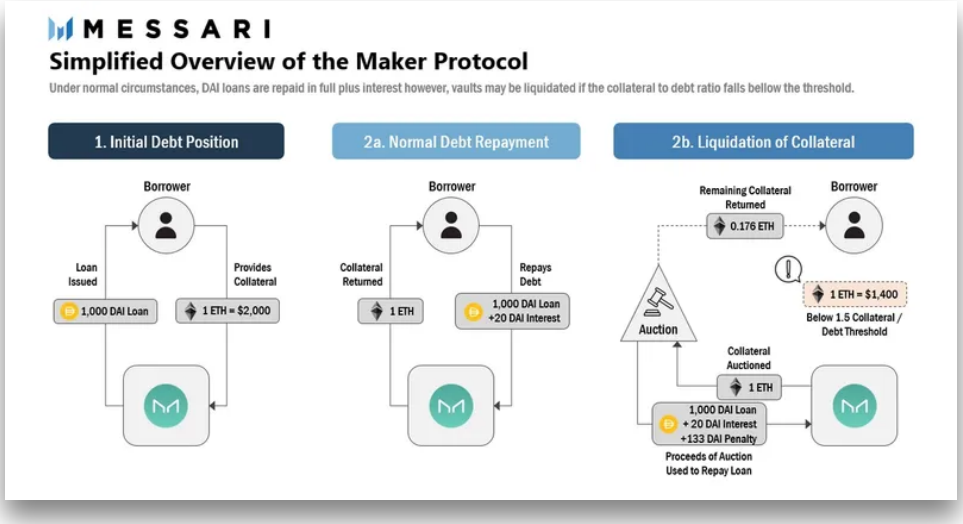
MakerDAO

MakerDAO is a decentralized protocol that allows users to borrow DAI, a non-custodial stablecoin, against their digital assets. DAI is the largest decentralized, non-custodial stablecoin in the crypto space.

IV. Non-Custodial Stablecoins

Custodial stablecoins are the most used stablecoin, usually backed off-chain by traditional assets (fiat currency). However, custodial stablecoins are still subject to regulations and authoritative scrutiny. **Non-custodial stablecoins** intend to take the working concepts of custodial stablecoins and utilize the benefits of blockchain technology.

The most common non-custodial stablecoin is known as DAI by Maker Protocol which resides on the Ethereum blockchain. This specific type of stablecoin is defined as an over-collateralized stablecoin backed on-chain by digital assets as collateral. Maker's innovative Multi-Collateral Dai system gives users the ability to *mint* (or generate) DAI by leveraging on-chain digital assets as collateral. DAI is an algorithmic stablecoin with a soft peg to one US dollar, $1 backed by on-chain digital assets that are deposited into Maker Vaults. Maker Vaults are smart contracts that lock users' deposited tokens and grants them the ability to *mint* (or generate) DAI. This allows users the financial freedom to unlock their tokens value without having to sell them.



https://messari.io/article/makerdao-valuation

Aave

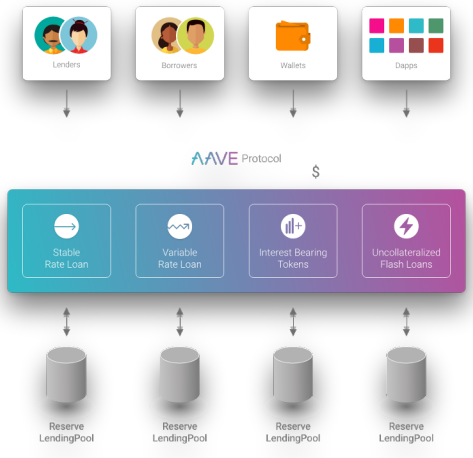
Aave, first known as ETHLend, launched on the Ethereum network in 2017. Stani Kulechov had a vision where DeFi users could receive interest on their deposits as well as be able to borrow other digital assets against their deposits.

V. DeFi's Liquidity Hub

One of Aave's flagship products is its interest-bearing vaults, which generate continuous earnings that dynamically change based on current market conditions. When tokens are deposited into an Aave vault, the user receives interest-bearing aTokens representing their portion of tokens deposited into the Aave vault. The primary source of earnings comes from two streams, the interest rate paid on over collateralized loans and flash loan fees.

Users can borrow two types of loans on the Aave platform. The first, over collateralized loans, require the user to deposit more collateral into the Aave vault than the debt they can incur on the vault. A specific collateralization ratio, managed by Aave Governance, must be maintained to prevent the vault from being liquidated due to risky debt.

The second type of loan a user can borrow from Aave is called a *flash loan* or an under collateralized loan. There is a technical learning curve to properly execute a flash loan, making them accessible mainly to developers. Aave will loan a user any amount of available assets without putting up any collateral before the loan. Flash loans must be paid back in full within one block transaction on the blockchain. This includes the interest and fees accrued when the assets are borrowed.



https://docs.aave.com/hub

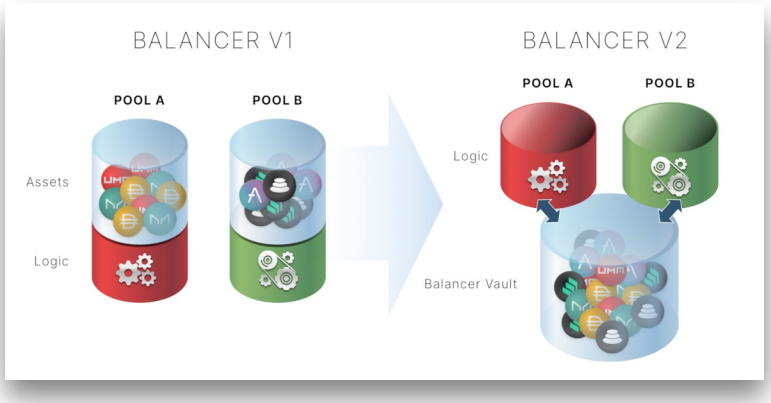
Balancer

Created in 2019, **Balancer** is an automated portfolio manager and liquidity provider on the Ethereum Blockchain. The team behind Balancer concluded that liquidity pools with high token-counts are like traditional index funds.

VI. Automated Portfolio Manager

At the heart of Balancer is **The Vault**, a smart contract that contains and manages all tokens in each Balancer pool. The design of The Vault allows Balancer to achieve reduced gas swaps when exchanging between a variety of different tokens. The Vault's architecture simplifies the overall logic of each Balancer pool, since the accounting and management responsibility is delegated to The Vault. Each Balancer pool is only responsible for keeping track of swaps, liquidity additions, and liquidity removals. The re-balancing mechanism takes place within The Vault, giving the design of Balancer liquidity pools a unique advantage. By concentrating all liquidity into a central location, this allows Balancer to offer developers deep liquidity for any token they are launching. Any token can plug into Balancer's Vault's liquidity, only needing to satisfy a few requirements.

By having the accounting and management take place in one central place, this allows Balancer to offer batch swaps with minimal gas fees. In some instances, a user may need to swap between multiple tokens. On traditional model DEXs, a trader would have to perform two or more swaps to reach their destination token. This can end up in a trader paying two separate gas fees. Since Balancer's Vault keeps track of the accounting and management of every token for every Balancer pool, this allows a seamless transaction between any asset(s) a user desires to exchange for.



https://docs.balancer.fi/products/the-vault

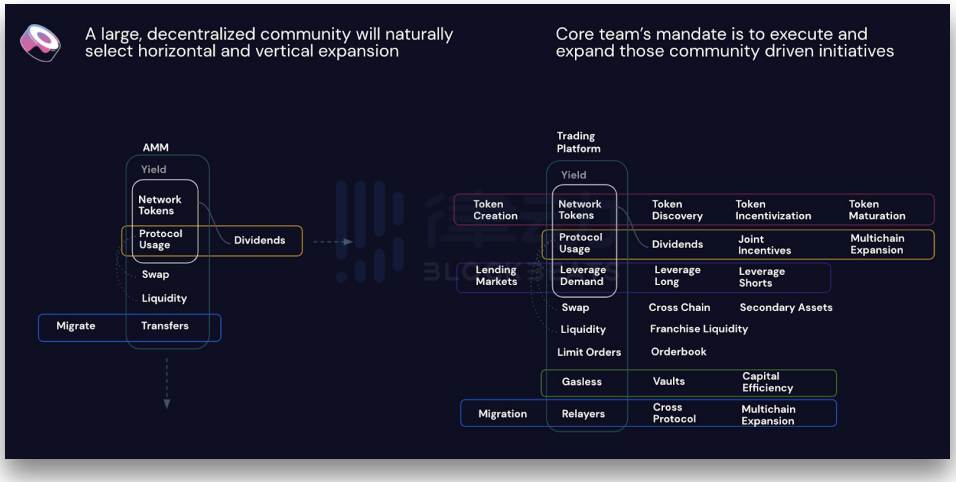
Sushi

In late August of 2020, a pseudonymous developer by the name of Chef Nomi forked the Uniswap product and launched his own variation, **SushiSwap**. Sushi is a decentralized exchange (DEX) and rewarded early liquidity providers (LPs) with the main governance token of the protocol, SUSHI.

VII. The Uniswap Fork

Sushi's main edge over Uniswap was this liquidity mining program for its governance token SUSHI. Sushi's liquidity mining program rewarded early participants with a hefty amount of SUSHI tokens in the overall tokenomics of the project. Tokenomics is the basic economy of a blockchain or blockchain application's token. The first iteration of Sushi's product had users deposit Uniswap LP tokens into the product to earn SUSHI. Later, Sushi developed their own liquidity pools that users had to migrate their capital to, resulting in $800 million migrating from Uniswap pools to Sushi pools.

Early in its development, Sushi had internal issues that arose with one of its core developers, Chef Nomi. In a move that tanked SUHI's token price 70% over 24 hours, Chef Nomi exchanged $14 million of SUSHI for ETH. This led to a major backlash from the community that resulted in Chef Nomi handing over the management of Sushi's treasury to FTX CEO Sam Bankman-Fried. The Sushi treasury was then converted into a multi-signature wallet. A multi-signature wallet requires multiple parties to sign off on a transaction to approve the action. This security mechanism helps prevent malicious intent from a single party and is often used to manage treasury funds in crypto.



https://coinyuppie.com/why-do-so-many-vcs-invest-in-sushiswap/

Uniswap

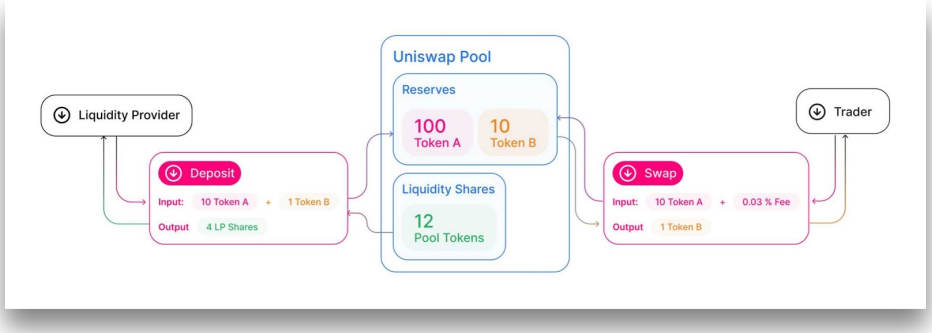
In 2018, Uniswap was founded by Ethereum co-founder Hayden Adams. He created a core development team, *Uniswap Labs*, to lead the development of the Uniswap Protocol. One of the most innovative financial applications in crypto, Uniswap, is the originator of the Automated Market Maker (AMM).

VIII. Automated Market Maker

Uniswap is a *decentralized exchange*(DEX) that facilitates the peer-to-peer transaction of cryptocurrencies. Built on Ethereum, Uniswap is a pivotal development within decentralized finance (DeFi) and contributed significantly to the explosive growth seen during the DeFi Summer 2020 bull run.

Traditionally, markets utilize a central limit order book with bids and asks to exchange assets. This system is what is seen in the stock market, where buyers and sellers create orders by price and size that are filled as demand fluctuates. Uniswap developed a program known as an **Automated Market Maker (AMM)** utilizing smart contracts on Ethereum. Programs are instructions or executable scripts that are written in a programming language, in this case Solidity.

AMMs are commonly referred to as *liquidity pools* and consist of two tokens with an equal split of 50/50 deposited from each token. Liquidity pools replace the need for buy and sell orders, creating a constantly liquid market for users to exchange with. When one of the tokens is exchanged for the other, the relative prices of each token change and a new market rate is determined for each token. **Liquidity Providers (LPs)** are individual users who supply liquidity for AMMs and in return receive a % fee for the volume transacted within that specific pool.



https://academy.shrimpy.io/lesson/what-is-an-amm-automated-market-maker

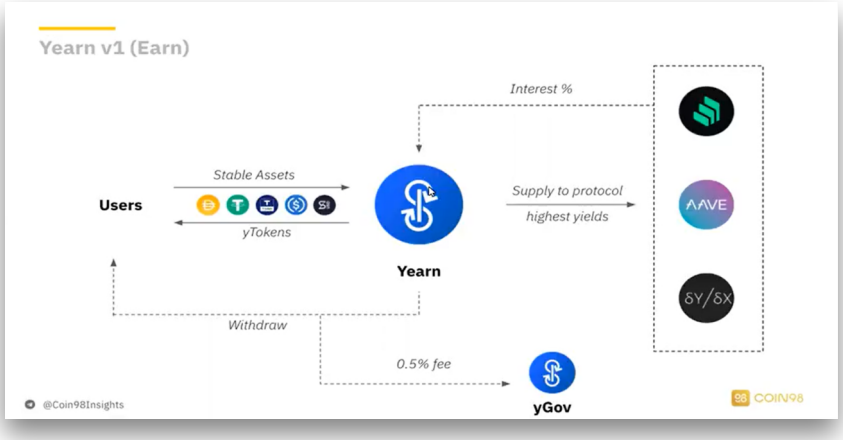
Yearn

Yearn Finance is a DeFi protocol that offers a suite of financial products that helps users achieve an optimal yield on their digital assets. Yearn was deployed on the Ethereum blockchain and is maintained by various independent developers from within the community.

IX. DeFi Yield Aggregator

Yearn developed algorithmic trading strategies to optimize yield across all DeFi platforms on the Ethereum blockchain. This means users do not need extensive knowledge of the underlying protocols used to generate the yield. Users simply deposit their digital assets into the yVault (yearn vault) and Year will automatically route the deposited funds through the optimized strategy to earn a yield on their deposited assets. The APR of each yVault depends on the present opportunities available in the DeFi market. The yVault strategies will automatically rotate capital to new arising opportunities.

yVaults can be viewed as savings accounts for users' digital assets. The vaults are capital pools that generate a yield for depositors based on the present opportunities in the DeFi landscape. Yearn's vaults provide a beginner-friendly way to participate in the financial opportunities present in DeFi. By routing the trading strategies behind the scenes with algorithms, users only need to deposit their digital asset into the yVault, and the rest is handled by the protocol. yVaults are constantly looking for the best yield opportunities in DeFi and optimizing returns for depositors. yVaults include features such as auto-compounding yield and re-balancing holdings to maximize returns.



https://coin98.net/what-is-yearn-finance-yfi

Infrastructure

Infrastructure is a key piece in allowing decentralized applications (dApps) to properly communicate with the blockchain they are deployed on. Scaling infrastructure is crucial for a blockchain to reach mass adoption with the next billion users. Having an abundant amount of RPC nodes for developers to connect their dApps with as well as growing the validator community is essential to creating a sustainable blockchain ecosystem.

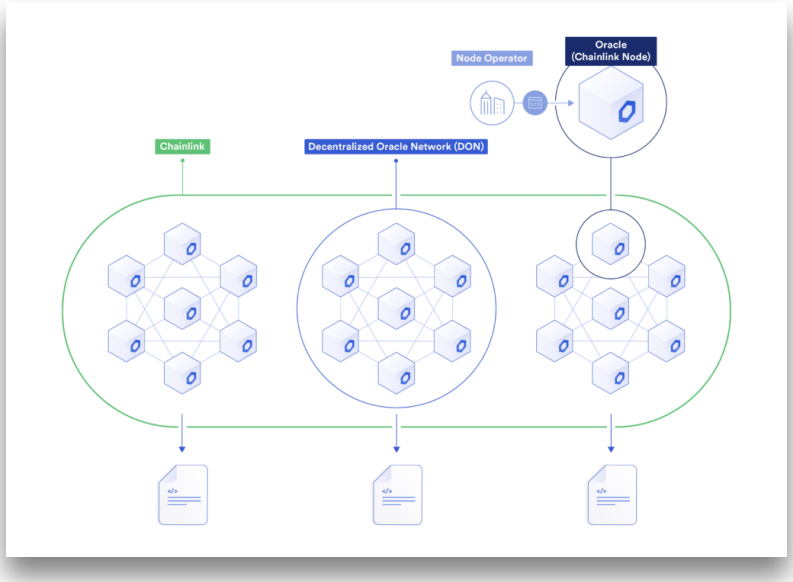
Chainlink

Chainlink was developed in 2017 by Sergey Nazarov and Steve Ellis. Originally developed to help reduce bottlenecks in the Ethereum ecosystem, it was developed with the foresight of being blockchain-agnostic. This flexibility has allowed Chainlink to be a key driver of any blockchain ecosystem.

I. Decentralized Oracle Networks

Chainlink Oracles are a key component to the overall functionality of Web3 and DeFi. Blockchains that utilize centralized entities for off-chain data create a single point of failure which can be detrimental to a blockchain ecosystem. One of the most used assets in crypto is stablecoins pegged to the US dollar. For blockchains to have an accurate price feed on the US dollar, they need access to external data from reputable sources with this information. Chainlink developed a solution to prevent centralized points of failure by creating DONs which introduce multiple layers of decentralization.

This demand for connectivity to off-chain systems was the driving force behind the creation of Chainlink. At the foundation of Chainlink are **Decentralized Oracle Networks (DONs),**which are maintained by a Committee of Chainlink *oracles*. The purpose of DONs is to help extend and enrich the capabilities of smart contracts on any blockchain that has smart contract functionality. By providing resources such as networking, storage, and computation, DONs must do so in a manner that has strong confidentiality, integrity, and accountability, as well as available properties. The structural design of DONs allows them to be compatible with any blockchain that supports smart contracts.



https://coin98.net/what-is-yearn-finance-yfi

Conclusion

Zooming out beyond the immediate economic environment, the past decade blockchain technology has accelerated at an unprecedented rate. Since the creation of bitcoin in 2009, blockchain technology has evolved into a thriving ecosystem with millions of users across the globe participating daily.

In the past 2 years, there has been billions of funding from Venture Capitalist that has poured into blockchain start-ups. A more clear sign of promise is the amount of developer activity occurring on some of these blockchains. Web2 developers from YouTube, Facebook, Google, Apple, Amazon, etc. are leaving their jobs to go into Web3/Blockchain development.

All of these metrics point to a promising future despite the downturn in the economy lately. The best products are developed and released in rough times.

Disclosures: This document has been provided to you solely for information purposes and does not constitute an offer or solicitation of an offer or any advice or recommendation to purchase any securities or other financial instruments and may not be construed as such. The factual information set forth herein has been obtained or derived from sources believed by the author and IDX Insights, LLC ("IDX") to be reliable but it is not necessarily all–inclusive and is not guaranteed as to its accuracy and is not to be regarded as a representation or warranty, express or implied, as to the information's accuracy or completeness, nor should the attached information serve as the basis of any investment decision. This document is intended exclusively for the use of the person to whom it has been delivered by IDX, and it is not to be reproduced or redistributed to any other person. The information set forth herein has been provided to you as secondary information and should not be the primary source for any investment or allocation decision. Information contained herein has been obtained from sources believed to be reliable, but not guaranteed. Forward-looking statements are not guarantees of future results. They involve risks, uncertainties and assumptions, there can be no assurance that actual results will not differ materially from expectations. Past performance is no guarantee of future results. No part of this material may be reproduced in any form, or referred to in any other publication, without express written permission from IDX. The information contained herein is only as current as of the date indicated, and may be superseded by subsequent market events or for other reasons. Charts and graphs provided herein are for illustrative purposes only. The information in this document has been developed internally and/or obtained from sources believed to be reliable; however, neither IDX nor the author guarantees the accuracy, adequacy or completeness of such information. Nothing contained herein constitutes investment, legal, tax or other advice nor is it to be relied on in making an investment or other decision. There can be no assurance that an investment strategy will be successful. Historic market trends are not reliable indicators of actual future market behavior or future performance of any particular investment which may differ materially, and should not be relied upon as such. This document should not be viewed as a current or past recommendation or a solicitation of an offer to buy or sell any securities or to adopt any investment strategy. The investment strategy and themes discussed herein may be unsuitable for investors depending on their specific investment objectives and financial situation. IDX provide links to third-party websites contained herein only as a convenience and the inclusion of such links does not imply any endorsement, approval, investigation, verification or monitoring by us of any content or information contained within or accessible from the linked sites. If you choose to visit the linked sites you do so at your own risk, and you will be subject to such sites' terms of use and privacy policies, over which IDX.com has no control. In no event will IDX be responsible for any information or content within the linked sites or your use of the linked sites. Information contained on third-party websites that IDX may link to is not reviewed in its entirety for accuracy and IDX assumes no liability for the information contained on these websites. It is not possible to invest directly in an index. Exposure to an asset class represented by an index may be available through investable instruments derived from that index. IDX makes no representations regarding the advisability of investing in investment products based on the Index, which is not sponsored, endorsed, sold or promoted by IDX. Index returns do not reflect payment of certain sales charges or fees an investor may pay to purchase the securities underlying the Index or investment vehicles intended to track the performance of the Index. The imposition of these fees and charges would cause actual performance of the securities/vehicles to be lower than the Index performance shown. IDX gives no representations or warranties as to the accuracy of such information, and accepts no responsibility or liability (including for indirect, consequential or incidental damages) for any error, omission or inaccuracy in such information and for results obtained from its use. Information is as of the date indicated, and is subject to change without notice. This material is intended for informational purposes only and should not be construed as legal, accounting, tax, investment, or other professional advice.