# Decentralized Autonomous Organizations

**A Project Work Report**

*Submitted in the partial fulfilment for the award of the degree of*

**BACHELOR OF ENGINEERING**

**IN**

**INTERNET OF THINGS**


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# Abstract

Decentralized autonomous organizations (DAOs) have gained significant prominence in recent years, redefining traditional organizational structures and harnessing the power of blockchain technology. This article provides a comprehensive exploration of the operating principles of DAOs, the limitations and challenges they present, especially regarding autonomous decision-making and reliance on smart contracts.

It is a revolutionary type of establishment that leverages blockchain-based technology as its underlying infrastructure. They operate on the principle of decentralization, which means they are not controlled by a single entity or individual but are managed collectively by their members. Blockchain technology, with its inherent transparency and immutability, serves as the foundation on which DAOs are built, ensuring the integrity of their operations.

Using smart contract technology is one of the key components that makes DAOs work. When certain conditions are met, these contracts that self-execute automatically carry out predefined tasks. Smart contracts are the digital glue that binds DAOs together, facilitating decision-making, fund management, and more without the need for intermediaries. Despite its potential, DAOs also have limitations and challenges.

Security breaches can have dire consequences, as several high-profile DAO hacks have shown. Ensuring the security and robustness of smart contracts is a primary concern. Additionally, DAOs may face legal and regulatory challenges in various jurisdictions, as they often operate in a legal grey zone. The potential for mob behaviour among DAO members and the challenge of making collective ethical decisions also pose significant obstacles.

One of the most attractive aspects of DAOs is their autonomous decision-making capabilities. Through smart contracts and a token-based governance

system, DAO members can collectively decide on a variety of issues, such as resource allocation, project proposals, and protocol upgrades. This autonomous decision-making fosters a sense of community ownership and eliminates the need for centralized authorities. However, it also requires a well-thought-out structure and governance mechanism to prevent manipulation or collusion. DAOs rely heavily on smart contracts to perform operations without intermediaries. While this eliminates the risk of human error and reduces costs, it also places enormous responsibility on the quality and security of the smart contracts themselves.

Code vulnerabilities, bugs, and unforeseen interactions can lead to significant financial losses or even dissolution of the DAO. To reduce these risks, smart contracts must undergo extensive testing and auditing.

DAOs offer several benefits, such as increased accountability, improved productivity, and greater accessibility. The transparency of blockchain technology ensures that all actions within the DAO are recorded and verified, promoting trust and accountability. Additionally, DAOs have the potential to attract more participants, eliminate geographical barriers, and reduce the need for intermediaries, thereby democratizing decision-making.

This research contributes to a better-informed discussion about the future of decentralized governance and autonomous collaboration. By providing an overview of the technological underpinnings, benefits, and ethical concerns surrounding DAOs, it promotes a more complete understanding of their potential impact on other industries. each other and the global community.

As DAOs continue to evolve, the challenges they face will require innovative solutions, and their benefits will shape the future of organizational structures and decision-making processes.

**Keywords**: Decentralized Autonomous Organization, blockchain, MetaMask, economy, Ethereum, localhost, hardhat, web3, node.js.

## 1. Introduction

## 1.1 Problem Definition

In today's centralized and conventional decision-making processes, organizations often face a number of critical issues that degrade their efficiency and reliability. Centralization leads to lack of transparency, lack of public ownership and manual administrative procedures. These problems lead to inconsistency, hinder integration, and make it difficult to maintain openness and trust in modern organizational environments.

One of the main consequences of centralized decision making is that organizations can operate slowly. Hierarchical structures and reliance on a select few decision makers can lead to bottlenecks and a lack of flexibility to respond to rapidly changing environments. Additionally, a lack of public ownership means stakeholders and employees often feel disconnected from the decision-making process, which can lead to low morale and lack of engagement.

Additionally, manual administrative procedures in centralized systems are error-prone, time-consuming, and can lead to inefficiencies. These processes often involve many different intermediaries, increasing the risk of miscommunication and mismanagement.

The solution to these problems lies in adopting decentralized decision-making, promoting community ownership, and automating organizational procedures while ensuring security and compliance. One excellent illustration of this paradigm change is DAOs. They facilitate collective decision-making, ensuring that all stakeholders have a voice on important issues. Smart contracts automate various aspects of the organization, reducing the need for intermediaries and manual oversight.

The main goal of this initiative is to advance this growing technology to make it more accessible and applicable globally. By further enhancing decentralized decision-making and community ownership, this innovation has the power to completely transform the way organizations operate.

It can build inclusiveness, transparency and trust, making it easier for organizations to adapt to changing circumstances while maintaining their integrity. With this initiative, organizational frameworks around the world will hopefully have a more trustworthy, nimble, and collaborative future.

## 1.2 Problem overview

In a rapidly evolving digital landscape and ever-changing business models, the inadequacies of traditional organizational structures are becoming increasingly apparent. Conventional systems characterized by centralized control, opacity, and inefficiency are struggling to meet the demands of a globalized and interconnected world. As technology advances and information becomes more decentralized, organizations are looking for creative solutions to address these limitations.

One such solution is to explore decentralized autonomous organizations (DAOs), which represent a paradigm shift in organizations' operations. DAOs leverage emerging technologies like blockchain to deliver on the promise of decentralization and autonomy. Unlike traditional centralized structures, DAOs distribute decision-making authority among members, creating a more democratic and transparent environment. This decentralization can help overcome some of the key challenges that conventional organizations face.

However, DAO adoption is not without its challenges. This research paper is dedicated to exploring these challenges in-depth, focusing on the central role of smart contracts in DAO operations. Self-executing digital contracts known as "smart contracts" facilitate a number of DAO processes, including voting, resource distribution, and fund management. Understanding the complexities and potential vulnerabilities of smart contracts is critical to ensuring the success of DAOs.

By studying these challenges and the practical applications of smart contracts, this article aims to highlight the transformative power of DAOs. They have the potential to reshape organizational structures and interactions, making them more flexible, transparent, and inclusive. DAOs present an opportunity to lessen the number of people holding all the power and empower a broader community of stakeholders.

This research not only aims to explore the potential benefits but also provides insight into how these new organizational structures can overcome obstacles and pitfalls in their journey to redefine the way we work and collaborate in the digital age.

## 1.3 Software Specifications

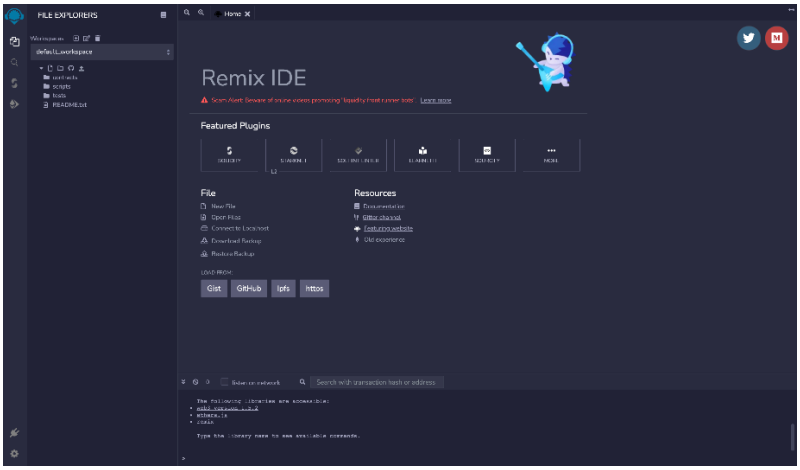
1. Gitpod: For application developers, Gitpod is a cloud-based integrated development environment (IDE). It provides a convenient way to create, test, and code software projects entirely through a web-based browser. Gitpod offers a collaborative and efficient development environment where developers can collaborate on code, work on projects from different

devices, and easily set up their development environments.


https://i.ytimg.com/vi/D-TVrtWjL5M/maxresdefault.jpg

With features like pre-configured development environments, instant code sharing, and integration with version control systems like Git, Gitpod simplifies the development workflow and makes it easier for developers to work on projects in a flexible and distributed manner.

2. Remix IDE: A potent collection of resources and tools for developing, implementing, testing, and assessing smart contract applications is Remix IDE. These smart contracts are designed to be interoperable with Ethereum and its associated technology, the Ethereum Virtual Machine (EVM).




Remix IDE is especially useful for blockchain developers who are working on decentralized applications (dApps) and need a comprehensive environment for writing and testing their smart contracts. It offers features like integrated debugging, code analysis, and a user-friendly interface to streamline the development process.

3. MetaMask Wallet: MetaMask is both a mobile application and a web-based browser plugin that serves as a digital wallet for managing Ethereum and other cryptocurrencies. It allows

users to control their Ethereum wallet's private keys remotely, providing a convenient and a safe way to transact on the distributed ledger Ethereum and engage with decentralized software. programs (dApps).


https://bitcoinik.com/wp-content/uploads/2020/10/metamask.png

Serving as a conduit between the Ethereum blockchain and your web browser, MetaMask streamlines the process of accessing and utilizing dApps. Users can manage their digital assets, initiate transactions, and interact with decentralized platforms without the need for a separate wallet application.

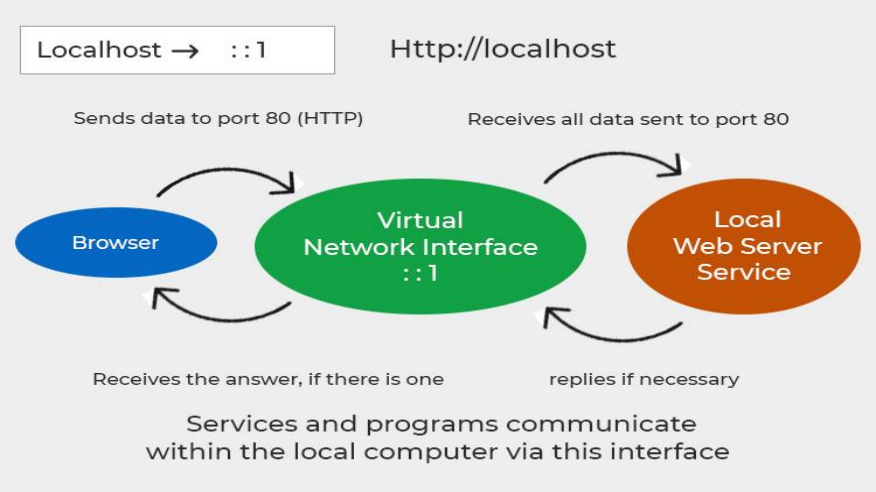
4.Hardhat configuration: Hardhat is a development framework designed for creating blockchain applications and smart contracts, especially on the Ethereum network. It includes various components and tools that help modify, compile, debug, and deploy decentralized applications (dApps) and smart contracts.


“https://www.freecodecamp.org/news/content/images/size/w1000/2021/05/image-1.png”

Hardhat streamlines the development process by providing a comprehensive development platform for Ethereum-based projects. Developers can write, test, and deploy their smart contracts using Hardhat's built-in functionalities, which include automated testing, debugging, and a range of plugins to extend its capabilities.

5. Localhost: In the context of software development, "localhost" refers to the address of a host or system that is being used to execute a program or serve as a virtual server for local development and testing purposes. When a developer is working on a project, they can run the

project's code on their local machine, and it is typically accessible through the "localhost" address.




"https://www.temok.com/blog/wp-content/uploads/2020/11/005.jpg"

This allows developers to test and debug their applications in an isolated environment before deploying them to a production server or a live environment. It's a valuable tool for ensuring that the software behaves as expected during development and troubleshooting any issues.

## 2. Literature Survey

### 2.1 Existing system

- Blockchain and DAO Taxonomy: The article you are referring to focuses on developing a comprehensive taxonomy that categorizes various questions and research related to blockchain and decentralized autonomous organizations (KNIFE). This taxonomy aims to classify common challenges, such as security vulnerabilities, attacks, and risks associated with blockchain technology and DAOs.

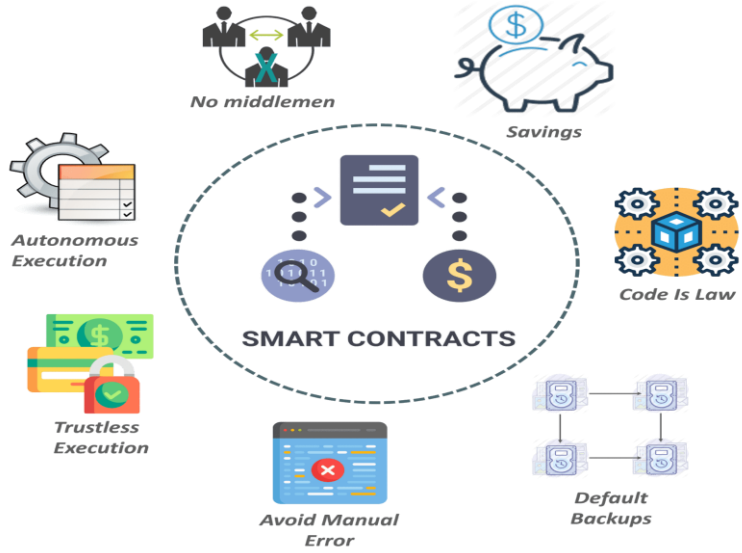
  Additionally, it explores counter-trends, governance issues in DAOs, and the evolving discourse around these topics. The article may aim to provide a structured framework for researchers and practitioners to understand and navigate the complex landscape of blockchain and DAOs [3].

- Empirical review of the major DAO frameworks: This article takes a closer look at some of the major DAO frameworks, specifically Aragon, DaoStack, and DAOhaus. It looks at these frameworks concerning funding models, voting procedures, activity levels, and growth.

The main goal is to be able to contribute data and empirical analysis to the growing body of research on DAOs. Understanding how these frameworks work and evolve can provide valuable insights for those interested in the practical aspects of decentralized governance and organization [4].

- Legislation and Legal Identities for DAOs: This piece of writing explores the legal and regulatory aspects of DAOs. It delves into the question of whether existing legislation should be amended to accommodate DAOs and if they should be granted independent legal identities and limited liability, similar to the way token holders are protected.

  Research on the legal and regulatory framework surrounding blockchain technology and decentralized autonomous organizations (DAOs) is essential because it affects how these technologies function and are embraced by the general public [5].

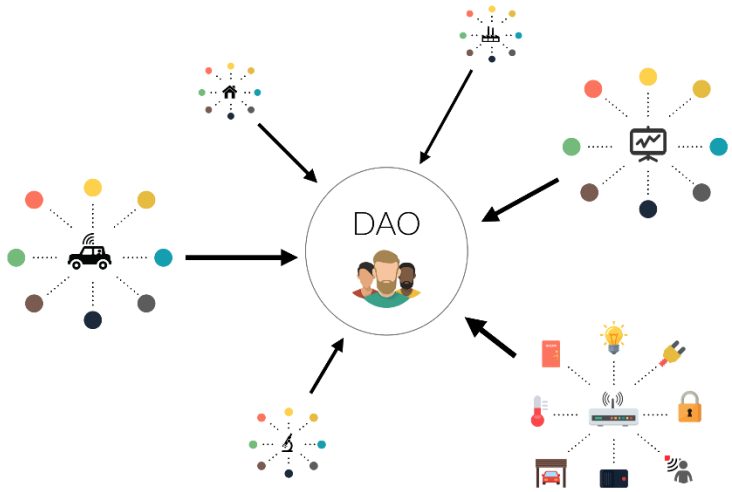



"https://1.bp.blogspot.com/-6Ck131EvlAc/XqAqRbeOvtI/AAAAAAAABts/UvhNMVnnqfMX0Joboax8UhjPwrG_QJLUgCNcBGAsYHQ/s1600/Smart-contract-capability-smart-contract-edureka.png"

- Smart Contracts for Automation: The study discusses the practical applications of smart contracts, particularly in the context of automating cryptocurrency payments and replacing manual labour with artificial intelligence (AI).

  It may also explore how online platforms can facilitate communication between individuals and AI systems. The focus here is on how blockchain and smart contracts can streamline processes and reduce human intervention in various economic and operational aspects [8].

- DAOs in Web-Based Government: This research can provide a concrete example of how decentralized autonomous organizations are used in web-based government systems. It evaluates the effectiveness of using DAOs for governance, potentially highlighting the benefits and challenges of such a decentralized approach in public administration and decision-making [9].




"https://blockchainhub.net/wp-content/uploads/2016/08/mother.png"

- Smart Legal Contract Markup Language (SLCML): The notion of Smart Legal Contract Markup Language (SLCML) is presented in this article. SLCML is proposed as a means of creating legally binding DAOs.

  It aims to bridge the gap between legal structures, business and blockchain technology by providing a standardized language for creating legally compliant smart contracts. This innovation addresses a critical need in DAO development, which often requires a regulatory framework to operate effectively [10].

- Smart Contract Configuration Process: This article provides a detailed review of the process involved in configuring smart contracts. It can explore the steps required to create, deploy, and manage smart contracts on different blockchain platforms. This information is important for developers and businesses looking to leverage smart contracts in their applications because it helps them understand the technical aspects of implementation [16].

## 2.2 Proposed System

In order to compare traditional centralized autonomous organizations and decentralized autonomous organizations, the proposed research article will look at the conceptual properties of various concepts, working models, challenges, and future trends.

Additionally, the study will examine the activity and operational statistics required for the successful management of DAOs. Here we will expand on the components of the Dapp (decentralized application) system mentioned in the context of the research paper.

**Smart Contract**: A smart agreement is a programmable, autonomous agreement that automatically carries out its conditions of service without the need for a middleman. In the context of research, smart contracts play an important role in both traditional centralized autonomous organizations and decentralized autonomous organizations. They facilitate various activities such as digital transactions, connecting to wallets like MetaMask, and managing processes such as withdrawing and depositing ether.

**Hardhat Localhost Network**: Hardhat Localhost Network is a local development network used for testing and developing decentralized applications. It ensures user privacy and consent at the local level. Using the localhost network for development is important because it allows developers to work in an isolated environment. This ensures that the Dapp functions properly before deploying it on the live blockchain. Ethereum, as a mature blockchain platform, is chosen for its strong support of smart contracts.

**User Interface**: It is the visual aspect of Dapp which allows users to interact with it. It provides an intuitive and user-friendly experience. The user interface is essential for user engagement and interaction with the Dapp.

Users can perform actions such as opening and closing contracts, checking their wallet address, and depositing or withdrawing ether through this interface. Intuitive and responsive user interfaces are crucial to Dapp's success as it improves user experience and encourage adoption.

## 2.3 Literature Review summary

| **Year and Citation** | **Article/ Author** | **Tools/ Software** | **Technique** | **Source** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| October 2019, pp. 870-878, vol: 6, issue: 5, doi: 10.1109/TCSS.2019.2938190 . | Fei-Yue Wang, Yong Yuan, Liwei Ouyang, Juanjuan Li, Shuai Wang, and Wenwen Ding | Blockchain, artificial intelligence, Swarm Intelligence, and Aragon Network Token. | It contains a five-layer architecture-based justification supporting DAO. | IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS |
| August 2020, DOI:10.1145/3412569.3412579 | Youssef El Faqir, Javier Arroyo, Samer Hassan. | Genesis Alpha, Aragon Connect, Moloch Dao, Genesis DAO, and Visualisation | In order to show the prospect of DAO, it develops a free software application that visualizes its activities. | OpenSym 2020: 16th International Symposium on Open Collaboration |
| 2021, vol. 2, pp. 204-215, 2021, doi: 10.1109/OJCS.2021.3072661 . | Zibin Zheng, Huawei Huang, Sicong Zhou, and Lu Liu | Smart contracting, distributed ledger technology, DaoStack, blockchain, and fault-tolerant systems | It addresses the frequent concerns with blockchain innovation that are linked to it, such as the counter-trend concerns and numerous bitcoin assaults. | “IEEE Open Journal of the Computer Society” |

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|---|---|---|---|---|
| “01 October 2021, doi: 10.1186/s13174-021-00139-6, pp 2-20” | Javier Arroyo, Samer Hassan, and Youssef Faqir-Rhazoui | Blockchain, xDai, GraphQL Language, Quantitative Research, DaoStack, and the Ethereum Mainnet. | It examines each of the three primary frameworks (Aragon, DaoStack, and DAOhaus) used today for rendering it easier to create and operate DAOs. | “Journal of Internet Services and Applications ” |
| November 1, 2019, pp 423-458, | Alexandra Sims | Smart contracting, decentralized administration, tokenization, airdrops, forking, and distributed ledger systems. | It demonstrates how organizational frameworks have changed, and DAOs are only the latest iteration. | Social Science Research Network |
| March 6, 2021 | Wulf A. Kaal | Decentralized accounting, token models, reputation staking, sock puppet acts of violence, inadequate | It investigates the key components of a potential DAO's architecture, its capacity to widen the DAO ecosystem, | Social Science Research Network |

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| | | economic approach, and assault resilience. | and its potential applications in both the private and public sectors. | |
| Volume-17, Issue-1, July 2023, Pages 18–25, ISSN: 2455-3956 | Romex K Jha | Integrity, Token dissemination, Meta Cartel, Decentralised accountability, and decision-making. | It intends to make creative suggestions for improving the efficiency of DAO procedures for making decisions, providing them with the resources they must conquer challenges and realize their transformational ability within the decentralized ecology. | World Journal of Research and Review |
| doi: 10.1109/ISCON47742.2019.9036152. 2019, pp. 667–671. | Shelly Sachdeva, Anjani Raj Yadlapalli, Vijayant Pawar, and Ninad Mohite | AI, auxiliary conditional GAN, centralized physical structures | Its goal is to build a fully autonomous, decentralised organisation | The Fourth International Conference on Computer Networks |

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| | | Google collaboration, Google cloud. | that does not require outside assistance to function. | and Information Systems (ISCON 2019) |
| April2018, DOI:10.1109/ICEDEG.2018.8372356 | Weidong Shi, Nour Diallo, Abraham Bez Surez, Glenn Turner, Lin Chen, Yang Lu, Zhimin Gao, Nolan Shah, Larry Carranco, Ton-Chanh Le, and Lin Chen | Ethereum, Remix | The paper addresses ways to enhance digital government systems using the blockchain and a decentralized autonomous organization (DAO). It refers to the use of encryption methods, consensus protocols, and smart contracts for securing and automating various government procedures. | 2018 International Conference on e-democracy & eGovernment (ICEDEG) |
| May 2021, DOI:10.1109/ACCESS.2021.3081926 | ALEX NORTA, ALEXANDER WULF, BENJAMIN LEIDING, SANDEEP SAXENA, | Strength and Intelligence in Legal Contract Markup | The aim of the research is to discuss the difficulties | IEEE Access |

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| | CHIBUZOR UDOKWU, AND VIMAL DWIVEDI | Language (SLCML) | in creating smart contracts for intricate cooperation like DAOs that appropriately reflect legal and commercial logic. The study intends to simplify the creation of legally enforceable smart contracts for intricate cooperation like DAOs by proposing the SLCML. | |
| DOI: 10.1016/j.techfore.2022.121806, September 2022 | Laura Albareda and Carlos Santana | SPSS, web of science database | The main tenets of DAOs—decentralized, automated, and autonomous organizations—are covered in the paper. The importance | Technological Forecasting and Social Change |

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| | | | of smart contracts, blockchain technology, and task automation as essential elements of DAOs is underlined. | |
| DOI: 10.14763/2021.2.1556, April 2021 | Primavera De Filippi and Samer Hassan | Aragon, DaoStack | The history of Decentralized Autonomous Organizations (DAOs) and how they relate to blockchain technology are both covered in the paper. | Internet Policy Review |
| DOI: 10.1186/s41469-018-0038-1, June 2018. | Ying Hsieh, Jean-Philippe Vergne, Philip Anderson 3 , Karim Lakhani 4 and Markus Reitzig 5 Philip Anderson 3 , Karim Lakhani 4 and Markus Reitzig 5 | Blockchain, Cryptocurrency, fsQCA, formal software protocols | The term "decentralized autonomous organizations" (DAOs), which is proposed in the research paper to describe the novel organizational forms | Journal of Organization Design |

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| | Ying-Ying Hsieh 1* , Jean-Philippe Vergne 2 , Philip Anderson 3 , Karim Lakhani 4 and Markus Reitzig Ying-Ying Hsieh, Karim Lakhani, Markus Reitzig, Philip Anderson, Jean-Philippe Vergne, and Philip Anderson | | made possible by blockchain technology, is explored along with the organizational structure and characteristics of Bitcoin. | |
| April 2023, DO10.48550/arXiv.2304.09822 | Yang Wang, Tanusree Sharma, Dawn Song, Andrew Miller, Yujin Kwon, Kornrapat Pongmala, Henry Wang, and Yang Wang | Etherscan, Aragon | The results of this study shed light on the complex interactions among decentralization, autonomy, and proposal execution, providing useful knowledge for creating and improving DAO structures to fulfil their intended purposes. | Computer Science ArXiv |

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| June 2023, vol. 33(1), pages 1-14 vol. 33(1), pages 1-14ol. 33(1), pages 1-14<br>DOI: 10.1007/s12525-023-00659-y | Nils Augustin, Alexander Willem de Jong, and Andreas Eckhardt | Zotero, SPSS | In order to highlight parallels and differences in their organizational structures, governance, and underlying beliefs, the study presents a first comparison between DAOs and open-source software (OSS) communities. | Electronic Markets |
| September,2021<br>VL - 14<br>DOI -10.1007/s12083-021-01127-0 | Anoud Bani-Hani, Elhadj Benkhelifa, Chirine Ghedira-Guegan, Faiza Loukil, and Shafaq Naheed Khan | Solidity, Fabasoft Contracts | This paper provides a comprehensive analysis of blockchain-enabled smart contracts, their challenges, and possible solutions across several application domains. It | Peer-to-Peer Networking and Applications |

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| | | | highlights the importance of contract management software and Layer 2 protocols as new developments in the development of smart contracts. | |

## Related Literature Tools and Technologies

**[1] "Decentralized Autonomous Organizations: Concept, Model, and Applications**

**Shuai Wang, Wenwen Ding, Juanjuan Li, Yong Yuan, Liwei Ouyang, and Fei-Yue Wang"**

Blockchain:

**Definition**: Distributed ledger technology, or blockchain, securely and irreversibly logs transactions. It is made up of a series of blocks, with a list of transactions contained in each block.

**Application**: Blockchain has applications in many different industries, including finance (cryptocurrencies like Bitcoin), supply chain management, healthcare (patient record security), and voting systems (safe and transparent elections).


"https://www.qsstechnosoft.com/wp-content/uploads/2018/12/blochchain-1.jpg"

Artificial Intelligence (AI):

**Definition**: Artificial intelligence (AI) is the simulation of human intelligence in machines that can carry out tasks like speech recognition, visual perception, language understanding, and decision-making that typically require human intelligence.

With time, artificial intelligence (AI) systems can perform better by learning from data and experiences. Within artificial intelligence, machine learning is a subfield that focuses on teaching computers to recognize patterns and make judgments without explicit programming.

**Applications**: Artificial Intelligence (AI) finds widespread application in fields such as robotics, computer vision, machine learning, natural language processing (NLP), and data analytics. Other uses for it include recommendation engines, driverless cars, and virtual assistants.

"https://crystalclearcomms.com/wp-content/uploads/2019/09/AI-and-woman.jpg"

Swarm Intelligence:

**Definition**: The collective behavior of social insects like ants and bees served as the model for the concept of swarm intelligence. It involves self-organizing, decentralized systems in which individual agents (or entities) interact and collaborate to achieve a common goal.

Decentralized, self-organized systems that display swarm intelligence display coordinated activity that is modelled after the social insect colonies. A swarm's ability to solve complicated problems or complete tasks through local interactions and basic rules is an example of emergent intelligence that goes beyond the capabilities of individual parts.

**Applications**: Swarm Intelligence has applications in optimization problems, robotics, traffic management, and even financial markets. It mimics the behavior of swarms of organisms to find efficient solutions to complicated problems.

Aragon Network Token (ANT):

**Definition:** Decentralized autonomous organizations (DAOs) can be created and managed with the help of the blockchain-based Aragon platform. The Aragon network's native cryptocurrency is called ANT.

**Applications**: ANT tokens are used for governance and decision-making in the Aragon Network. They give token owners the ability to suggest and cast votes on decisions or changes pertaining to how the network is run.

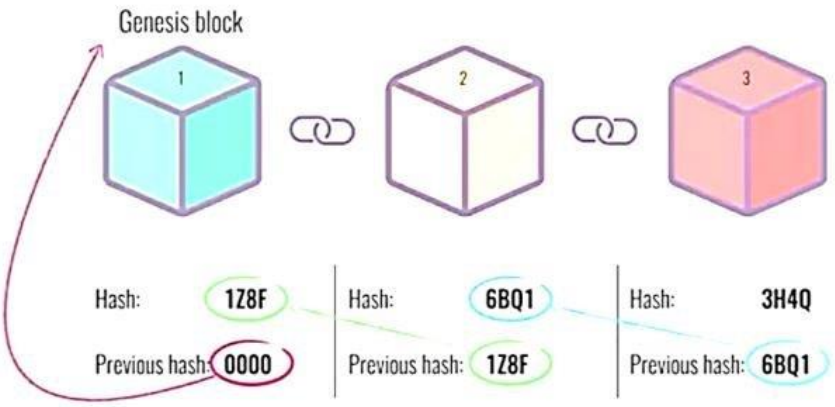
Aragon makes it easy to create DAOs for a variety of purposes, such as governance, project management, and community organizing.

[2] **"An overview of decentralized autonomous organizations on the blockchain**

**Youssef El Faqir, Javier Arroyo, and Samer Hassan"**

Genesis Alpha:

**Definition**: Genesis Alpha typically refers to the initial phase or launch of a blockchain project, where the network and its native cryptocurrency are introduced. This signifies the beginning of a blockchain's existence.




https://www.researchgate.net/profile/Karthika-Rn/publication/345351195/figure/download/fig1/AS:954706994135040@1604631293031/Genesis-Block-V-BLOCKCHAIN-FEATURES.jpg

**How to use:** Any blockchain project should start with Genesis Alpha since it establishes the groundwork for future expansion and development.

Aragon Connect:

**Definition**: Aragon Connect is a set of open-source smart contracts and tools that enable developers to create and integrate services within the Aragon Network. It simplifies the process of creating decentralized applications (Dapps) on the Aragon platform.

Aragon Connect is a state-of-the-art platform that transforms communication and teamwork. Aragon Connects robust features and user-friendly UI enable users to easily communicate with partners, clients, and coworkers from anywhere in the globe. Aragon Connect enables teams to collaborate productively and successfully by facilitating virtual meetings, document sharing, and real-time idea generation. Users can feel secure knowing that sensitive data is safeguarded by the platform's cutting-edge security safeguards. Aragon Connect is the way of the future for collaboration; it will let us connect and collaborate more effectively by overcoming geographical and temporal barriers.

**How to use:** Aragon Connect facilitates the development of decentralized applications and organizations by providing a standardized and scalable framework for building on the Aragon Platform.

Moloch Dao:

**Definition:** Moloch DAO is an Ethereum-based decentralized autonomous organization that aims to fund Ethereum development projects. It allows members to collectively decide on funding proposals and capital allocation to improve the Ethereum ecosystem.

Moloch DAO is a decentralized autonomous organization (DAO) dedicated to supporting initiatives that enhance the Ethereum ecosystem and vital digital public goods. It has a

straightforward architecture with one smart contract per DAO and runs on the Ethereum mainnet. Weighted voting, a fundamental component of Moloch DAO, enables different governance weights for participants in the Ethereum ecosystem, offering an advantage over multisets that give each participant a single vote. Permissioned membership, which allows current members to vote on the admission of new members, is another noteworthy feature. Moloch DAO has received a lot of attention and support from well-known members of the Ethereum community and has been successful in promoting DAO experiments.

**How to use**: Moloch DAO demonstrates the potential of DAOs in community funding and governance, especially in the context of blockchain and cryptocurrency development.

Genesis DAO:

**Definition:** Genesis DAO is a specific DAO created by the decentralized prediction market platform Augur. It is designed to manage platform development and governance decisions.

Genesis The goal of DAO, or decentralized autonomous organization, is to encourage creativity and teamwork among blockchain enthusiasts. It runs on the Ethereum blockchain and was developed as a component of the wider DAOstack ecosystem.

As a funding method, the Genesis DAO enables people to submit project ideas and get community support for them. Token holders can cast their votes on proposals according to their ownership in the DAO in a decentralized voting process that determines funding decisions. This guarantees a transparent and equitable distribution of resources.

The reputation system of Genesis DAO is one of its main characteristics. Reputation tokens are awarded to participants in proportion to their contributions to the community, which include successful project proposals and execution.

**How to use:** The Genesis DAO is an example of how a DAO can be deployed to facilitate decentralized decision-making and capital allocation within a specific project or organization.

Visualization:

**Definition:** Visualization refers to the presentation of data or information using graphics or images. It is a technique that makes complex data easier to understand and understand.

**How to use:** Visualization is widely used in a variety of fields, including data analysis, scientific research, and business to help individuals better understand data, identify samples, and communicate insights effectively.

In the context of blockchain and DAOs, visualizations can be used to represent data about transactions, network activities, or governance decisions to facilitate analysis and decision-making.

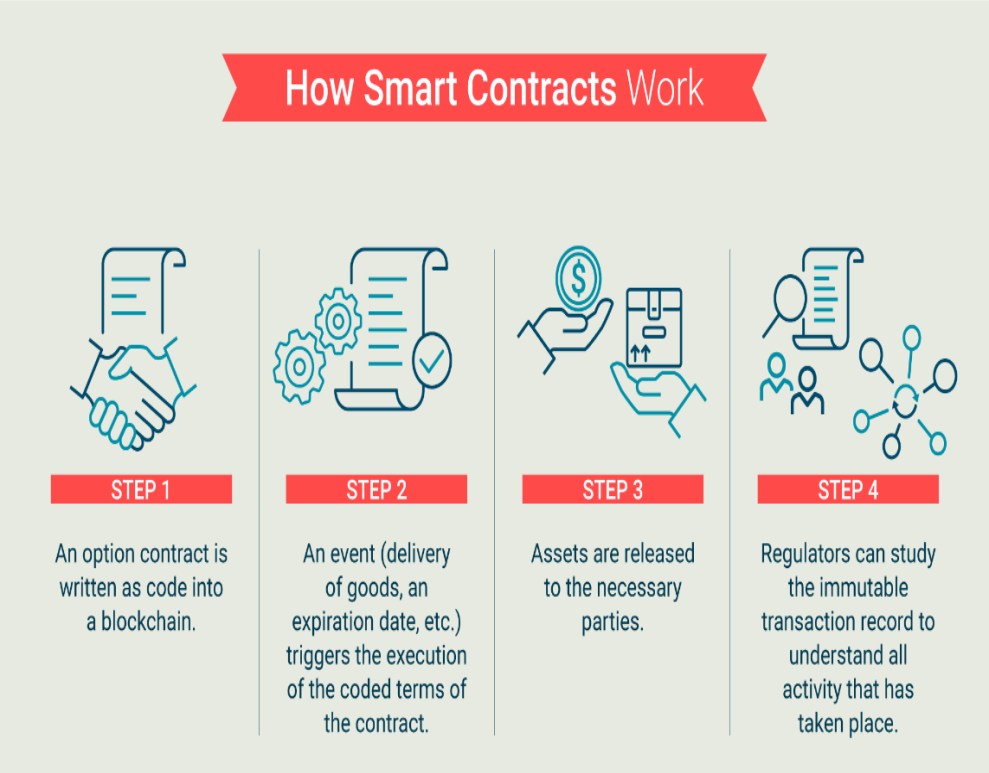
[3] **“From Technology to Society: An Overview of Blockchain-based DAO**

**Lu Liu, Sicong Zhou, Huawei Huang, Zibin Zheng”**

Smart Contract:

**Definition**: A self-executing digital contract known as a "smart contract" is one in which the terms of the parties' agreement are expressed explicitly in code. These contracts apply and execute automatically when pre-defined conditions are met.

A smart contract is a self-executing agreement that has its terms encoded directly into the code. It is installed on a blockchain platform, like Ethereum, and when certain criteria are satisfied, it takes automatic action. Among the many benefits of smart contracts are their immutability, precision, and efficiency. They remove human error, expedite contract execution, and once installed, they cannot be changed. Smart contracts can have certain drawbacks, too, such their permanence and the need for the programmer to make sure the code complies with the contract's requirements. Smart contracts can be used for a variety of purposes, from straightforward customer-business interactions to more intricate uses like online dispute settlement and insurance.



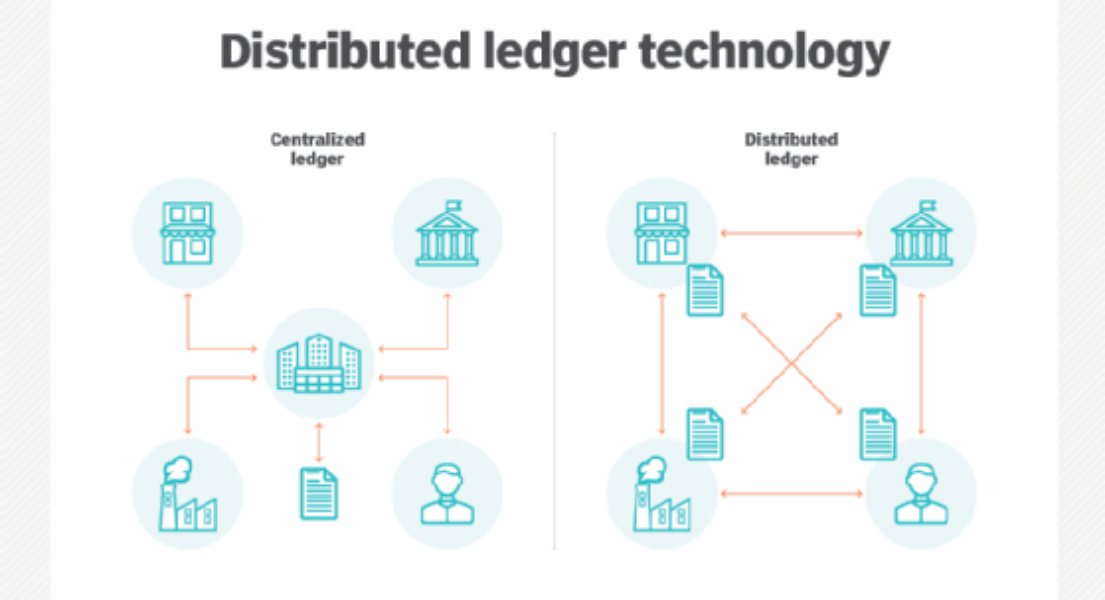

“https://learn.g2.com/hs-fs/hubfs/Smart%20Contracts.png?width=2115&name=Smart%20Contracts.png”

**Usage**: Smart contracts are widely used in blockchain platforms such as Ethereum for a variety of applications, such as decentralized finance (DeFi), supply chain management, and tokenization, Allows automatic and trust less transactions.

Distributed Ledger Technology:

**Definition**: It is a decentralized system for recording and verifying transactions across multiple nodes or participants in a network. It ensures data consistency and immutability thanks to a distributed and consensus approach.

A decentralized database architecture called distributed ledger technology (DLT) makes it possible to maintain transparent and safe records on a network of computers. DLT disperses data and processing among network users, improving trust, security, and resilience in contrast to traditional centralized systems. As a kind of DLT, blockchain arranges data into historical blocks that are connected by cryptographic hashes to guarantee transparency and immutability. DLT frequently uses smart contracts, which are self-executing contracts with established rules, to automate complicated transactions. DLT promotes efficiency and lessens the need for middlemen in a number of industries, including finance, supply chains, and healthcare. Its decentralized structure reduces the number of single points of failure and creates a basis for digital interactions that is resistant to tampering and driven by consensus.




"https://cdn.ttgtmedia.com/rms/onlineimages/cio-distributed__vs_central_ledger-f_mobile.png"

**Uses**: Distributed ledger technology (DLT) forms the basis of blockchain technology and finds application in diverse domains such as cross-border payments, supply chain management, and cryptocurrency.

DaoStack:

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**Definition**: A framework and platform called DaoStack is used to establish and oversee decentralized autonomous organizations, or DAOs. It provides tools and smart contracts that enable decentralized governance, decision-making, and collaboration.

A platform called DAOstack makes it possible to establish and run decentralized autonomous organizations (DAOs). It offers a platform and resources for creating decentralized applications (DAOs) on top of blockchain technology, particularly Ethereum. DAOstack seeks to enable these organizations' decentralized governance and decision-making procedures.

Arc, a modular framework for building DAOs, and Alchemy, a user interface for engaging with DAOs, are two of the platform's many components. Additionally, DAOstack presents GEN, a native token used for DAO governance and decision-making.

The holographic consensus technique of DaoStack is one of its main characteristics. By means of this method, DAOs are able to compile the collective knowledge of their members and arrive at better conclusions.

**How to use**: DaoStack simplifies the creation and management of DAOs, making it easier for communities or organizations to collaborate and make collective decisions without the need for centralized control.

Blockchain:

**Definition**: Blockchain is an autonomous, immutable ledger system that securely, openly, and chronologically records transactions. It is made up of a series of blocks of data, with a list of transactions contained in each block.

Blockchain is the distributed and decentralized ledger technology that powers a wide range of cryptocurrencies and uses. It is made up of a series of blocks, each of which has a transaction record.

These blocks are connected and safeguarded by cryptographic methods, creating an unchangeable and transparent record that is available to all network users.

Because blockchain technology is decentralized, it eliminates the need for a central authority, improving security and lowering the possibility of fraud. It has uses in voting systems, supply chain management, healthcare, and other fields in addition to cryptocurrency.

Blockchains can be used to implement smart contracts, which are self-executing contracts with established rules that automate procedures. As technology advances, more efficiency, transparency, and confidence in digital interactions across industries are anticipated.

**Use:** Blockchain serves as the basis for cryptocurrencies like Bitcoin and Ethereum, but it is also utilized in many other industries for applications like supply chain management response, provenance tracking, and digital identity.

Fault Tolerant System:

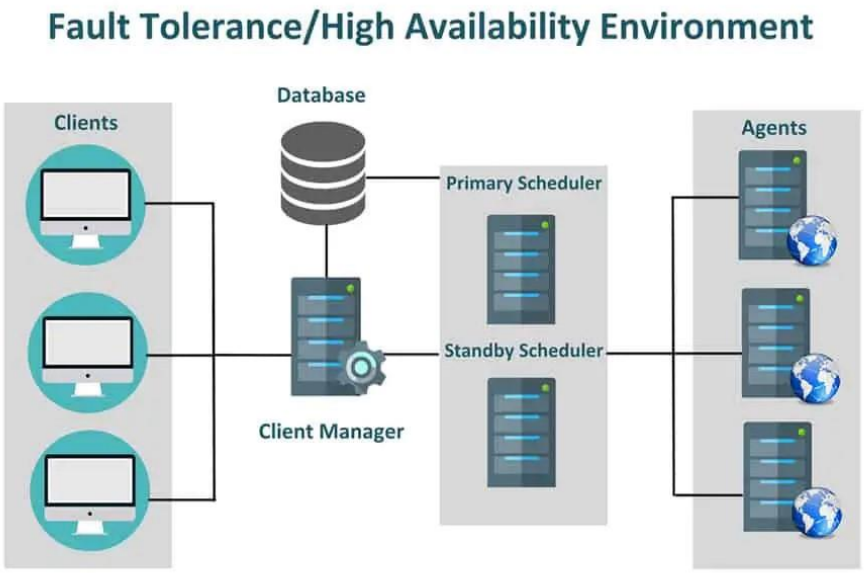
**Definition**: A fault-tolerant system is designed to continue operating even in the event of a hardware or software failure. They are resilient to failures, ensuring system availability and reliability.

The purpose of a fault-tolerant system is to continue operating and performing even in the event that certain parts malfunction. In order to guarantee ongoing functioning even in the event of hardware or software failures, redundant components and methods are used.

In mission-critical systems, where downtime is intolerable, this resilience is essential. Error detection, isolation, and correction techniques are all part of fault tolerance. Redundancy can be attained by parallel processing, mirrored data, and backup systems.

Sophisticated fault-tolerant systems adjust to changing circumstances by dynamically rearranging and redistributing work based on algorithms.

Fault-tolerant systems improve reliability, reducing the impact of errors and adding to the general stability and dependability of complex technological ecosystems, whether in aerospace, telecommunications, or critical infrastructure.




"https://networkencyclopedia.com/wp-content/uploads/2019/09/fault-tolerance-example.jpg"

**Use**: Fault-tolerant systems are important in mission-critical applications such as financial services, healthcare, and telecommunications because they minimize the risk of system failure and data loss.

[4] **"A comparative analysis of the platforms for decentralized autonomous organizations in the Ethereum blockchain**

**Youssef Faqir-Rhazoui, Javier Arroyo, and Samer Hassan"**

Blockchain:

**Definition:** Blockchain is a distributed ledger technology that securely, openly, and irreversibly logs transactions on computer networks. It is made up of a series of blocks, with a list of transactions contained in each block.

**Usage**: Applications for blockchain technology include supply chain management, identity verification, decentralized finance (DeFi), and cryptocurrencies like Ethereum and Bitcoin.

xDai:

**Definition:** xDai is a blockchain network that operates as a sidechain of the Ethereum mainnet. It enables fast and low-cost transactions using the DAI stablecoin as the base currency.

Built on Ethereum, xDAI is a reliable payments blockchain that facilitates quick and affordable transactions. It makes use of a special dual-token paradigm in which fees, payments, and transactions are made via xDAI.

Stability is ensured via the xDAI token's peg to the value of DAI on the Ethereum mainnet. xDAI offers 5-second transaction finality and runs on a different chain from the Ethereum mainnet. Because of its cheap transaction costs, which make it appropriate for daily use and microtransactions, it has grown in popularity.

Many applications and platforms have embraced xDAI as a substitute for the expensive fees and sluggish transaction times seen on the Ethereum mainnet. It is usable and accessible via wallets such as MetaMask, and block explorers allow you to examine its transactions.


"https://azcoinnews.com/wp-content/uploads/2020/08/xdai.jpg"

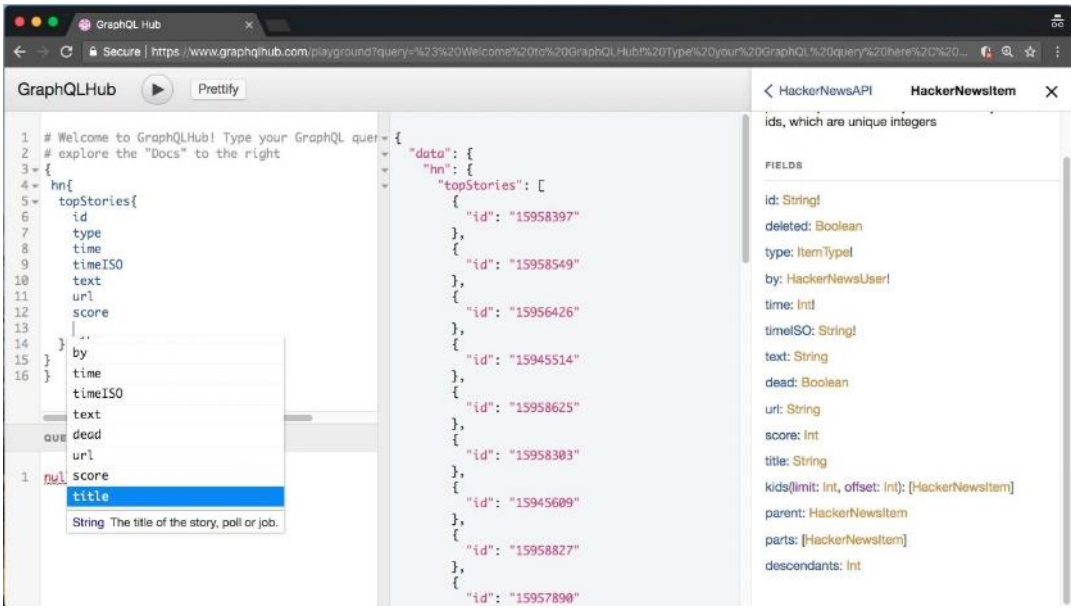
**Usage:** xDai is used for applications that require fast and low-cost transactions, making it suitable for a variety of use cases, such as microtransactions and instant payments.

GraphQL Language:

**Definition:** With the help of the query language GraphQL for APIs, clients can ask the server for particular data, preventing over-fetching or missing data. It provides a more flexible and efficient way to interact with APIs.

A query language and runtime called GraphQL enables clients to ask for and obtain particular data from servers. By allowing clients to identify the precise fields and connections they require in a single request, it offers a flexible and effective method of retrieving data. With GraphQL, the client has more control over the form and content of the answer than with typical REST APIs, where the server makes such decisions.

Clients can specify the desired data format and fields in queries they send to the server using GraphQL. After that, the server provides the requested data, only providing the fields that were specifically asked for. By doing this, data over- and under-fetching is eliminated, resulting in increased performance and less bandwidth use.

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**Usage:** GraphQL is used in web and mobile applications to retrieve and manipulate data from the server, providing a more precise and efficient alternative to traditional REST APIs.

Definition of Quantitative Research: This type of research involves gathering and examining numerical data in order to reach conclusions, forecast future events, or test theories. Statistical analysis, experiments, and surveys are frequently used in this.

**Usage:** To gather and analyse numerical data to make well-informed decisions, quantitative research is extensively used in many fields, such as the social sciences, economics, and market research.

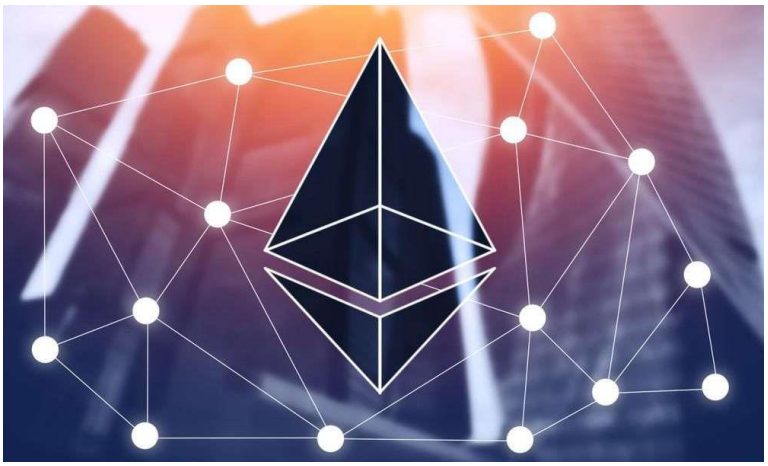
DaoStack:

**Definition:** A framework and platform called DaoStack is used to establish and oversee decentralized autonomous organizations, or DAOs.

**How to use**: DaoStack simplifies the creation and operation of DAOs, allowing communities and organizations to participate in decentralized governance and resource allocation.

Ethereum Mainnet:

**Definition:** Ethereum Mainnet is the main and most widely used network in the Ethereum blockchain ecosystem. This is where the majority of Ethereum's native cryptocurrency, Ether (ETH), and decentralized applications (Dapps) live.



"https://www.crypto-news-flash.com/wp-content/uploads/2019/06/Parilov-Ethereum-1000x600.jpg"

**Usage:** The Ethereum mainnet is the default environment for most Ethereum-based transactions and smart contract operations. It is used for many applications, from DeFi and NFTs to secure data storage and more.

[5] **"Blockchain and Decentralised Autonomous Organisations (DAOs): the evolution of companies?**

**Alexandra Sims"**

Smart Contract:

**Definition:** Digital contracts that self-execute and have pre-established terms and conditions are known as smart contracts.

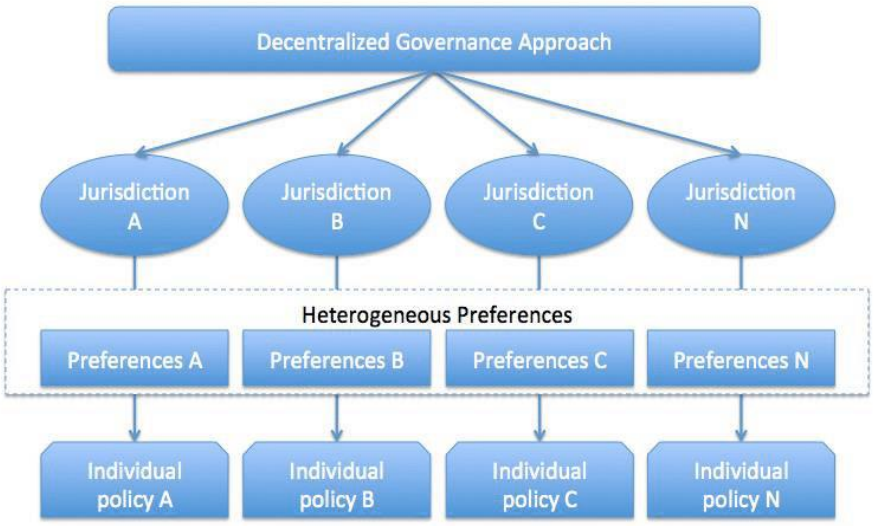
When certain conditions are satisfied, they automatically carry out and enforce the terms of the agreement without the need for a middleman.

**Usage**: Smart contracts are widely used in blockchain platforms, such as Ethereum, for applications such as automated payments, decentralized applications (Dapps), and token issuance.

Decentralized Governance:

**Definition:** Decentralized governance refers to the management and decision-making process in decentralized organizations (DAOs).

In these organizations, governance, and control are distributed among participants, often through voting mechanisms.

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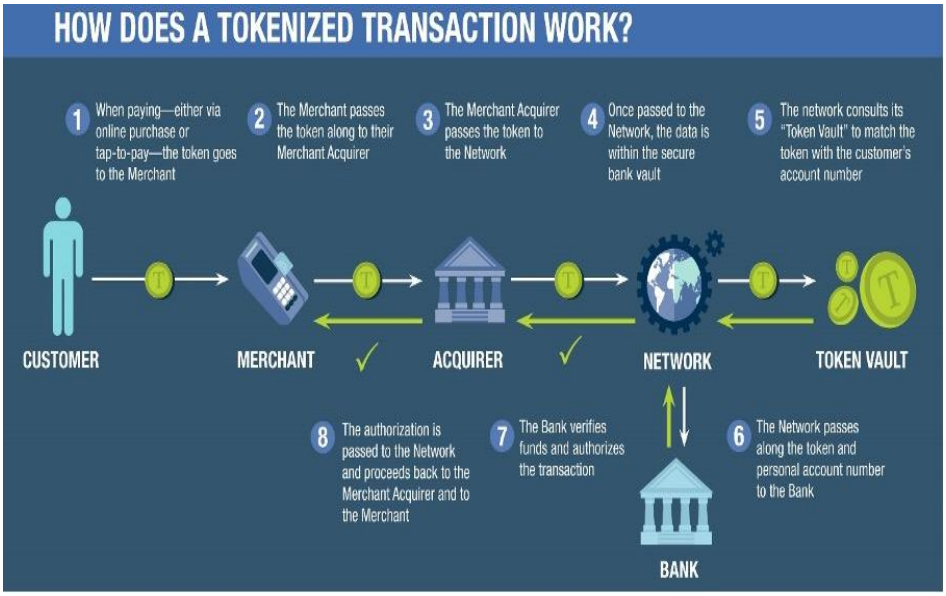
**Usage:** Decentralized governance is used in DAOs to make collective decisions on issues such as capital allocation, protocol upgrades, and project management without relying on a central authority.

Tokenization:

**Definition:** The process of turning resources or rights into digital tokens that can be exchanged on a blockchain is known as tokenization. These tokens can represent ownership of physical assets, shares in a company, or access to specific services.

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**How to use:** Tokens are used in many different industries, such as gaming, finance, and real estate, to create digital assets that are simple to divide and transfer.

Airdrop:

**Definition:** Airdrop involves distributing free tokens or digital assets to a large number of cryptocurrency wallet addresses as part of a marketing or promotional strategy.

**How to use**: Airdrops are used to raise awareness, attract users, or encourage community participation in a project or cryptocurrency. Recipients typically receive tokens without direct fees.

Forking:

**Definition:** In the context of blockchain technology, forking is the process of creating a new blockchain with unique features and regulations, frequently based on an already-existing blockchain's codebase.

**How to use:** Forks can be planned or controversial and can lead to the formation of a new network or cryptocurrency. They can resolve disagreements or come up with improvements and innovations.

Distributed ledger system:

**Definition:** It allows multiple copies of a ledger or database to be distributed across a computer network. These copies are synchronized and updated in a decentralized and consensus manner.

**Usage:** Applications for distributed ledger systems, like blockchain, include supply chain management, safe data storage, and cryptocurrency trading.

[6] **"A Decentralized Autonomous Organization (DAO) of DAOs**

**Wulf A. Kaal”**

Decentralized Accounting:

**Definition:** Decentralized accounting refers to the process of maintaining financial records and transactions in a decentralized manner, often using blockchain technology. Transactions are recorded on a distributed ledger, ensuring transparency and immutability.

**How to use:** Decentralized accounting can be applied to cryptocurrency, supply chain management, and financial auditing to improve transparency and eliminate the need for centralized authorities.

Token Model:


**Definition:** Token Models are frameworks that define the functionality and use cases of tokens in the blockchain ecosystem.

These models include utility tokens, security tokens, and governance tokens, each serving a specific purpose.

**Usage**: Token models help define how tokens are used, transacted, and managed in blockchain projects and decentralized applications.

Reputation Staking:

**Definition:** Reputation Staking involves participants in a network or platform pledging their reputation as a form of collateral. It can be used to ensure user reliability or encourage honest behavior.

**How to use:** Reputation staking is commonly used in online communities, blockchain networks, and decentralized platforms to establish trust and maintain accountability.

Sock Puppet Violence:

**Definition:** "Sock Puppet Violence" is not a widely recognized term. It can refer to cases where individuals use fake or anonymous identities (“puppets”) to engage in harmful behavior online, such as trolling, harassment, or cyberbullying.

**Usage:** This concept highlights the negative aspects of online behavior and emphasizes the need for measures to counter such actions, such as moderation, reporting mechanisms, and online safety initiatives.

Incomplete economic approach:

**Definition:** An incomplete economic approach refers to an imperfect or incomplete strategy for managing the economic aspects of a project, foundation, or organization. This can lead to financial instability or inefficiency.

**Usage:** Recognizing and overcoming an inappropriate economic approach is essential for the sustainability and success of any business, especially in decentralized systems and projects blockchain projects.

Attack Resilience:

**Definition:** The ability of a system, network, or organization to withstand and bounce back from different kinds of attacks, such as cyberattacks, physical threats, or other forms of aggression, is known as attack resilience.

**Usage:** Ensuring resilience against attacks is critical to the security and reliability of decentralized systems, where threats and vulnerabilities can be exposed to targeted malicious agents.

[7] **"Challenges of Effective Decision Making in Decentralized Autonomous Organizations (DAOs)**

**Romex K Jha"**

Integrity:

**Definition:** Integrity, in the context of decentralized systems, refers to the qualities of being honest, trustworthy, and adhering to a set of principles and values. This is necessary to ensure transparency and trust in decentralized networks.

**Usage**: Maintaining integrity is important in blockchain and decentralized systems because it helps establish trust between participants and ensure the accuracy of data and transactions.

Token diffusion:

**Definition:** Token diffusion is the distribution or issuance of tokens within the blockchain ecosystem. This involves assigning tokens to participants, users, or stakeholders based on specific criteria or rules.


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**How to use:** Token distribution is a fundamental aspect of many blockchain projects and decentralized organizations because it determines how tokens are distributed and who has access to them.

Meta Cartel:

**Definition:** A community and decentralized autonomous organization (DAO) in the Ethereum ecosystem is called Meta Cartel. It focuses on funding and supporting blockchain projects, especially those related to Ethereum-based applications.

https://pbs.twimg.com/profile_images/603587037204066304/9mWLoQ5G_400x400.png

**Usage**: One DAO that is significant in the blockchain space for decision-making and resource distribution is Meta Cartel.

Decentralized Accountability:

**Definition:** Decentralized Accountability refers to the practice of holding individuals or organizations within a decentralized network responsible for actions or decision determination. This often involves mechanisms such as reputation systems and governance processes.

**Usage:** Decentralized accountability is essential to maintain trust and prevent misuse or abuse in decentralized organizations and blockchain networks.

Decision making:

**Definition:** Decision-making is the process of choosing the best course of action from among many alternatives. In decentralized systems, decision-making often involves consensus, voting, or other democratic processes.

**How to use**: Decision-making is fundamental to the functioning of decentralized organizations and blockchain networks. It is used to determine protocol upgrades, capital allocation, and other governance-related issues.

[8] **"Artificially Intelligent Decentralized Autonomous Organization**

**Anjani Raj Yadlapalli, Ninad Mohite, Vijayant Pawar, Shelly Sachdeva"**

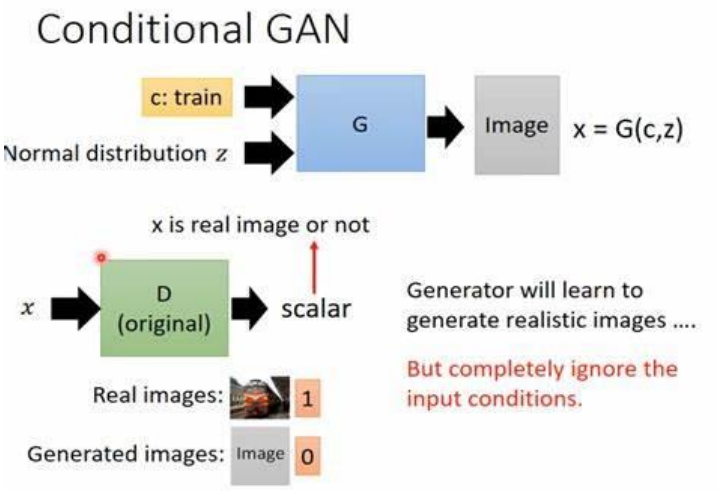
AI (Artificial Intelligence):

**Definition:** The creation of computer systems that are able to carry out operations that typically require human intelligence, such as understanding natural language, identifying patterns, making decisions, and learning from data, is referred to as artificial intelligence.

**Uses**: It has many applications, including virtual assistants, autonomous vehicles, recommendation systems, and data analytics.

Auxiliary Conditional GAN (Generative Adversarial Network):

**Definition:** Auxiliary Conditional GAN is a type of machine learning model used in generative tasks. It builds on traditional GAN architecture by adding backend information (conditioning) to produce more targeted and controlled output.

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**Usage**: Applications for backend conditional GANs include data augmentation, style transfer, and image generation.

Centralized physical architecture:

**Definition:** The centralized physical architecture refers to centrally located and managed physical facilities, data centres, or infrastructure. They are often associated with traditional non-distributed computing and networking models.

A design where components and resources are gathered in one central area is referred to as a centralized physical architecture in the context of architecture. In this design, data is usually stored, processed, and distributed to clients or devices via a central server or mainframe.

The majority of the computational needs of clients or end-user devices in a centralized physical architecture are met by the central server. The server does computations, handles data storage and retrieval, and administers and restricts access to resources. When clients send requests for information or carry out actions, the server answers appropriately.

Numerous systems, including client-server networks, centralized databases, and mainframe computing, have frequently employed this architecture.

**Usage:** Centralized physical structures are commonly used in traditional data center setups where resources are consolidated into one or more locations.

Google Collaboration:

**Definition:** Google Collaboration generally refers to collaboration tools and services provided by Google, such as Google Workspace (formerly G Suite), which includes apps like Google Docs, Sheets, and Drive to collaboratively edit documents and share files.


"https://algotrading101.com/learn/wp-content/uploads/2021/05/Google-Colab-Guide-e1620759490851.jpg"

**How to use**: Its tools are widely used for remote work, team collaboration, and document management, providing real-time collaboration.

Google Cloud:

**Definition:** Platform as a Service (PaaS), Software as a Service (SaaS), and Infrastructure as a Service (IaaS) are just a few of the cloud services offered by Google Cloud, the company's cloud computing platform. It offers cloud resources for creating and implementing services and apps.


"https://logos-world.net/wp-content/uploads/2021/02/Google-Cloud-Symbol.png"

**Usage:** This Cloud is used by businesses and developers to host web applications, store and analyse data, and run various cloud-based services.

[9] **"eGov-DAO: a Better Government using Blockchain based Decentralized Autonomous Organization**

**Nour Diallo, Weidong Shi, Lei Xu, Zhimin Gao, Lin Chen, Yang Lu, Nolan Shah, Larry Carranco, Ton-Chanh Le, Abraham Bez Surez, Glenn Turner"**

Ethereum:

**Definition:** Ethereum is a blockchain and cryptocurrency platform that lets programmers make smart contracts and decentralized apps (Dapps). It is known for its decentralized and open-source nature as well as its native cryptocurrency, Ether (ETH).


"https://logos-world.net/wp-content/uploads/2020/12/Ethereum-Emblem.png"

**How to use**: Many uses of Ethereum exist, such as supply chain management, non-fungible tokens (NFT), decentralized finance (DeFi), and more. It gives programmers a platform to build cutting-edge blockchain-based solutions.

Remix:

**Definition:** Remix is an integrated development environment (IDE) for Ethereum smart contracts that is web-based and open-source.

It offers an easy-to-use interface for creating, evaluating, and implementing smart contracts on the Ethereum network.

**Use**: Remix is a valuable tool for Ethereum developers because it simplifies smart contract development and testing. It offers features such as code validation, debugging, and integration with the Ethereum network for contract deployment.

[10] **"A Formal Specification Smart-Contract Language for Legally Binding Decentralized Autonomous Organizations**

**Vimal Dwivedi, Alex Norta, Alexander Wulf, Benjamin Leiding, Sandeep Saxena, And Chibuzor Udokwu"**

Solidity:

**Definition:** Solidity is a high-level, statically constructed programming syntax made for the Ethereum platform's smart contract development.

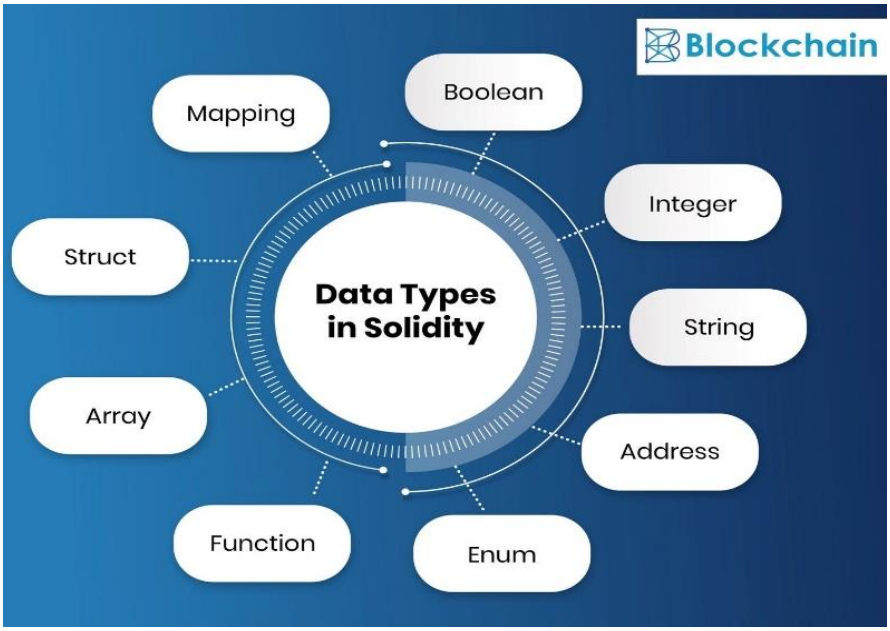
The Ethereum blockchain can be used to write smart contracts using the computer language Solidity. It adheres to the concepts of object-oriented programming and is statically typed. Smart contracts are self-executing contracts with the conditions of the agreement explicitly encoded into code.

Solidity gives developers the ability to describe the logic and behavior of these contracts. Solidity-coded smart contracts can be implemented on the Ethereum network and communicate with other contracts as well as decentralized apps (dApps).

To improve code reuse and maintainability, Solidity offers capabilities like inheritance, libraries, and modifiers. Additionally, it has functions and data types built-in to handle operations unique to blockchains.

Building decentralized applications and putting blockchain-based solutions into practice require the use of Solidity.

This is the most popular and widely used language for Ethereum-based Dapps and smart contracts.

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**Uses**: Solidity is used by developers to create self-executing contracts to automate transactions, enforce rules, and enable decentralized applications on the Ethereum platform. This is the language in which Ethereum smart contracts are written.

"Smart Legal Contract Markup Language" :

**Definition:** It is a specialized markup language designed for creating contracts intelligence that has legal effect.

A specialized coding framework called a Smart Legal Contract Markup Language (SLCML) makes it easier to create and implement smart legal contracts. Automated contracts that enforce agreements are created on distributed ledger technologies, such as blockchain.

SLCML enables exact and transparent contract execution by fusing machine-readable code with legal language. It provides an intelligible definition of contract terms, conditions, and activities for both legal experts and computer systems.

SLCML enables that contractual requirements are autonomously enforced, increasing efficiency and decreasing the need for middlemen by integrating executable code into legal agreements.

This novel strategy seeks to reduce conflict, expedite legal procedures, and create a more automated and safe environment for contractual partnerships.

Unlike Solidity, which is mainly used for blockchain-based contracts, SLCML focuses on merging traditional legal contracts with smart contract technology.


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**How to use**: SLCML is intended for legal professionals and developers to create legally binding smart contracts and comply with existing legal frameworks.

These contracts are designed to bridge the gap between traditional legal agreements and blockchain-based smart contracts.

[11] **"Blockchain and the emergence of Decentralized Autonomous Organizations (DAOs): An integrative model and research agenda**

**Carlos Santana, Laura Albareda"**

The statistical package used in social sciences, or SPSS:

**Definition:** A statistical software program called SPSS is used for statistical modelling, data mining, and analysis. It offers a large selection of features and tools for both basic and sophisticated statistical analysis and data manipulation.


https://www.ubt-uni.net/wp-content/uploads/2021/11/SPSS-37-min-scaled.jpg

**Uses**: It is commonly used by researchers, statisticians, and social scientists to analyse data, create reports, and visualize results. It can be used for a variety of tasks including survey analysis, hypothesis testing, and regression analysis.

Web of Science:

**Definition:** Web of Science is an online research database and citation index covering a wide range of academic and scientific documents.

It includes journals, conference proceedings, patents, and other scientific resources in various fields.

**How to use**: Web of Science is widely used by researchers, scholars, and institutions to search and access scientific articles, track research trends, and evaluate impact and history.

Citation history of research articles. It is useful for performing literature reviews and bibliometric analysis.

[12] **"Decentralized Autonomous Organization**

**Samer Hassan, Primavera De Filippi"**

Aragon:

**Definition:** With the help of the open-source blockchain platform Aragon, users can establish and oversee decentralized autonomous organizations (DAOs). It offers the means to establish a decentralized application (DAO) with an adjustable voting system, governance framework, and decision-making procedure.


"https://criptotrader.s3.eu-west-3.amazonaws.com/wp-content/uploads/2021/09/09160223/proyecto-aragon-blockchain.jpg"

**How to use**: Aragon is used to establishing decentralized organizations for a variety of purposes, such as project governance, community management, and decentralized applications.

It makes the creation of DAOs easier and offers participants an interface that is easy to use.

DaoStack:

**Definition:** A framework and platform called DaoStack is used to establish and oversee decentralized autonomous organizations, or DAOs.

It gives users access to a suite of tools, smart contracts, and governance frameworks that make it simple to establish and manage DAOs.

**How to use:** DaoStack is used to establish DAOs and manage decentralized decision-making processes within these organizations.

It provides functionality for proposal submission, voting, and resource allocation in a decentralized and collaborative manner.

[13] **"The Rise of Decentralized Autonomous Organizations: Coordination and Growth within Cryptocurrencies**

**Ying-Ying Hsieh, Jean-Philippe Vergne, Philip Anderson, Karim Lakhani, Markus Reitzig"**

Blockchain:

**Definition**: Blockchain is a distributed ledger technology that securely, openly, and irreversibly logs transactions on computer networks.

It is made up of a series of blocks, with a list of transactions contained in each block.

**Use**: Because blockchain technology can produce transparent and safe transaction records, it is applied to many different areas, such as voting systems, supply chain management, and cryptocurrency.

Cryptocurrency:

**Definition**: A cryptocurrency is a type of virtual or digital money that has security provided by cryptography.

It is frequently built on blockchain technology and functions without the intervention of a centralized authority.


"https://itcloudreviews.com/wp-content/uploads/2020/07/cryptocurrency.jpg"

**How to use**: Cryptocurrencies are digital assets that are used as stores of value, for peer-to-peer transactions, and for online payments. Examples of these include Bitcoin and Ethereum.

fsQCA (Fuzzy Set Qualitative Comparative Analysis):

**Definition:** fsQCA is a research method used in the social sciences to analyse complex cause-and-effect relationships.

It combines qualitative and quantitative data to examine how different factors contribute to specific outcomes.

**Usage:** fsQCA is applied in research to determine necessary and sufficient conditions for a specific result, thereby helping researchers analyse and understand complex social phenomena.

Formal software protocols:

**Definition:** Formal software protocols refer to clearly defined and specific communication rules and behaviours used in network and software systems.

These protocols define how different software or system components interact with each other.

**Usage**: Formal software protocols are used in a variety of applications, such as computer networks, IoT devices, and distributed systems, to ensure secure and reliable communications between different entities or components.

[14**] "Unpacking How Decentralized Autonomous Organizations (DAOs) Work in Practice**

**Tanusree Sharma, Yujin Kwon, Kornrapat Pongmala, Henry Wang, Andrew Miller, Dawn Song, Yang Wang"**

Etherscan:

**Definition:** Etherscan is a blockchain mining and analytics platform specifically designed for the Ethereum blockchain.

It allows users to search, explore, and analyse the Ethereum blockchain for a variety of purposes, including tracking transactions, monitoring contract activity, and reviewing network statistics.


"https://cryptorandgroup.com/wp-content/uploads/2020/04/etherscan-1.jpg"

**How to use**: Etherscan is widely used by Ethereum users, developers, and researchers to better understand Ethereum transactions, smart contracts, wallet balances, and other online activities.

It offers an intuitive user interface for gaining access to and comprehending Ethereum data.

Aragon:

**Definition**: Decentralized autonomous organizations (DAOs) can be created and managed with the help of the open-source blockchain platform Aragon.

It provides a framework for establishing governance structures, voting mechanisms, and decision-making processes within DAOs.

**Usage:** Aragon is used to establish decentralized organizations for various purposes, including project governance, community management, and decentralized applications.

It makes the process of setting up DAOs easier and provides an intuitive interface through which members can communicate and manage these groups.

[15] **"Understanding decentralized autonomous organizations from the inside**

**Nils Augustin, Andreas Eckhardt, Alexander Willem de Jong"**

Zotero:

**Definition:** A free and open-source reference management tool called Zotero assists researchers in gathering, classifying, and referencing scholarly materials like books, articles, websites, and more. Users can work together on research projects, store references, and generate citations and bibliographies.

"https://www.ulb.tu-darmstadt.de/media/ulb/lernen_und_arbeiten/lernformate/literaturverwaltung_1/Zotero_Bild_fuer_Webseite.jpg"

**Usage**: Zotero is used by researchers, scholars, and students to streamline the process of gathering and citing sources for research articles, theses, and academic projects.

It integrates with web browsers and word-processing software to simplify reference management.

The statistical package for social sciences, or SPSS, is a software application used for data management, statistical analysis, and data visualization.

It offers a range of tools for transforming data, making graphs, and running statistical tests. **Usage:** SPSS is commonly used in fields such as social sciences, psychology, and business for data analysis and statistical modelling.

Researchers and analysts use it to process and interpret data for research projects, surveys, and experiments.

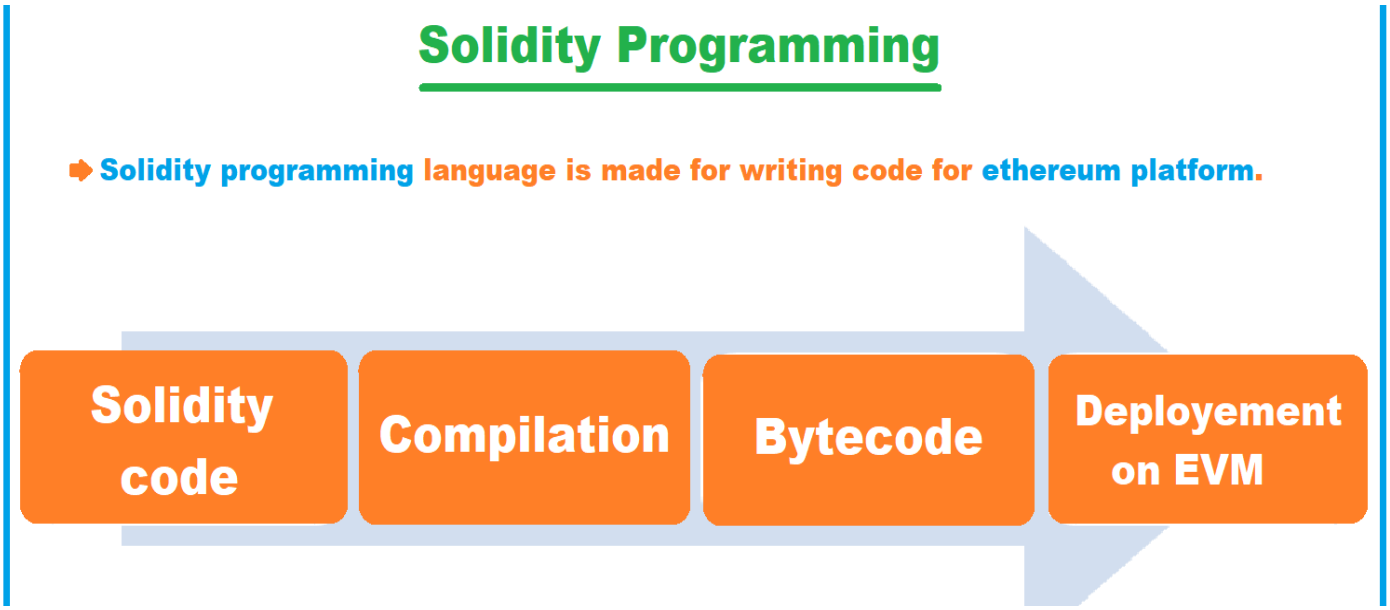
[16] **"Blockchain smart contracts: Applications, challenges, and future trends**

**Shafaq Naheed Khan, Faiza Loukil, Chirine Ghedira-Guegan, Elhadj Benkhelifa, Anoud Bani-Hani"**

Solidity:

**Definition:** With an emphasis on Ethereum, Solidity is a high-level programming language used to create smart contracts on blockchain networks.

Its purpose is to make it easier to create self-executing contracts with predetermined terms and conditions.

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**Usage**: Solidity is employed by developers to create smart contracts for various applications, including decentralized finance (DeFi), non-fungible tokens (NFTs), and supply chain management.

It allows for the automation of contract execution and is integral to blockchain-based applications.

Fabasoft Contracts:

**Definition:** Fabasoft Contracts is a contract management software solution designed to streamline the entire contract lifecycle, from creation and negotiation to signing, management, and archiving. It aims to improve contract efficiency and compliance for organizations.


https://cdn.softwarereviews.com/production/logos/offerings/7841/large/LOGO-Fabasoft-Contracts-RGB.png?1617160333

**How to use**: Fabasoft Contracts is used by businesses and organizations to automate and centralize contract-related processes.

It provides contract creation, version control, digital signature, and compliance monitoring functionality.

## 3. Problem Formulation

The Traditional Autonomous Organisation models in many industries frequently result in inconsistencies, a lack of accountability, single points of breakdown, lower inclusiveness, and difficulties upholding openness and trust.

Therefore, there exists a need for a framework which will enhance the decision-making process by providing community involvement, and automate administrative processes while maintaining compliance and privacy.

### Problems with Traditional Autonomous Organizations:

**Inconsistency**: Traditional autonomous organizations often experience inconsistencies in decision-making because different individuals or departments have There may be conflicting priorities or approaches.

**Lack of Accountability:** Accountability can be a problem in traditional organizations because decision-makers are not always held accountable for their actions.

**Single points of failure**: Centralized organizations can be vulnerable to single points of failure, where the failure or incompetence of a key person or department can disrupt the Whole organization.

**Low inclusiveness:** Traditional organizations may not engage all stakeholders or community members in the decision-making process, resulting in a lack of inclusiveness.

**Challenges in maintaining openness and trust:** Traditional organizations may have difficulty maintaining transparency and trust because they do not always share information or have the participation of all stakeholders in the decision-making process.

**The need for a new framework:**

**Improving decision-making**: The proposed framework aims to improve decision-making by engaging communities in an inclusive way than.

**Automate administrative processes**: Automation can streamline administrative tasks, thereby reducing human error and increasing efficiency.

**Maintaining compliance and privacy**: The new framework is also expected to address compliance requirements and privacy concerns, which are increasingly important across many industries.

**Research Objective:**

**Relative Analysis:** The primary goal of the research is to perform a comparative analysis between decentralized autonomous organizations (DAOs) and traditional autonomous organizations.

**Working prototype**: The research will develop a working prototype to illustrate how the new framework can be implemented in practice.

**Challenges*:** The study will also explore the challenges that both traditional and decentralized organizations encounter in the process of adopting and implementing this new framework.

**Implementation of a Transaction-Based Dapp:**

**User Authentication and Trust**: The Dapp will enable users to make authenticated and trusted transactions. This is a critical aspect of enhancing trust and security in any organization.

**Hardhat Localhost Network:** Using the Hardhat Localhost Network for development ensures privacy and consensus, which is crucial for testing and refining the system before deploying it to a public blockchain.

**Transaction History Access**: Allowing users to access transaction history through the Ethereum explorer enhances transparency and accountability.

Ultimately, the goal of this research work is to provide a relative analysis in regard of Traditional Autonomous Organisation and Decentralized Autonomous Organizations (DAOs) on the basis of functional prototype and challenges it encounter.

Moreover, to implement its application, this paper showcases a transaction-based Dapp that will allow the user to make authenticated as well as trusted transactions on Hardhat Localhost Network.

Furthermore, the client will be able to access the transaction history using the Ethereum explorer.

## 4. Objectives

The objective of investigating Decentralized Autonomous Organizations (DAOs) is to comprehend their potential to reshape traditional organizational structures by leveraging blockchain technology and autonomous decision-making processes.

### Understanding DAOs and Blockchain Technology

**Reshaping Traditional Organizational Structures:** The main goal of your studies is to understand how DAOs, enabled by blockchain technology, can disrupt and reshape conventional organizational structures.

Blockchain has the potential to completely change how businesses function because of its decentralized and transparent structure.

### Examining key aspects of DAOs

**Governance structures**: Your research aims to study governance structures in DAOs. DAOs often rely on decentralized decision-making mechanisms, and understanding how these structures work is important to assess their potential impact.

**Smart contract functions:** DAO is built on smart contracts. Determining how these self-executing contracts carry out rules and automate procedures in DAOs is crucial to comprehending their internal operations.

**Security Issues:** Security is an important concern, especially in the blockchain and DAO space.

Your research aims to address and analyse the challenges and security vulnerabilities that DAOs may face, due to their autonomous and decentralized nature.

**Scalability Issues**: Scalability is an important consideration for any blockchain-based system. It is important to study scalability issues in DAOs to evaluate their potential for growth and mass adoption.

### Explore the benefits of implementing DAOs

**Transparency, efficiency, and participatory decision-making:** The study focuses on the possible advantages of putting DAOs into practice, including greater inclusivity and participatory decision-making, automation leading to increased efficiency, and increased transparency. carry out the steps. This demonstrates the benefits DAOs can offer businesses.

**Utilization of Platforms like MetaMask and Web3**: The research emphasizes the use of platforms like MetaMask and Web3, which are integral to interacting with blockchain networks and smart contracts.

This showcases the practical tools and technologies that enable DAOs.

**Development of Transaction-Based Dapps**

**Demonstrating DAO Functionality**: By creating transaction-based decentralized applications (Dapps), your research provides a hands-on demonstration of how DAOs function in practice.

This practical approach helps readers understand the real-world application of your research findings.

**Transformational Impact of DAOs and Integration Suggestions**

**Illuminating Transformational Impact:** The ultimate goal is to shed light on the transformational impact that DAOs can have on traditional organizational structures.

Understanding how they can improve transparency, efficiency, and decision-making processes is central to this objective.

**Provide recommendations on adoption and integration**: Your research aims to provide practical recommendations for the successful adoption and integration of DAOs in modern ecosystems, recognizing the challenges knowledge, and potential opportunities.

## 5. Methodology

1. **Literature Review**

- Academic Documents: Start by conducting a comprehensive review of scholarly articles, articles, and books related to DAOs.

  This should include topical works as well as the most recent research.

  Focus on understanding the historical development of DAOs, their conceptual foundations, and how they have evolved over time.
- White papers and case studies: Review white papers and case studies from various DAO projects.

  These documents often provide insight into practical implementations and real-world DAO use cases.

Pay attention to the details about the governance model, smart contract implementation, and the challenges they face.

- Governance: Explores the different governance models that have been proposed or used in DAOs.

  This will cover decision-making procedures both on and off the chain, as well as token holders' and other stakeholders' roles in governance.

- Smart Contracts: Investigate the use of smart contracts in DAOs.

  Understand how they are written, and executed, and how they support DAO operations.

  Pay attention to the coding languages and frameworks commonly used in smart contract development.

- Challenges: Identify the difficulties and challenges noted in the literature.

  This can include issues related to security vulnerabilities, scalability, regulatory compliance, and the possibility of malicious actions within the DAO.

**2. Analyse prototypes**

- Existing prototypes: Analyse active DAO prototypes or current initiatives.

  Look for projects that are actively operating and implementing decentralized decision-making and smart contracts.

  Let's look at successful and failed archetypes to get a complete perspective.

- Motivation: Study how these DAOs work in practice. Check out how decisions are made, how voting mechanisms work, and how smart contracts can be used for different purposes, such as managing funds or performing specific functions.

**3. Benchmark**

- Cross-industry analysis: Compare DAO implementations in different industries, such as finance, administration, arts, or supply chain management.

  Evaluate specific use cases and the effectiveness of the DAO model in these different areas.

- Advantages and Disadvantages: Identify the advantages and disadvantages of different CAD models.

  Determine what factors contribute to their effectiveness or limitations.This analysis must include aspects such as transparency, comprehensiveness, and efficiency.

**4. Define requirements**

- Governance framework: Identify essential components of the governance framework, including decision-making procedures, voting mechanisms, and roles of participants (holders hold tokens, delegates, etc.).

- Scalability: Explores scalability challenges related to DAOs and recommends solutions or best practices to address them.

- Security Process: Reviews security best practices for DAOs, including measures to prevent attacks, smart contract vulnerabilities, and dispute resolution mechanisms.

- Participation Motivation: Analyse how participants are encouraged and motivated to actively participate in DAO activities.This may involve the design of the token economy and reward system.

**5. Research and design**

- Underlying platform: Investigate blockchain platforms (e.g., Ethereum, Binance Smart Chain) commonly used to develop DAOs.

  Understand the advantages and limitations of each platform.

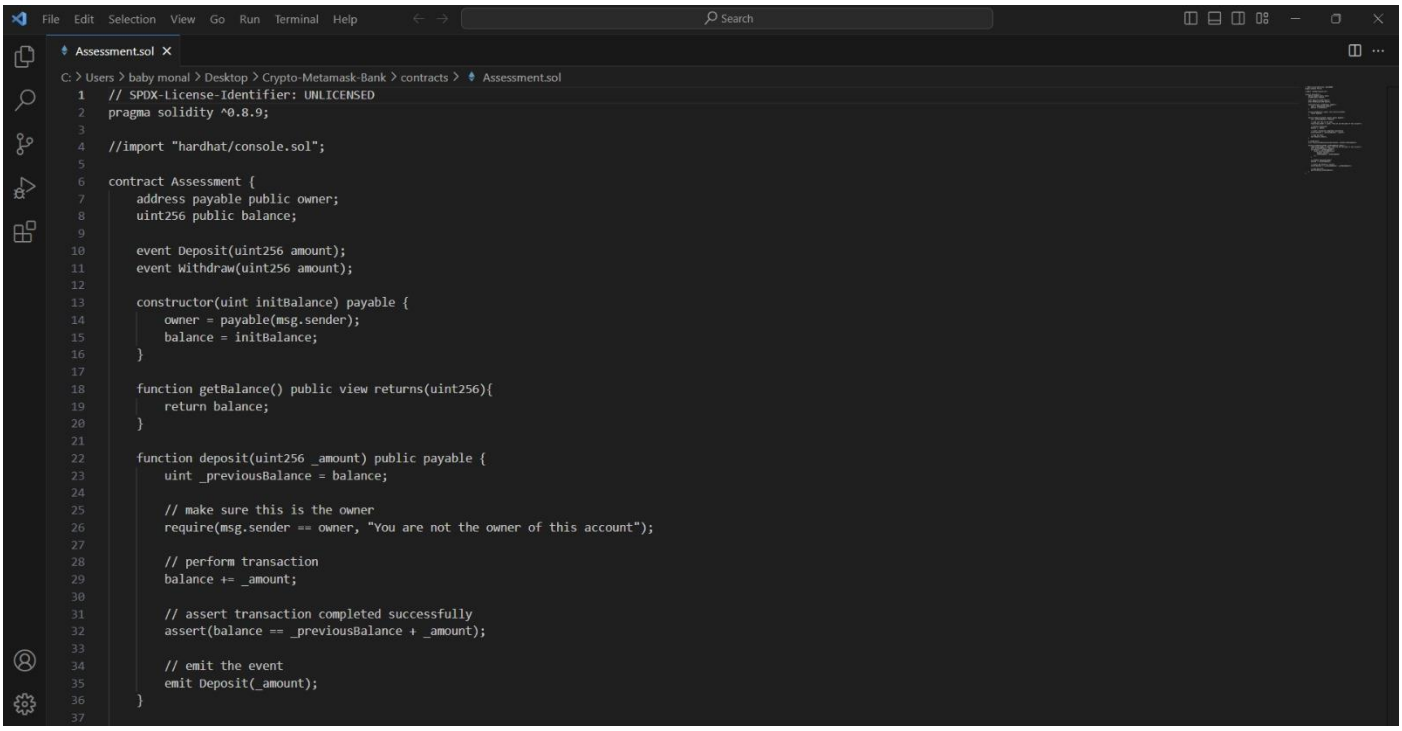
- Smart Contract Systems: Analyse the technical aspects of smart contract systems, such as Ethereum's Solidity, or alternative languages such as Vyper.

  Explore the design considerations that impact DAO usability and user experience.

- Usability and experience: Test the user interface and user experience design of the DAO.

  Consider the ease of engagement for different stakeholders, from non-technical users to developers

## 6 Experimental software setups:




1.. Project setup:

- Create a new project directory for your dApp.
  • Use npm init to start a new Node.js project. By doing this, you can set up the package.json file to manage the dependencies and scripts for your project.

2. Implementing Intelligent Contracts:

- Use Solidity to write the code for your smart contract. The contract should include functions to handle deposits and withdrawals.
- Use the Hardhat framework for compiling, deploying, and testing your smart contracts. You'll need to install Hardhat and set up a Hardhat project.

3.. UI development:

- Create HTML files for your dApp UI. This HTML file will serve as the user interface of your application.
- Add buttons for the "Deposit" and "Withdraw" actions in your HTML file. These buttons will trigger interaction with your smart contract.
- Configure your front-end code's Web3.js instance. A JavaScript library called Web3.js is used to communicate with the Ethereum blockchain.
- Use a MetaMask-injected Web3 provider to enable communication with the Ethereum network. This allows users to sign transactions and interact with your dApp.

4.. MetaMask integration:

- Install the MetaMask browser extension in your browser.

- Create a MetaMask wallet or connect an existing wallet to a test network you are using (e.g. Localhost for development or a test network like Ropsten or Rinkeby).
- Import Ether testnet to your MetaMask wallet with just one tap to use it for test transactions.

5. Hardhat network configuration:

- Install Hardhat globally using npm install -g hardhat.
- Create a Hardhat configuration file (hardhat.config.js) to determine your network settings. You will specify the provider URL for the test network (e.g.Alchemy, Infura) and configure the accounts for deployment.

6. Deploy smart contract:

- Deploy your smart contract to the testnet using the Hardhat deployment script. You will use Hardhat's deploy function and specify the network to which you want to deploy the contract.
- After deployment, get the contract address. This address is important for your user interface to interact with the smart contract.

7. UI Interaction:

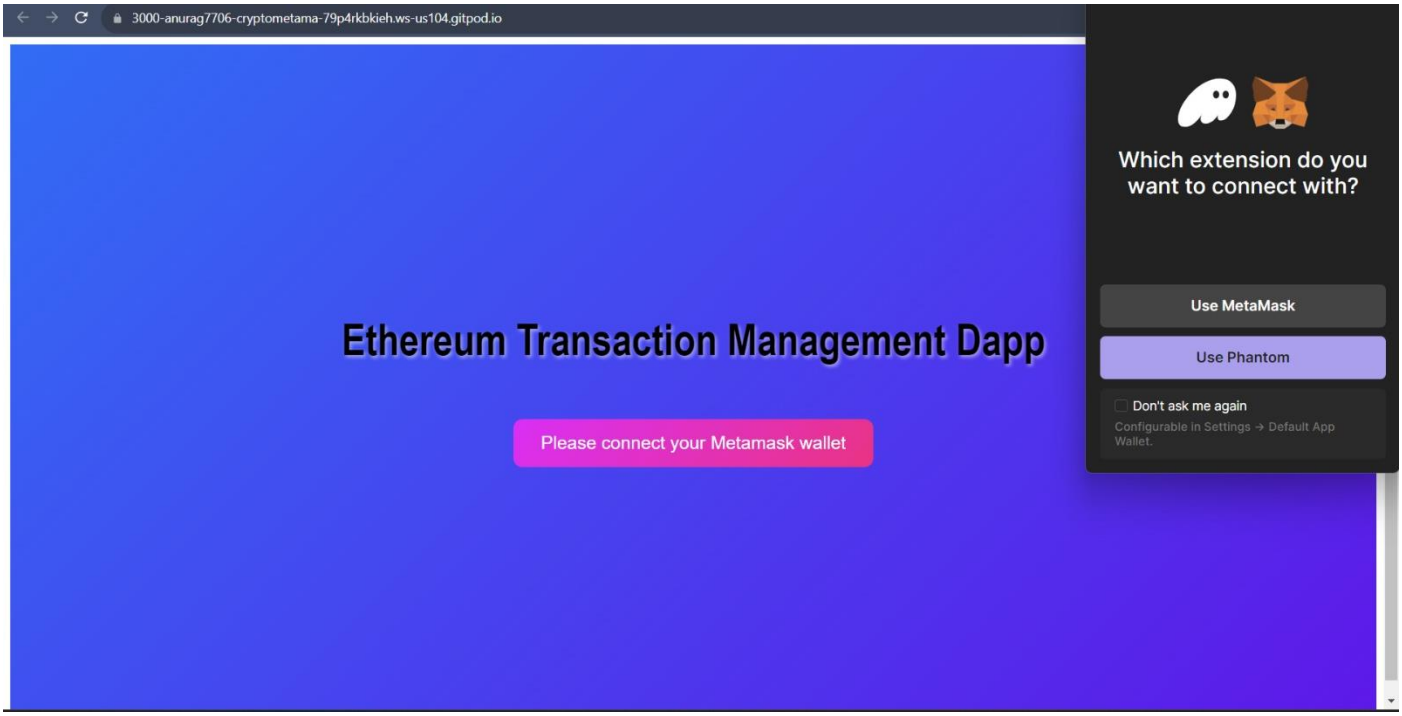
- In your UI code, use the Web3.js library to connect to your deployed smart contract. You will need to provide the ABI (Application Binary Interface) and contract address.
- Implement JavaScript functions in your interface to handle the "Deposit" and "Withdrawal" actions. These functions will call the corresponding smart contract methods and interact with MetaMask to sign transactions.

8.. User Testing:

- Test your dApp on the testnet by interacting with the "Deposit" and "Withdrawal" buttons using MetaMask.
- Ensure transactions are signed and executed correctly on the blockchain.
- You can open Etherscan to view your transaction history and confirm that your app is working as expected.

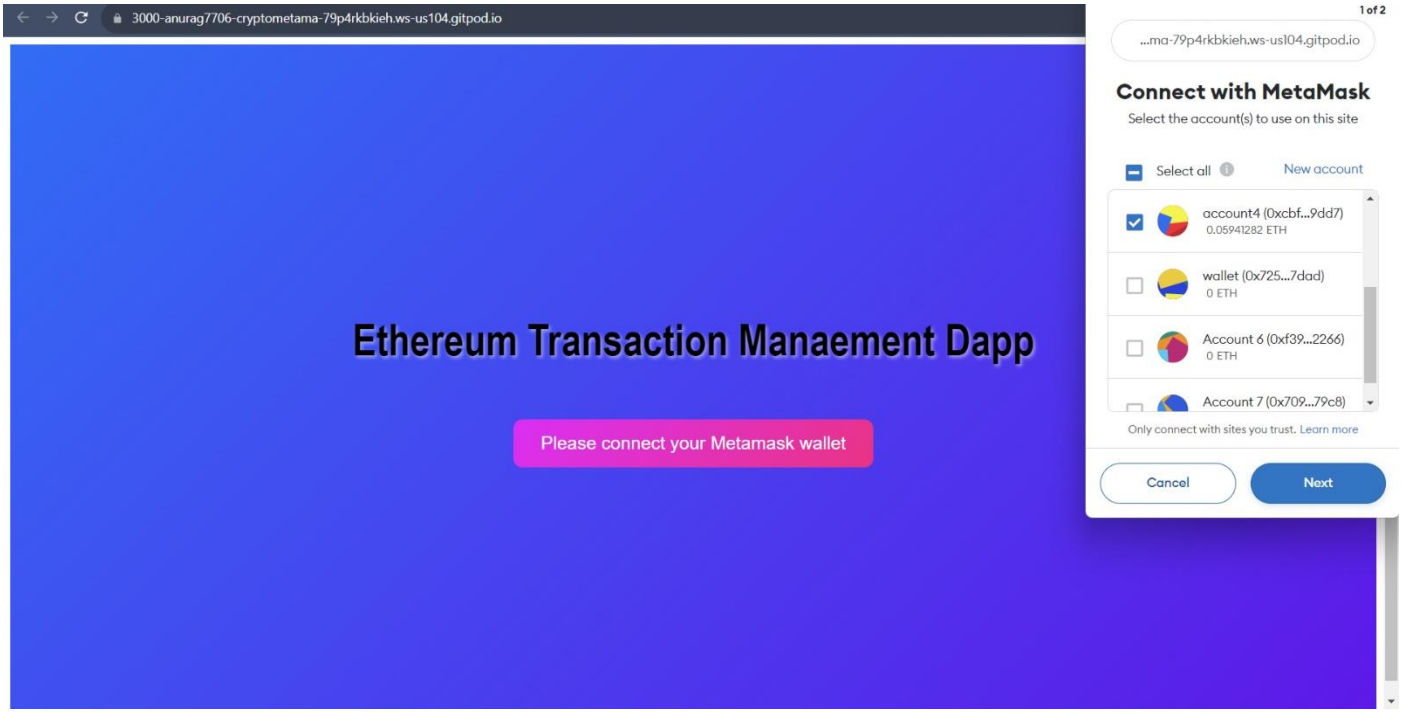
This step-by-step process covers the development and testing of a basic dApp for handling deposits and withdrawals, including integrating MetaMask, deploying smart contracts, and building the front end. It's a fundamental example of how to create a blockchain-based application.

## 7. Final results


The final conclusion of this article revolves around the essential components of transaction management in decentralized applications (DApps) in the context of blockchain technology.

It highlights key aspects that ensure the accuracy, security, and efficiency of interactions with blockchain, with a particular focus on creating a transparent and trust less environment for other applications.




each other, including on-chain management procurement and financial transactions.


The article provides a comprehensive understanding of key aspects of DApp transaction management, providing valuable insights for those involved in the development and deployment of blockchain-based applications.

## 8. Conclusion

Research on decentralized autonomous organizations (DAOs) shows profound potential to reconfigure long-standing organizational models. This paper highlights the dual nature of DAO implementation, focusing on both the promising opportunities and inherent challenges associated with this transformative concept.

It delves into an in-depth exploration, covering essential aspects such as governance models, smart contract integration, security considerations, scalability barriers, and practical applications of KNIFE.

In doing so, the study emphasizes the profound significance of DAOs in various sectors of the economy and social structures. It recognizes that while DAOs have the potential to revolutionize collaboration and resource management on a global scale, their ultimate success depends on their ability to overcome these challenges and accelerate the development and development of favourable ecosystems.

Essentially, the DAO serves as a catalyst for a paradigm shift, paving the way for highly efficient, transparent, and decentralized organizational structures.

As they develop, they promise to become powerful change agents, capable of reshaping the future of how people collaborate, make decisions, and manage resources, contributing to an open world.

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