Dapps and DAOs

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What is Decentralization?

In blockchain, decentralization refers to the transfer of control and decision-making from a centralized entity (individual, organization, or group thereof) to a distributed network. Decentralized networks strive to reduce the level of trust that participants must place in one another, and deter their ability to exert authority or control over one another in ways that degrade the functionality of the network.

Aspect	Centralized Systems	Decentralized Systems	Distributed Systems
Control & Authority	Controlled by a single entity or authority.	Distributed among multiple entities/units.	Shared among interconnected nodes or peers.
Decision-making	Made at the central point, top-down approach.	Partially distributed, some autonomy given.	Collaborative among interconnected nodes.
Data & Resources	Concentrated and managed centrally.	Spread across multiple locations or nodes.	Shared and replicated across multiple nodes.
Communication	Typically through the central authority.	Interconnected nodes may communicate.	Nodes communicate directly or indirectly.
Failure Resilience	Vulnerable to single point failures.	More resilient due to distributed nature.	Highly resilient due to redundancy & sharing.

Smart Contracts

A digital contract is similar to the contract in the physical world. A smart contract translates an agreement to computer code and runs on the blockchain. Simply put, it's some code written inside the blockchain. This code keeps track of terms of agreements and automates fulfillment. Smart contracts help the involved parties exchange money, property, shares, or anything else of value.

1. **dApps (DECENTRALIZED APPLICATIONS)**

The concept of decentralized apps is still in a nascent stage and as such, it is not easy to provide an all-encompassing answer to questions like, "what are dApps?". However, from what has been witnessed so far, it is possible to draw out a few of the leading characteristics of these applications.

But first things first – let us take a step back and understand the underlying technology behind dApps, which is blockchain. If you're familiar with how a blockchain works, you must be aware that it is a ledger of transaction records arranged in 'blocks' that are interlinked by cryptographic validation. Each such block is linked to its predecessor and successor and it is impossible to tamper with the data written into a block.

A specific blockchain involves digital storage of consensus between all the parties involved in the chain of transactions, with each transaction being preserved perpetually and visible to everyone in the loop. The critical thing to note here is that this ledger is distributed across multiple nodes and hence, it is neither stored in a centralized location nor managed by one entity.

Key Attributes of dApps:

- **Open Source:**

  Ideally, it must have an autonomous governing system, with all changes decided by the consensus of the majority of users. The code base of the dApp must be available for scrutiny.

- **Decentralized:**

  All operational records of a dApp must be stored on a public and decentralized ledger (blockchain) to ensure the control does not fall into a centralized authority.

- **Rewards:**

  Validators within the blockchain invest work (human effort, computing power and electricity) to verify transactions and add blocks to the chain. As such, it is necessary to incentivize them and the commonly accepted currency is cryptographic tokens.

- **Protocol:**

  The community around the decentralized app must agree on a cryptographic algorithm to demonstrate proof of value. For instance, both Bitcoin and Ethereum are currently using Proof of Work (PoW), with the latter also conducting research on a hybrid PoW/Proof of Stake (PoS).

  If the above traits are considered, then Bitcoin certainly deserves a round of applause for being the first decentralized app to be developed and implemented. If you need an introduction, Bitcoin is a self-sustaining public ledger that enables efficient transactions without intermediaries and a centralized control entity.

How does a dApp Differ from a Traditional App?

Decentralized applications are a significant shift from traditional apps, mainly because of the underlying principle of decentralization that drives the entire lifecycle. Trust and data immutability is another factor that differentiates the two. Unlike traditional apps that have a centralized controlling authority, dApps run on a decentralized blockchain and the data once written on the chain cannot be changed or erased. Therefore, at every stage of the dApp development lifecycle, you need to ensure that you apply the principles of the decentralized network.

Furthermore, in the case of traditional apps, one assumes that once the interface design is completed, the app will run faster since there is less dependency on third parties. On the other hand, when developing a decentralized app, one needs to design for trust and scalability.

Another major difference between the two is the rigor with which a dApp code needs to be tested before it is pushed to mainnet. Since a smart contract cannot be changed once it is launched, it is important to ensure that it is bug-free. This approach of ensuring certainty by maintaining caution is very different from the iterative "fail fast, learn faster" approach followed in the case of traditional app development.

What are the Key Advantages of dApps over Traditional Apps?

It is worth calling out some of the key advantages that these applications have over traditional applications, which are listed in the following section.

1. Being decentralized, these apps are tamperproof and the records inherent are unalterable. They are also highly secure and immutable from hacking, intrusions and any other potential sabotage.
2. It enables faster payment processing due to the absence of intermediate applications such as the integrated payment gateway for accepting funds.
3. It promotes greater anonymity as these applications do not require users to follow lengthy signup processes.
4. It provides reliable data records because users can access the public blockchain to verify transaction information.

Decentralized Autonomous Organization (DAO)?

A decentralized autonomous organization (DAO) is an entity with no central leadership. Decisions get made from the bottom-up, governed by a community organized around a specific set of rules enforced on a blockchain.

DAOs are internet-native organizations collectively owned and managed by their members. They have built-in treasuries that are only accessible with the approval of their members. Decisions are made via proposals the group votes on during a specified period.

A DAO works without hierarchical management and can have a large number of purposes. Freelancer networks where contracts pool their funds to pay for software subscriptions, charitable organizations where members approve donations and venture capital firms owned by a group are all possible with these organizations.

Before moving on, it's important to distinguish a DAO, an internet-native organization, from The DAO, one of the first such organizations ever created. The DAO was a project founded in 2016 that ultimately failed and led to a dramatic split of the Ethereum network.

How does a DAO work?

As mentioned above, a DAO is an organization where decisions get made from the bottom-up; a collective of members owns the organization. There are various ways to participate in a DAO, usually through the ownership of a token.

DAOs operate using smart contracts, which are essentially chunks of code that automatically execute whenever a set of criteria are met. Smart contracts are deployed on numerous blockchain nowadays, though Ethereum was the first to use them.

These smart contracts establish the DAO's rules. Those with a stake in a DAO then get voting rights and may influence how the organization operates by deciding on or creating new governance proposals.

This model prevents DAOs from being spammed with proposals: A proposal will only pass once the majority of stakeholders approve it. How that majority is determined varies from DAO to DAO and is specified in the smart contracts.

DAOs are fully autonomous and transparent. As they are built on open-source blockchain, anyone can view their code. Anyone can also audit their built-in treasuries, as the blockchain records all financial transactions.

Why do we need DAOs?

Being internet-native organizations, DAOs have several advantages over traditional organizations. One significant advantage of DAOs is the lack of trust needed between two parties. While a traditional organization requires a lot of trust in the people behind it — especially on behalf of investors — with DAOs, only the code needs to be trusted.

Trusting that code is easier to do as it's publicly available and can be extensively tested before launch. Every action a DAO takes after being launched has to be approved by the community and is completely transparent and verifiable.

Such an organization has no hierarchical structure. Yet, it can still accomplish tasks and grow while being controlled by stakeholders via its native token. The lack of a hierarchy means any stakeholder can put forward an innovative idea that the entire group will consider and improve upon. Internal disputes are often easily solved through the voting system, in line with the pre-written rules in the smart contract.

By allowing investors to pool funds, DAOs also give them a chance to invest in early-stage startups and decentralized projects while sharing the risk or any profits that may come out of them.

Disadvantages of DAOs

Decentralized autonomous organizations aren't perfect. They are an extremely new technology that has attracted much criticism due to lingering concerns regarding their legality, security and structure.

MIT Technology Review has, for example, revealed it considers it a bad idea to trust the masses with important financial decisions. While MIT shared its thoughts back in 2016, the organization appears to have never changed its mind on DAOs — at not least publicly. The DAO hack also raised security concerns, as flaws in smart contracts can be hard to fix even after they are spotted.

DAOs can be distributed across multiple jurisdictions, and there's no legal framework for them. Any legal issues that may arise will likely require those involved to deal with numerous regional laws in a complicated legal battle.

In July 2017, for example, the United States Securities and Exchange Commission issued a report in which it determined that The DAO sold securities in the form of tokens on the Ethereum blockchain without authorization, violating portions of securities law in the country.

Examples of DAOs

Decentralized autonomous organizations have gained traction over the last few years and are now fully incorporated into many blockchain projects. The decentralized finance (DeFi) space uses DAOs to allow applications to become fully decentralized, for example.

To some, the Bitcoin (BTC) network is the earliest example of a DAO there is. The network scales via community agreement, even though most network participants have never met each other. It also does not have an organized governance mechanism, and instead, miners and nodes have to signal support.

However, Bitcoin is not seen as a DAO by today's standards. By current measures, Dash would be the first true DAO, as the project has a governance mechanism that allows stakeholders to vote on the use of its treasury.

Other, more advanced DAOs, including decentralized networks built on top of the Ethereum blockchain, are responsible for launching cryptocurrency-backed stable coins. In some cases, the organizations that initially launched these DAOs slowly give away control of the project to one day become irrelevant. Token holders can actively vote on governance proposals to hire new contributors, add new tokens as collateral for their coins or adjust other parameters.

In 2020, a DeFi lending protocol launched its own governance token and distributed it through a liquidity mining process. Essentially, anyone who interacted with the protocol would receive tokens as a reward. Other projects have since replicated and adapted the model.

Now, the list of DAOs is extensive. Over time, it has become a clear concept that has been gaining traction. Some projects are still looking to achieve complete decentralization through the DAO model, but it's worth pointing out they are only a few years old and have yet to achieve their final goals and objectives.

As internet-native organizations, DAOs have the potential to change the way corporate governance works completely. While the concept matures and the legal gray area they operate in is cleared, more and more organizations may adopt a DAO model to help govern some of their activities.