**Lecture 4-5 Notes**

**Decentralized Autonomous Organization**

**5.1 DAO**

* A Decentralized Autonomous Organization is a sophisticated smart contract.
* They have more code than other smart contracts because they govern more than just the transfer of value.
* DAOs have voting rights of members.
* The bylaws of DAO are in the code of the smart contract and are secured directly within their blockchain.
* The concept of a DAO was created to address what in economics is referred to as the “principal-agent problem”.
* The principal-agent problem is a dilemma that occurs when an “agent” can make decisions on behalf of another agent but is influenced by their own self-interest.
* The “agent” may choose to take more risk because they do not actually carry the cost of that risk.
* An example of this would be a CEO (the agent) who wants a short-term gain that nets them a bonus, rather than a longer-term choice that is better for the health and welfare of the company.
* A DAO allows people to collaborate and agree on courses of action within agreed rules.
* The code within a DAO acts as the governance structure.
  + For example, the DAO mentioned in the previous section was created to receive investment funds, and then safeguard them.
  + Members of the fund could then vote on proposals that the community presented.
  + Bylaws within the DAO set time frames for voting and, in general, establish the rules for how the funds would be managed.
* The appeal of this new way of investing was that it allowed anyone with access to cryptocurrency to become a member of the investment group and vote on the investment projects.
* They didn’t have to ask anyone’s permission or make disclosures about their finances in the way that accredited investors have to within traditional systems.
* Another appeal was that the code could not be amended and so criminal and unscrupulous individuals could not defraud the group.
* Only the members of the DAO could control it, and each member’s control was limited to what they had contributed.
* Members could leave and sell their membership in a marketplace. The DAO in effect removed the principal-agent problem.
* The code in the first DAO on Ethereum was not perfect.
* The imperfection was discovered quickly and exploited.
* One of the great strengths and weaknesses of open source code is that anyone can look at it and find ways to subvert what you are trying to do.
* A strength is that it can help you uncover bugs quickly, but some- times at a high cost.
* Smart contracts that hold cryptocurrency or something else of value are vulnerable because their code is exposed to everyone and hackers are incentivized to break them.
* The Bitcoin network is considered to be a DAO. It allows any person to join in the creation and security of the system and cooperation is completely voluntary.
* The rules for the network are held within its consensus protocol, and the miners vote by choosing what blocks to build on.
* DAOs can now be used to do a lot more when applied to the idea of traditional organizations. For example, they could be used for voting for a new government, or by shareholders in a public or private corporation irrespective of the size.
* DAOs hold a lot of potential in helping remove some of the less savory parts of business and politics and allowing individuals a fair voice in the things that they have invested in.
* Instead of the hierarchical structure that is employed by most governments, militaries, and corporations to manage all aspects of our society, a DAO presents a new option.
* An organization can now more easily be governed by rules that are enforced through code. They allow for cleaner group decision-making as each person’s voice is only as loud as their contribution (or some other arbitrary rule the group has chosen).
* For example, DAO voting would allow the shareholders to select the positions of the board of directors and the employees, or even the election of new government officials.
* DAOs could be used to manage public resources and help overcome another economic term “the tragedy of the commons”.
* The tragedy of the commons is where self-interest depletes or destroys a natural resource. As in the exam- ple above, a DAO could allow for a democratic consensus on how to use or preserve these resources.
* These examples have extreme limitations within our current system.
* Judicial systems are still essential to justice and the enforcement of laws and the protection of physical property.
* However, within the borderless Wild West of the internet, these types of structures are in- triguing as they may allow for further globalization.

###### **5.2 How DAOs work**

* DAOs run through rules encoded within their smart contracts. They live completely online but can govern assets that are offline, like real estate or natural resources.
* DAOs allow two parties that have never met to cooperate and make decisions on a thing of value that they both share an interest in maintaining.
* DAOs enable these individuals to do things like hiring other individuals to perform tasks that can’t be automated.
* Many DAOs have hired individuals to develop software, for example. DAOs rely on tokens to gain cooperation. The tokens act as an internal property that has value and is controlled by the group. The group’s actions are governed by the rules written into the DAO’s smart contract. The tokens can represent shares that give voting rights, pay dividends, or are given out as rewards for cooperation.
* Once you have deployed your DAO, it is autonomous.
* Many blockchains transition to autonomy slowly as small groups are more vulnerable to attack, at least within the context of public blockchains and mining.
* Public blockchains need to reach a critical mass of decentralization to withstand things like a mining pool being attacked.
* This is when a pool of miners will rotate quickly from one blockchain to another in order to optimize how quickly they can harvest and sell a cryptocurrency.
* These types of mine-and-dash activities can be damaging to the blockchain as it drives down the crypto prices and can leave the blockchain transactions stalled.

###### **5.3 Key takeaways about DAOs**

* All of a DAO’s transactions are a record within its blockchain. The transparency in account- ing and financials lets the code act as the accepted, trusted third party.
* DAOs gain consensus by having their members vote on important issues such as the with- drawal or movement of funds. A majority of its stakeholders specified in the smart contract must agree on all decisions.
* Many smart contracts give voting windows so that proposals and actions are not held up by non-responsive members.

**5.4 LEGALITY OF DAOs**

* The code and capabilities of DAOs do not absolve individuals from complying with regulations and laws.
* If you are thinking about creating a DAO, seek legal counsel.
* Many countries have begun to create a legal framework that allows for the unique nature of DAOs.
* For example, Malta created a legal framework for DAOs that classifies them as a new type of legal entity, referring to them as “technology arrangements”.
* Malta has created a new regulatory body called the Digital Innovation Authority (MDIA).

**5.5 Traditional Organizations Vs DAO Architecture**

* In traditional companies, all agents of a company have employment contracts that regulate their relationship with the organization and with each other.
* Their rights and obligations are regulated by legal contracts and enforced by a legal system which is subject to the underlying governing law of the country they reside in.
* If anything goes wrong, or someone does not stick to their end of the bargain, the legal contract will define who can be sued for what in a court of law.
* DAOs, on the other hand, involve a set of people interacting with each other according to a self-enforcing open-source protocol.
* Keeping the network safe and performing other network tasks is rewarded with the native network tokens.
* Blockchains and smart contracts hereby reduce transaction costs of management at higher levels of transparency, aligning the interests of all stakeholders by the consensus rules tied to the native token.
* Individual behaviour is incentivized with a token to collectively contribute to a common goal. Members of a DAO are not bound together by a legal entity, nor have they entered into any formal legal contracts.
* Instead, they are steered by incentives tied to the network tokens, and fully transparent rules that are written into the piece of so ware, which is enforced by machine consensus.
* There are no bilateral agreements. There is only one governing law – the protocol or smart contract – regulating the behaviour of all network participants.
* As opposed to traditional companies that are structured in a top-down manner, with many layers of management and bureaucratic coordination, DAOs provide an operating system for people and institutions that do not know nor trust each other, who might live in different geographical areas, speak different languages, and therefore be subject to different jurisdictions.
* Instead of legal contracts managing the relations of the people, in the Bitcoin Network, all agreements are in the form of open-source code that is self-enforced by majority consensus of all network actors.
* DAOs do not have a hierarchical structure, except for the code. Once deployed, this entity is independent of its creator and cannot be censored by one single entity, but instead by a predefined majority of the organization’s participants.
* The exact majority rules are defined in the consensus protocol or the smart contract, and will vary from use case to use case. In some countries, like Austria for example, there are trends in the legal literature to see DAOs as a civil law partnership.
* A DAO can be formalized by a smart contract. Use cases range from simple to complex. The complexity depends on the number of stakeholders, as well as the number and complexity of processes within that organization that will be governed by the smart contract.
* Depending on the purpose and governance rules of the organization, these use cases can have a resemblance to companies or nation-states.
* The more centralized governance rules are, the more it resembles a traditional company. In a more decentralized setup, the governance rules might resemble nation-states, automatically steering behaviour with tokenized incentives and disincentives.
* In such cases, the token governance rules incentivize and steer a network of actors without centralized intermediaries, thereby replacing the need for top-down organizations managed by a group of people, with self-enforcing code. Such decentralized organizations can use the legal system for some protection of physical property, but such usage is secondary to the preemptive security mechanisms smart contracts o er.
* A complex stack of technologies, steered by consensus protocols, has to be put in place in order to create a functioning autonomous infrastructure. Their native protocol tokens enable distributed Internet tribes to emerge.
* DAOs are open-source, thus transparent and, in theory, incorruptible. All transactions of the organization are recorded and maintained on a blockchain.
* Interests of the members of the organization are – if designed correctly – aligned by the incentive rules tied to the native token. Proposals take the primary way for making decisions within a DAO, which are voted for by majority consensus of involved network actors.
* As such, DAOs can be seen as distributed organisms, or distributed Internet tribes, that live on the Internet and exist autonomously, but also heavily rely on specialist individuals or smaller organisations to perform certain tasks that cannot be replaced with automation.
* We will likely see many more DAOs, with a wide range of purposes, evolve on top of the technology that Bitcoin once pioneered. In combination with the “Internet of Things,” smart property governance can also be integrated into the blockchain directly, potentially allowing decentralized organizations to control vehicles, safety deposit boxes and buildings.

**5.6 Advantageous & Disadvantageous**

**Advantageous**

* More trust
* All information stored in the blockchain ledger
* Making own Decisions

**Disadvantageous**

* A disputed point is trust. People develop smart contracts. Therefore, you can have errors. We do have to trust them to do their job correctly. One mistake can lead to the failure of the system. Thus, the whole trust lies in the code.