Lecture 07 — Tokenized Assets: A closer look at DeFi, Tokenization, and NFTs

<u>Transcript</u>

The Internet is an integral part of our lives and constantly evolving. As we mentioned in our previous lecture, we can think of the Internet in three eras.

During the early days, we created basic websites and mostly static applications. Information became more accessible and distributed.

During the second phase, Web2, the Internet became more user-focused and interactive. Large companies emerged and helped people share content and data on social media. We even provided peer reviews. Most of today's Web2 experience relies heavily on a centralized architecture, big tech companies, and economic models driven by advertising.

We're starting to experience the third phase of what is referred to as Web3. A version of the Internet that promises more decentralization, equitable access, and more democratized economic models.

The launch of Bitcoin in 2009 kickstarted both blockchain technology and the ethos of Web3 innovation. The emergence of Ethereum in 2015 accelerated the concept by introducing the idea of decentralized applications and peer-to-peer markets for digital goods. Ethereum's innovation of smart contracts created a foundation for the development of a wide range of services including Decentralized Finance, Non-Fungible Tokens, Tokenization, Governance via Decentralized Autonomous Organizations, and even Blockchain Gaming.

We will explore some of these Web3 use cases in this video.

Decentralized Finance, otherwise known as DeFi.

Think of Web3 as using blockchain technology to create a more user-centric Internet; and DeFi as Web3's version of a more transparent, decentralized, and accessible financial system. Most DeFi platforms are decentralized applications built on Proof-of-Stake blockchain networks. Blockchains like Ethereum enable new solutions to access financial services and execute transactions without the help of intermediaries like a bank or a government.

For example, decentralized exchanges are peer-to-peer marketplaces that allow buyers and sellers to engage without a centralized authority, reducing friction and inefficiencies by deploying smart contracts to self-execute and transparently record transactions on the blockchain. These exchanges are non-custodial, meaning that no third party intermediates the trades between peers or controls the funds during the trading process. Other decentralized applications in DeFi allow for similar financial services like lending, borrowing, asset issuance, or even derivatives without relying on a traditional financial institution.

Never before were individuals able to access advanced financial products and services with nothing more than an Internet connection and a crypto wallet.

DeFi is based on public blockchain networks and allows anyone to participate.

Its infrastructure is decentralized, meaning it operates independently from centralized authorities.

The smart contracts are programmable and composable, meaning they can be custom tailored for specific purposes and multiple smart contracts can interact with each other. This allows for a wide range of applications to create sophisticated financial products that both mirror existing offerings and enable new ones not previously possible in the world of traditional finance.

And the underlying blockchain technology makes it immutable and cryptographically verifiable, which should make the financial system more secure and transparent.

What are some of the DeFi Drawbacks?

Despite DeFi's benefits, the technology is still in its infancy.

One of the primary risks in DeFi is smart contract vulnerability. Along with the immutability of smart contracts comes the risk that, if they are designed incorrectly, it may be difficult or impossible to fix software bugs, leading users to lose their funds unintentionally. This risk can be compounded by the transparent nature of smart contract code. While the transparency allows anyone to audit the code for their benefit, it also introduces hackers and scammers seeking to exploit these vulnerabilities in DeFi platforms.

DeFi protocols often involve the use of highly volatile crypto assets or stablecoins backed by fiat deposits. Users need to educate themselves on the multitude of risks these present. We discuss the volatility risks of crypto assets and the counterparty risks associated with stablecoins in other lectures.

Furthermore, there is currently a lack of discrete regulations and oversight governing DeFi. Many of these platforms operate across borders so it becomes difficult for regulators to define jurisdiction and establish rules. Know-Your-Customer and other regulatory requirements can make it difficult to establish rules and investor protection.

Blockchain technology enabled for the first time in history digital private property. Prior to Bitcoin, it was impossible for users to prevent the copying and reproducing of digital property. For example, if you create a document and send it to another person, you cannot prevent that user from replicating the document and sending it to a third party. Bitcoin solved this problem, known as the "*double spend*" problem in finance, and thus empowered the idea that individuals and organizations can prove ownership of digital assets, access them, and even monetize them.

Within the context of blockchain, Tokenization is the act of representing the value of a tangible or intangible asset into a digital asset. A token can represent a digital item like intellectual property, data, identification, authentication, voting rights, or even real-world assets, such as art, commodities, real estate, or financial assets such as stocks, bonds, or even currency.

The token's smart contract defines the asset reference, its unique properties, terms, and potential legal rights. Once tokenized, the asset's ownership record can be verified and seamlessly integrated into the digital ecosystem of blockchain networks or DeFi platforms. Depending on the type of asset, it may still be necessary to comply with all regulations applicable to the underlying asset. For example, a tokenized bond needs to comply with the same regulation as a normal bond as it is only another technological representation of the underlying asset.

Potential benefits of tokenized money and tokenized assets include faster, cheaper, transactions across the world, transparency and provability through a cryptographically verifiable blockchain, and finally, integration with the growing Decentralized Finance ecosystem and liquidity.

So, what does tokenization look like?

When we talk about tokenization, we usually refer to Tokenized Money and Tokenized Assets, as introduced during our first Introduction lecture.

As mentioned in the previous lecture, tokenizing money means representing fiat currencies as digital tokens on chain. Tokenized money comes in different forms, including stablecoins, central bank digital currencies, and tokenized deposits. The promised benefits of tokenizing money are higher efficiency and programmability, among others.

We can tokenize stocks, entire funds, bonds, or real-world assets such as commodities or real estate.

Security tokens embody a particular investment, such as a share in a company. Besides serving as a digital representation of the underlying asset or utility, security tokens can be programmed to represent a variety of characteristics and ownership rights.

Blockchain tokens can be designed with a range of features that are typically performed by lawyers, transfer agents, or brokerages. For example, a tokenized equity can be restricted such that it can only be transferred to specific people, under specific circumstances, or at specific times.

So, ware NFTs?

Tokens can be designed to be either fungible or non-fungible. Fungible tokens, like bitcoin, are interchangeable with all other units of the same denomination. Non-fungible tokens, NFTs, are created or minted to be cryptographically unique.

The simplest example of a fungible asset is a Dollar or a Euro bill – you can pay with any single Euro bill and a retailer will accept any of them at an equal face value. Original artwork, in contrast, is not fungible, because no two paintings are identical. NFTs are linked to a unique digital, and sometimes physical, asset or intellectual property, providing proof of ownership, and therefore cannot be directly replicated by another token. Every NFT token has a one-of-a-kind token-ID that no other token has.

Non-fungible tokens are usually not divisible, just as you cannot send someone part of your concert ticket or a share of a medical record. The information that makes an NFT unique is stored on the blockchain, although the actual underlying data, such as medical records, may be

stored off-chain, with the token's metadata referring to that record.

Non-fungible tokens and their smart contracts allow for detailed attributes to be added, like the identity of the owner, rich metadata, or secure file links. They can be used to prove the ownership of digital items, intellectual property, identification, or even ownership of physical assets.

NFTs are mostly known for their use case in connection with digital art, but the applications for NFTs extend way beyond just digital collectibles and art. Any value or digital property can be represented as an NFT.

NFT use cases include Digital Collectibles, Art, Gaming, Ticketing, Digital Identification, Music, Loyalty Programs, Medical Records, and more.

NFTs first became popularized and widely used on Ethereum but can also be created on other smart-contract-enabled blockchains. The ecosystem is expanding, with blockchains including Solana, Polygon, Tezos, BNB, Flow, TRON, and most other smart contract blockchains now supporting NFTs. A new technical development has even resulted in a large and growing NFT ecosystem built on Bitcoin.

In Summary:

Web3 uses blockchain technology with the goal to create a more equitable internet.

DeFi platforms enable users to access various decentralized applications providing access to financial activities without relying on traditional financial institutions.

Tokenization is the act of converting the value of a tangible or intangible asset into a digital token.

We can tokenize stocks, entire funds, bonds, and even commodities or real estate.

Non-fungible tokens, NFTs, are created to be cryptographically unique and provably scarce.

Given the programmable variety of characteristics and ownership rights, we have only scratched the surface of possibilities when it comes to tokenized money and tokenized assets.