Handelshøyskolen BI

GRA 19703 Master Thesis

Thesis Master of Science 100% - W

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Deltaker

Navn:	Mathilde Gautier og Raphaël Roussel

Informasjon fra deltaker

Tittel *:	Impact of the decentralized economy of the WEB3 on the business strategies
Navn på veileder *:	Espen Andersen

Inneholder besvarelsen konfidensielt materiale?:	Nei	Kan besvarelsen offentliggjøres?:	Ja

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Abstract / Executive Summary

Having an initial interest in new technologies and in particular in blockchain technology, we discovered this year the world of WEB3, an ecosystem that encompasses all the decentralized companies (DApp) located on public blockchains. While learning about this technology and this environment, we progressively noticed a certain theoretical and academic void concerning the study of the business strategies of companies evolving in this domain.

Indeed, this is a new and very specific environment, which does not meet the classical concepts of business strategy as we know them today.

Thus, we decided to structure our thesis around this issue in order to address the following research question : *What is the impact of the WEB3 specificities on the strategies of the companies that evolve in it?*

Having hardly found any literature on the subject, we mainly conducted a quantitative and qualitative study through surveys and several interviews of the different stakeholders in the creation of a DApp.

We then classified and analyzed the several types of strategies specific to DApps: the internal organization of the companies, the technological choices, the financing options, the governance decisions, and finally the issue of community development.

This has allowed us to identify several findings that constitute strategic guidelines or keys to understand and apprehend WEB3 correctly. Among them, we can mention the importance of understanding the ideology of the decentralized web, the value of technology, the implementation of a two-speed strategy, and finally, the need to attempt to widen the market as much as possible.

If they are taken into account, they should allow to understand the strategic challenges of the WEB3 today and therefore increase the chances of success for someone creating his business in this environment.

I. Introduction to the subject of the thesis

  1) The subject of the decentralized economy and why it is relevant

Our master's thesis topic focuses on the strategies of companies in the decentralized economy called WEB3. A decentralized economy can be defined as a type of economy in which no single decision-making center imposes its objectives or rules on the other actors of the economic activity (Ethereum, 2022). Our current traditional economy, on the other hand, is centralized. Buying a house requires a notary, a bank transfer or a loan to be approved by a bank, and it is impossible (or very strongly discouraged) to buy high-value used goods from a private individual without involving a professional company, otherwise, there is a risk of fraud (Samsukha A., 2022).

In the decentralized type of economy, the economic actors carry out peer-to-peer exchanges. To make this possible, the WEB3 decentralized economy relies mainly on blockchain technology, whose technical characteristics we will detail later.

The decentralized digital economy (what we more commonly call the WEB3, as opposed to the WEB2, the web commonly used today) appeared in 2008 and developed strongly since the beginning of the year 2021 (Bitcoin, 2022).

Our master's thesis, which fits into this context, therefore proposes to discuss the strategic issues that companies wishing to develop in this new economy are currently facing. This topicality of our subject is exciting, especially since the novelty of this WEB3 economy makes it a subject that is still very little, if at all, treated. Not having found any study focusing on this particular aspect of the WEB3, we decided to investigate this topic by answering the following research question:

What is the impact of the WEB3 specificities on the strategies of the companies that evolve in it?

WEB3 is developing at a crazy speed, and affects all areas of the economy (finance, art, games, politics, industry ...). The blockchain technology, with its numerous promises and great potential (detailed later), will probably become essential in many fields in the years to come. For these reasons, we believe that

it is interesting, relevant and even crucial to take an interest in the strategies of companies using this new web.

2) Focus on our research question

We will now look in more detail at our thesis problem, which for reminder is "What is the impact of the WEB3 specificities on the strategies of the companies that evolve in it?", and its meaning. As explained above, we place ourselves in a particular economic environment: the WEB3 (the decentralized web based on blockchain technology), as opposed to the WEB2 (our traditional economy) (Wackerow, 2022). What interests us in particular is the adaptation of business strategies used by WEB3 actors to respond to the specificities of this new economic environment. In other words, to what extent does the unique functioning of the WEB3, its constraints and opportunities, impact the strategies of the companies that evolve in it?

By companies we mean the decentralized applications (called DApps), of goods or services, that constitute the WEB3 ecosystem (Breia R., 2022). We will come back to this in more detail below, notably through several examples of DApps. Concerning business strategies, we are talking about all the decisions taken by the different stakeholders of a DApp, with the aim of ensuring the growth and sustainability of the DApp. We will have the opportunity to identify them in more detail in the rest of the thesis, and in particular to analyze them in terms of successful or unsuccessful strategies.

It is important to understand what we mean by the specificities of WEB3, firstly in terms of technical operation, but above all in terms of impact on business strategies. For example, the decentralized operation of WEB3, which eliminates all banking intermediaries for financial transfers between individuals, makes traditional competition between financial institutions on the speed of validation of transfers obsolete (Sverdlik Y., 2021). Similarly, the open source nature of blockchain makes it extremely difficult to build a technological monopoly based on secret technological knowledge. Any WEB3 actor can create a legal copy of an existing DApp and make the modifications he wants if he considers that this will produce an added value (Boyer R., 2022). The particular WEB3 environment forces a large part of the classic

business strategies we know to adapt, to evolve, and even creates new specific business strategies, which would maybe not work on the traditional WEB2.

3) The importance of these strategies for all economic actors (WEB2 and WEB3)

We have so far opposed WEB2 and WEB3 because of their centralized / decentralized aspects. On the other hand, the border between this first economy, currently dominant, and this second one, more recent, is very thin. WEB3 and WEB2 coexist in many areas. The classic actors of our economy all have a counterpart on the WEB3 (Challand R., 2022). Google's search engine counterpart is Brave on WEB3, Dropbox's counterpart is Storj, Zoom's counterpart is Experty, and Twitter's counterpart is Ecency. These are just a few examples, but they are already giants in their field within the WEB3. The strategies they implement, the choices they make and the market shares they gain have a direct impact on the classic WEB2 players. For about 6 months, we, Mathilde Gautier and Raphaël Roussel, stopped using Google Chrome, seduced by the Brave search engine's proposals: faster, more secure, no tracking of our activities, possibility to value the data we create while surfing on the internet, and other advantages (Brave, 2022). And this is just one example. Understanding how to create a successful business on the WEB3 is not only a question for the actors of the decentralized economy, it is a crucial question that affects the actors of the traditional economy as well.

Source: njkhanh

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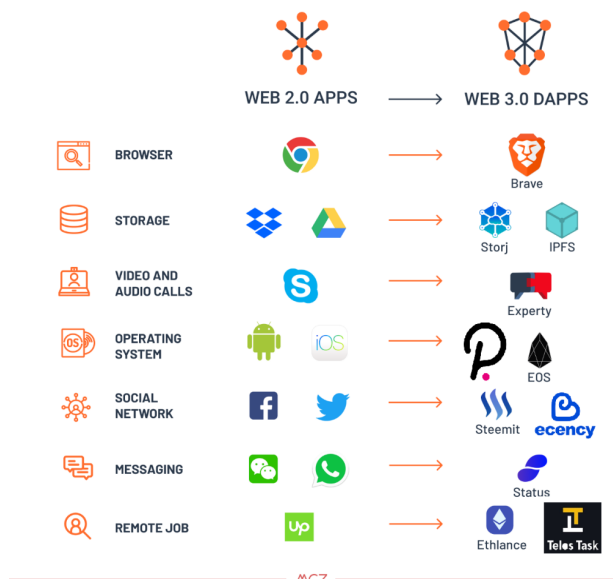
4) Our thesis plan

Due to the lack of solid studies on our subject, and the limited existing literature, we chose to build our thesis mainly around meetings with WEB3 actors. We therefore sought to meet as many and varied stakeholders as possible, and to confront them with our understanding of WEB3 and our theoretical knowledge acquired in business school. We have chosen to rely on these qualitative data throughout this paper to support, consolidate and illustrate our statements. All of these interviews are available in the appendix, alongside the other data used in this paper.

First, we will go over WEB3 in more depth: we will look at its technical functioning by detailing the key points of blockchain technology, then we will review the current state of the sector, and finally we will detail the different key players in relation to the strategies of the decentralized economy.

In the second part, we will look at the strategies specific to WEB3. After studying the specificities of the decentralized economy that make it impossible to use the classic WEB2 strategies, we will look in detail at the WEB3 strategies encountered and analyze them.

In a fourth part, we will detail the conclusions we have drawn from these analyses. We will do so in the form of four recommendations, gathering our advice concerning the impact of the WEB3 ecosystem on the strategies of the companies that evolve in it.

We will end our master thesis with a conclusion of our findings.

II. Understanding the ecosystem of the WEB3

1. Technical presentation of the blockchain environment

A minimum understanding of the technical functioning of blockchain technology is necessary to be able to grasp its challenges. We will therefore define the main terms and detail the functioning of a classic blockchain.

Blockchain - the main principles

Blockchain is a technology for storing and transmitting information that operates without a central control body. The blockchain was born in 2008 with Bitcoin, as a response to the financial crisis of the same year (Bitcoin, 2022).

Originally, it was thought to create this new financial asset - called crypto-asset - managed by an algorithm without the intervention of a central authority.

It is called a decentralized technology because the architecture of the blockchain is built without a central server and because the governance of the blockchain is based on the distribution of power among all users of the blockchain (Buterin V., 2017).

The blockchain is materialized by a database distributed within a community of users. This database, called a registry, contains the history of all transactions made between users since the creation of the blockchain. The transactions are grouped together in a succession of blocks linked to each other by a cryptographic process. The cryptography (from the Greek "crypto" meaning hidden and "graphie" meaning to write) is based on a mathematical "hash" function that transforms incoming data into a unique numerical identifier, the "hash", guaranteeing the integrity of the data (Blockchain France, 2021).
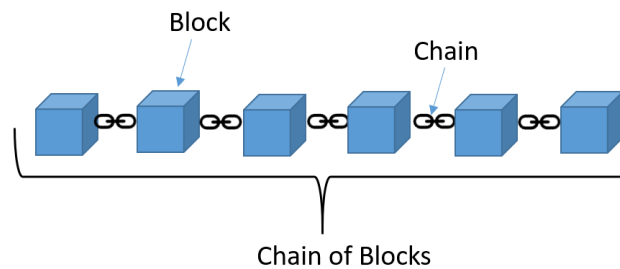
Source: [Medium](#)

Blockchain - its applications

The blockchain is used for two functions:
- First function "**recording and storage**": the blockchain allows to record and store values and transactions just like a notary. Any value or information that enters the blockchain through a transaction is included in a block that is cryptographically linked to previous blocks. As the blocks cannot be modified, the blockchain constitutes an immutable database containing the history of all exchanges made on the blockchain since its creation (ABC de l'économie, 2022).
- Second function "**issue and transmission**": based on this capacity of recording and storing data, the blockchain allows the issue and transmission of native digital assets, such as Bitcoins, but also of

existing assets enriched by a process called "tokenization". Tokenization of a real asset is the conversion of the rights attached to it into a digital record. Thus, it is a way to represent a real estate for example, or a bond, an intellectual property, a currency, in the digital world and to be able to exchange this asset by taking advantage of the mechanisms of the blockchain. Once registered on the blockchain, the token can be exchanged within the community and all the history linked to the holding of this asset is traced in the blocks (ABC de l'économie, 2022).
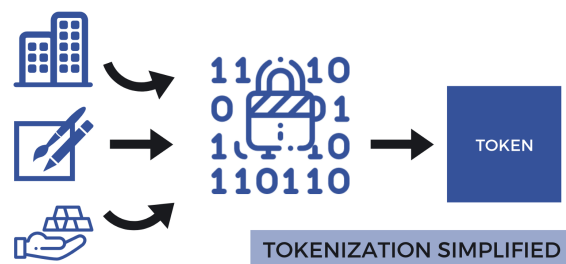
Source: Finyear

Thanks to these two functions "recording/storage" on the one hand and "emission/transmission" on the other hand, the blockchain technology allows people connected in a network, who do not know each other or who would not necessarily trust each other to :

- Free themselves from intermediaries such as banks, clearing houses, custodians, notaries, land registrars...
- Ensure the reliability and security of their operations (ibid).

Blockchain - public vs private

First of all it is important to understand that there are 2 main types of blockchains:

1. public blockchains: access and use are open to all from the internet. Examples of this type of blockchain are Bitcoin or Ethereum;
2. private blockchains, also called "permissioned": access and use are reserved for a limited number of users. A central unit controls access. A

private blockchain is less decentralized than a public blockchain (Iredale G., 2021).

In this paper, we will not focus on so-called "private" blockchains, which are limited to certain users. These are generally deployed within companies, to be used as a database. They can be used for the traceability of raw materials, in accounting, as an ERP, to facilitate audits, etc. We will not talk about the latter, but only about the so-called "public" blockchains, because they are deployed on the Internet, they form the WEB3, and are accessible by everyone, everywhere and at any time. It is this new public economy that interests us and that we have decided to study in this master thesis.

Blockchain - detail of the technical functioning

Private and public keys, initialization of the transaction
The identification of each party (buyer, seller) is done by a cryptographic process. Each user has a private key allowing him to sign his transactions, a public key that can only be associated with the private key, allowing to verify the authenticity and integrity of the transactions, and finally an address, a combination of letters and numbers, derived from the public key and comparable to the identifier of a bank account. The use of the key pair guarantees the integrity and security of transactions between users, each identified by their public address (Cryptopedia, 2022). The transaction between two parties is done by filling in the addresses (to identify the counterparties). Then, the issuer signs the transaction with his private key. The transaction information is then sent to a decentralized network of "nodes" hosted on computers located around the world for public blockchains (Cryptus, 2022).

Validation of the transaction and addition of a block to the chain
To be completed, the transaction will have to be "validated" by the blockchain network. There are several ways to perform this action (which determines who will be able to add the next blocks or not), and this is always done using a blockchain consensus algorithm (Gensler G., 2018). The two most used currently are the Proof of work - PoW (the first one to appear historically) and

the Proof of stake - PoS (more recent, which has become very widespread recently). They are not the only ones, others like the Delegated Proof of Stake - DPoS are very promising, and will probably become a standard in the near future (Bobée F., 2022). We will not go into the technical details of these two consensus algorithms here. To find their in-depth explanation, and the analysis of their advantages and disadvantages, go to "Appendix 1 - Detailed technical functioning of the blockchain technology".

Tokens, DApps, DAO and smart contracts

Now that the functioning of a blockchain has been explained, we will look at what evolves on a blockchain. We will start by studying the different categories of tokens (already discussed above), and their main uses. Then, we will look at DApps (Decentralized Applications), the heart of our topic, before ending with DAOs (Decentralized Autonomous Organizations), which could be considered as DApps with a governance.

1.   Tokens
Definition

What are generically called crypto-currencies are in reality "tokens". They are digital assets, non-duplicable, created and exchangeable on blockchains. Tokens are the cornerstone of the whole ecosystem related to blockchain and decentralization. Beyond trading, tokens are above all essential to interact with blockchains and DApps (Jeanneau C., 2018).

For the record, an asset is something that has a value. And this value can be financial of course, but it can also be a voting right or property for example (Lepage T., 2022). Associated with a blockchain that allows their exchange without duplication, tokens have made possible the digitization of value and its transfer in a decentralized digital environment. Indeed, before the arrival of blockchains, we used to talk mainly in terms of computer files. You could own a piece of music on your computer, which is an asset in the sense that it has value, and send it to anyone while keeping the original. But to be able to multiply an asset without limit is to make it lose its value. This is why the notion of a digital asset that retains its value is considered to have developed

with the invention of Satoshi Nakamoto, the Bitcoin. And tokens are a strategic component of this technological innovation.

Their utility

Once we understand that the main advantage of tokens is that they can be exchanged without duplication thanks to the blockchain, and that they have value, it is easy to find a whole lot of uses for them.

If everyone thinks of course of cryptocurrencies, which are tokens with a monetary value, it is possible to tokenize almost everything. Whether they are tangible assets or not: real estate, shares in the stock market, marriage contract or access right to a specific building for example. Once tokenized, all these assets can be transferred, claimed, exchanged, bought or sold without the intervention of a trusted third party other than the blockchain (Estimbre T., 2021).

The different categories of tokens

There are many types of tokens, each with its own characteristics and functionalities. Apart from the native tokens directly linked to a specific blockchain, which are also called "coins", the other tokens are all issued from smart contracts (Lefèvre R., 2022).

- **Native tokens / Coins**

  Called "coins", the main characteristic of a native token is that it is issued by a blockchain and is essential to its operation. It can be likened to the electricity (the coin) that powers an engine (the blockchain).

  For example, bitcoin is the native token of the Bitcoin blockchain (designated with a capital B). Transferring bitcoins requires paying a fee, also denominated in bitcoins, to the Bitcoin protocol. Likewise, the miners who will enter the transaction into the blockchain will also be paid in Bitcoin (Medipedia, 2018). It is this usefulness that makes the token valuable and allows it to be used as a currency. The other best-known native tokens are Ethereum's Ether, Solana's SOL or the Avalanche blockchain's AVAX.

- **Utility tokens**

This is by far the most represented category. They are tokens that have a specific use in a particular ecosystem. It can be a currency to pay for services, to use a service provided by a decentralized application (DApp) or to obtain a voting right in a decentralized autonomous organization (DAO) among others (Bitpanda, 2022).

- **Security tokens**

    They refer to a claim, when tokenizing real assets, such as a painting, company shares or real estate. They are not the most common tokens, because as they are backed by real assets, they are considered in many countries as financial assets (equity). They are therefore subject to legislation and are more complex to implement. On the other hand, they are also the least risky because they represent a share of a real asset (Bitpanda, 2022).

- **Non-fungible tokens (NFTs)**

    If the news has enormously highlighted the artistic NFTs, especially the various apes avatars that can reach crazy amounts, it is actually much more than that. A Non Fungible Token is a type of token whose usefulness will play a very important role in the future (especially with dynamic NFTs, which we will talk about later). An asset is said to be fungible when it is interchangeable, as it cannot be distinguished from its peers (Futura, 2022). For example, bitcoins are fungible, 1 bitcoin is identical to 1 other bitcoin.

    In contrast, a non-fungible token is unique and identifiable. They are therefore used in digital art, to make a work of art unique, but can be used in an infinite number of other applications: diplomas, copyright protection, transport tickets, intellectual property, voting rights, keys to a safe, etc.
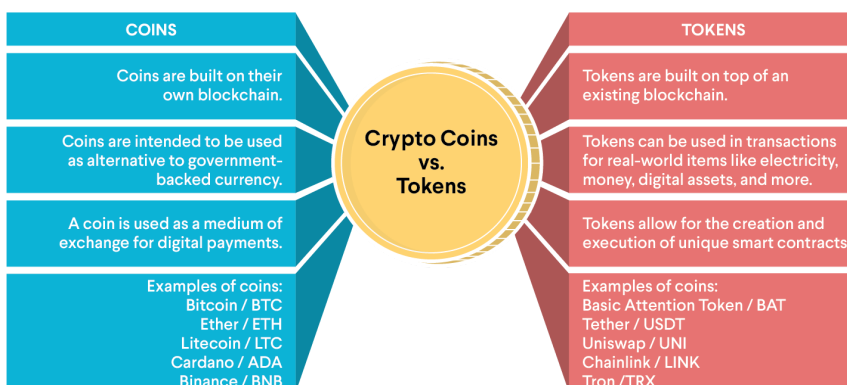
Source: Sofi

To sum up, we can say that tokens are digital assets. The **coins** are used to operate a specific blockchain (Ether for Ethereum for example), on which all **other types of tokens** evolve and can be exchanged (NFT, utility tokens, security tokens, etc.).

2.   DApps

We will not go too much into the details of DApps here, since examples, figures and details on how they work will be discussed later. But generally speaking, a DApp, or decentralized application, is an application that runs on a decentralized network (Lepage T., 2022), as opposed to traditional applications that rely on centralized servers (Blockchain France, 2018). Most often, it has several other characteristics:

- Its computer code is entirely open source.
- It does not need a central authority to function: it makes direct peer-to-peer interactions between users possible, via smart contracts.
- It uses a cryptocurrency or a token.
- The data is stored in an encrypted and transparent way on a blockchain (Blockchain France, 2018).

3.   The DAOs

A DAO (Decentralized Autonomous Organization) is an organization whose rules of governance are automated and immutably and transparently written in a blockchain. According to Stephan Tual, co-creator of TheDAO project in 2016: "It is an incorruptible form of organization that belongs to the people who helped create and fund it, and whose rules are public. So there's no need to trust anyone, because everything is in the code, auditable by everyone." To function, a DAO uses smart contracts, autonomous programs that automatically execute predefined conditions (Blockchain France, 2016). We detail what smart contracts are just below, and will come back to DAOs, their benefits and how they play a role in business strategies later in the paper.

4.   Smart contracts

Smart contracts are irrevocable computer programs, deployed on a blockchain, which execute a set of pre-defined instructions. The main idea behind this

concept of smart contracts is to guarantee the binding force of contracts not by legal law, but directly by computer code: "code is law", to quote Lawrence Lessig's famous formula (2000).

Their complexity depends on the role they are intended to play, and varies from one smart contract to another. The vast majority of smart contracts are used to automate token exchanges, and implement simple conditions using functions such as "if this... then that..." (if one or more specific conditions are met, then the smart contract automatically executes a predefined action) (Bobée F., 2022).

Simplified example of a smart contract allowing to buy the NFT "Master Thesis", giving access to our paper, by imagining that this NFT costs 1 Ether.

> *If - 1 Ether is sent to this blockchain address*
> *Then - Send an NFT "Master Thesis" to the sender's address*

Other more complex smart contracts seek to replicate all the clauses and rules that allow companies to operate, as in the case of a DAO for example. It should be noted that complexity is often the enemy of security, and that the more complex a smart contract is, the greater the risk that it has a vulnerability (Chapelle P., 2022).

All accounting entries relating to transactions of digital values carried out by smart contracts are systematically recorded in the blockchain. In this way, all asset transfers are public, predictable and irrevocable. Anyone can verify on the blockchain the proper execution of the smart contract and determine to whom the digital asset has been sent, i.e. who is the owner. Smart contracts therefore guarantee an extremely robust system of execution conditions, which leave no room for doubt or confusion (Collins P., 2021). The conditions are very clearly set in advance and the interpretation of the code is unambiguous, unlike human interpretation, which always leaves room for negotiation or the discovery of a legal vacuum. It is smart contracts that allow the creation of the decentralized economy of the WEB3, replacing trusted intermediaries by a public and robust code (ibid).

How a smart contract works

Source: Bitpanda
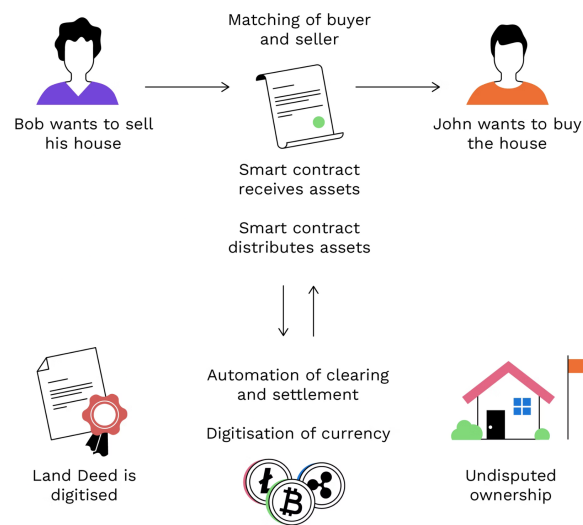
2. State of the Sector

The WEB3, the sector that includes all the DApps developed on public blockchains, has experienced a significant boom, especially since 2021. Indeed, the number of daily Unique active wallets connected to DApps increased seven times during the year, reaching an all-time high of 2.7 million at the end of 2021 (DApp Radar, 2021).

There are several reasons for this rapid expansion. First, the success of bitcoin, which reached record highs in value throughout 2021. We have also witnessed a change in the mentality of the general public with a gradual adoption of the technology by institutions, states such as El Salvador (De Kerchove Dexaerde Y., 2021) or even banks such as JP Morgan which launched its own cryptocurrency, the JP Morgan coin in 2020 (Whittemore N.,2020). Similarly, there is a growing interest in blockchain technology in several sectors, such as the supply chain, gaming or the banking sector. Finally, and this will be developed further in this section, since 2021 there has been a particular popularity of NFTs, which have led to exchanges worth several million dollars this year (Wavestone, 2021).

All of these elements contribute to the notoriety of the technology and to the expansion of the audience familiar with this environment. Moreover, despite

the scarcity of blockchain developers, the technology is developing at an incredible speed, surpassing the limits of the first blockchains, contributing to the emergence of new opportunities and the development of the sector (Lepage T., 2022).
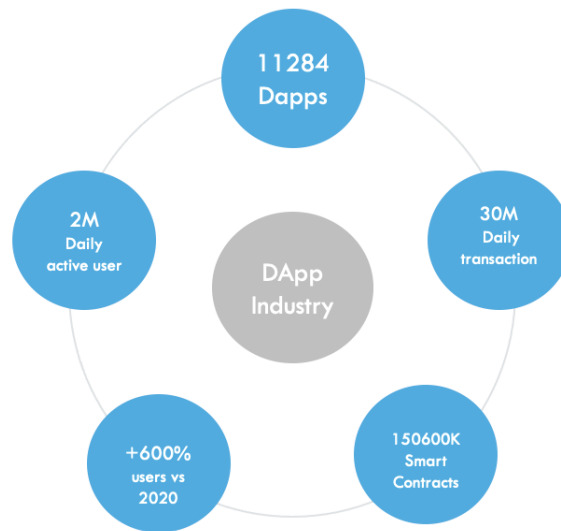
From Dapp Radar, Industry Overview, 2022

Protocols used

Since Ethereum was initially created to support DApps, it is the historical blockchain that dominates the market in terms of value. However, blockchain technology is evolving very fast, and new blockchains that are more efficient, cheaper, more scalable and environmentally friendly are being developed more and more. Thus, more and more DApps are developing on this type of protocol (Lepage T., 2022). For example, Binance Smart Chain (BSM) is leading the market in terms of volume with around 30% of daily users. However, if we look at the volumes, that is to say the total amount of incoming value to the smart contracts, Ethereum and BSM are close to each other, sharing the largest share of the total (DApp Radar, 2021).

DApps Types

If we look closer to the DApp industry and the different protocols on which DApps are built, we can point out two major DApp categories that are dominating the market: games, with around 50% of daily users and DeFi (decentralized finance) with 30% of daily users (DApp Radar, 2021).

The video game sector is one of the most important because it is currently one of the sectors where blockchain technology offers the most opportunities. Indeed, among them we can think of NFTs, wallets, and live WEB3 which give another dimension to gaming (a16z, 2022). Thus, 20% of NFT sales in 2021 were in gaming, and 49% of crypto-wallet activity came from games (Ibid.). Gaming is also successful because of the users' profile: gamers, because of their proximity to the computer field, are the most likely to have a certain interest in the world of WEB3 and blockchain. A good example is the French startup Sorare, specialized in NFT for sports and fantasy soccer, which raised 150 million euros in 2021, making it the biggest fundraising in the history of French Tech (Wavestone, 2021).

The DeFi is also the other main sector of WEB3, first of all because originally the blockchain through Bitcoin was created to offer an alternative to the traditional financial and banking system, which was decried from all sides in 2008 and was perceived as too centralized. The main objective of DeFi is to recreate the financial ecosystem that we know today, by eliminating trusted intermediaries such as banks, opening access to all financial services and products (means of payment, loans, savings, investments, etc..) anonymously and securely, it is in direct competition with the current banking monopoly (Jeanneau C.,2019). The sector is growing enormously today, from 15 to 80 billion dollars between January and August 2021 (Wavestone, 2021). For example, Maker DAO is a lending platform where users can borrow the stablecoin DAI, which is leveraged against the US dollar. The DAI crypto currency has a 24-hour trading volume of $134 million, with a market cap of $746 million (Coin Market Cap, 2022).

Trends

Today, the fastest growing type of DApp is the Non Fungible Token (NFT) market. Indeed, the NFT market has seen some of the most impressive growth since last year, with over $23 billion in transactions by 2021 (DApp Radar, 2021). Its success can be explained by an unprecedented media hype, in particular linked to the participation of celebrities such as Eminem or The Weekend, who have sold pieces of music or works of art in the form of NFTs (Sexer N., 2021). This craze has also been marked by historic record sales such

as Beeple in March 2021 which exceeded $69M. Since then, global NFT volumes have exploded and hundreds of millions of dollars are exchanged each month, creating a real speculative bubble around this concept of digital uniqueness. Similar to DApps, NFTs are mainly used in the gaming and DeFi sectors. For example, the French DApp Cometh, which allows users to own yield-generating NFTs, combining the features of DeFi and NFTs into a single gaming experience, recently raised over $10M (Marin M.,2022). Today, the NFT sector is exploding, and everyone is talking about it, which is generating a lot of liquidity, while there are very few people who actually have in-depth knowledge of it, creating a major information asymmetry (Lepage T., 2022). As a result, as soon as there is someone who has some knowledge, it is very easy to raise capital. One can sometimes see a disappointing side to it because all the projects are not at all interesting and lack added value (ibid). Moreover, this craze around NFTs overshadows other much more interesting projects such as some DAOs in the field of large-scale, decentralized and frictionless collaboration (ibid). For example, the DAO Crew 3, currently under development, offers to gather people around a single project with several tasks. The goal is that a certain number of tokens will be released upon completion of the task. The system is informed of a completion of a task by a peer to peer review system. We can see the interest in the adoption of this type of tool by companies which finally allows us to measure and quantify the collaboration of people, and to remunerate them precisely for their work (ibid).

Graphs

Data collected from DappRadar, Industry Overview (2022).
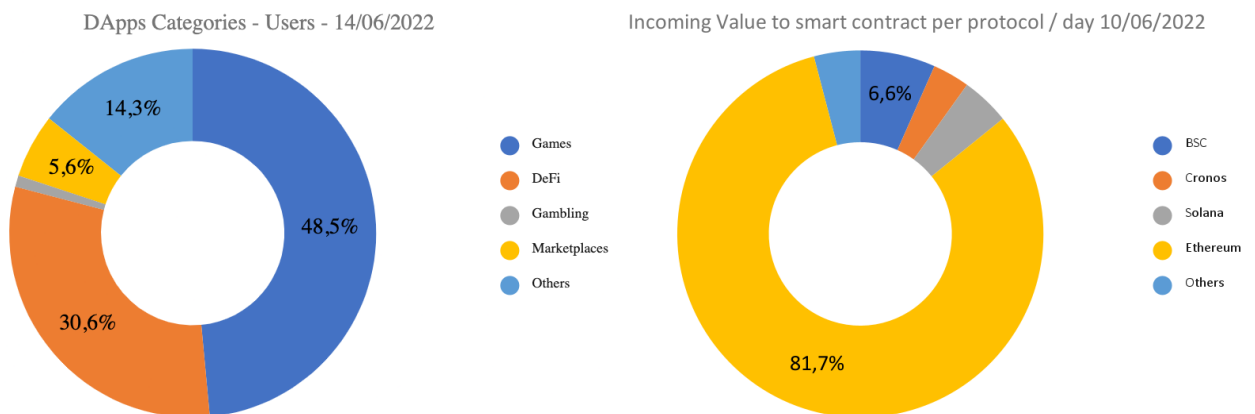
Users per Protocols- 14/06/2022
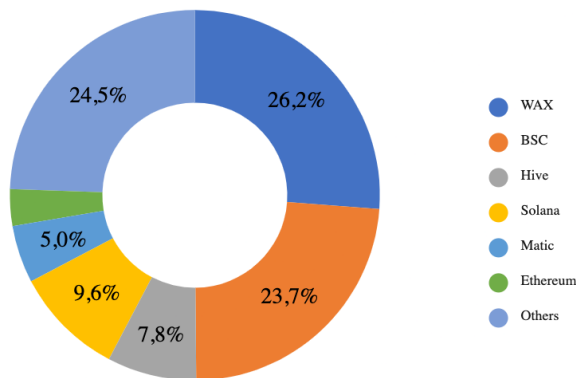
3. The various stakeholders

We are now going to identify and look at the different stakeholders that together compose the value chain of a WEB3 company. We will take the following general situation: an entrepreneur decides to create a classic WEB3 company, a DApp, which is intended for users from the general public (like ourselves), and therefore to deploy it on a public blockchain.

In this case, we have identified 4 specific actors:

1. *The creator of the DApp and his team*

2. *Actors external to the creator's team, but who still participate in some way in the successful launch of the DApp*

3. *The final users, or customers, of the DApp, who will use the product / service that the DApp represents*

4. *Finally, in a fourth section, we will look at the DApp itself (and in particular in its form of DAO when it exists) as an almost full-fledged actor in the WEB3 value chain*

1) *First, let's look at the actors at the very basis of any WEB3 company: the founder and his team*

In the same way as for a company evolving in the traditional WEB2 ecosystem, the tour starts with an entrepreneur deciding to launch a business project. The steps of creation of a WEB3 DApp is very similar to that of a classic web tech startup (Strøm J., 2022).

From a first idea, the entrepreneur-founder will try to build a team with all the necessary talents for the successful launch of the DApp. We find the usual

needs: finance, marketing, communication, sales, etc (ibid). Compared to a classic startup, there is also a need for advanced technology in the field of blockchain, and sometimes in cryptography (if the DApp's team plans to create its own blockchain for example). It is also necessary to have a web developer, to create the site that will bridge the gap between WEB2 and WEB3. Of course, it often happens that these talents are recruited as freelancers. A single entrepreneur can ask for a simple landing page, a smart contract and the DApp is up and running (Lepage T., 2022). It is however more difficult to successfully develop the DApp in the long term with such a strategy, as the business and technical skills needed to grow and scale the DApp may be missing.

(We interviewed Pierre Chappelle & Jan Strøm, see Appendix 2 & 5)

2) *Some actors, although outside the DApp creation team, play an important role in its successful launch.*

This is particularly the case of investors who, in the event of a fundraising on the part of the DApp, or ICO (Initial Coin Offering, i.e. the possibility of buying a certain quantity of tokens before the DApp's launch). The latter can invest alone as individuals making an online investment, be it companies, investment funds, tech incubators or banking institutions (Chauvin A., 2022). Finally, the current trend sees the emergence of a growing number of "launchpads" (crowdfunding platforms), allowing investors to gather in groups and access private sales, reserved to the members of these groups.

(We interviewed Antoine Chauvin, see Appendix 4)

3) *Naturally, the end users and potential customers are the keystone of the value chain*

As for any B2C business, end customers (their number and their purchases) are the first growth factor. The size of the "community" (the users of the DApp, who own tokens for speculative purposes or to use the service) is crucial, and often differentiates a successful DApp from a failure (Strøm J., 2022). These "token owners", whether they are companies, investment funds or individuals, are characterized by two things:

- they own a wallet on a WEB3 blockchain

- they have stored tokens of the DApp in it

(We interviewed Tanguy Lepage & Antoine Chauvin, see Appendix 3 & 4)

4) *The DApp, or rather the smart contracts that make it up, can even be considered as a link in the value chain, especially in the case of DAO*

Indeed, unlike a classic startup, the smart contracts that enable the DApp to operate on the blockchain where it has been launched are autonomous and can never be stopped. Therefore, the DApp, because of its autonomous and perennial behavior, can be approached as a 4th link of the value chain (Chauvin A., 2022). This vision of the DApp is all the more accurate and necessary when dealing with a DApp possessing a governance system: a DAO. The DAO, although governed by lines of code (smart contracts once again), must be approached as an entity with a behavior, operating rules, and reacting in a precise way according to the information received (we talk about input and output). If we look more closely at the case of DAOs, we can even identify a final category of actors, or rather a subcategory of end-users. These are the end-users (i.e. those who own tokens linked to the DApp) who can participate in the governance of the DApp, because of the tokens they own, their seniority or their number (see the section on governance, explained above). The latter are in a way particular end-users (ibid).

III. WEB3 strategies - categorization and analysis

Discrepancies between WEB3 and WEB2 business strategies

Now that we have a better understanding of how blockchain technically works, and the state of the WEB3 industry, it's time to turn to the strategies of companies in the decentralized economy. As introduced at the beginning of this master thesis, we postulate that the technical and contextual specificities of WEB3 impact the strategies of companies evolving on the blockchain. We seek to demonstrate that it is necessary for DApps to adapt the classical strategies used in our traditional economy, or even to invent new ones. To do so, we will start by showing that some of the most common WEB2 business strategies are

not relevant in WEB3. We will then try to explain in detail the reasons why these strategies cannot work in the decentralized economy of the WEB3.

1. Three classic WEB2 strategies, difficult to use in a decentralized economy

A strategy omnipresent in the digital sector: the technological advantage.

The current digital giants we know as GAFAM (Google, Apple, Facebook, Amazon and Microsoft) have in part built their business model on the creation of powerful and innovative software (Bastien L., 2022). Facebook's algorithm, Google's search engine, Apple's operating system, Microsoft's applications, all these programs are characterized by a computer code owned by the company. It is this code that defines the functioning of the application, and therefore allows its use. Because these digital applications are unique and the result of a lot of work, their code is kept secret. This is what makes the technological advantage of these digital giants (ibid). If everyone could copy and paste the code of the Google Chrome search engine and browse the Internet at will without using Google's services, the company would no longer make money from it. Keeping the functioning of their service secret is one of the necessities to keep their technological and thus competitive advantage.

On the WEB3, this kind of digital program is deployed on a blockchain in the form of smart contracts. These are also computer programs, made up of lines of code, that allow applications to run. However, unlike WEB2, everything published on a blockchain is open source, including the source code of the smart contract (Ethereum, 2022). The algorithms are accessible to any individual in the community, and can be replicated by them in a legal manner. Websites such as Etherscan, a Block Explorer and Analytics Platform for Ethereum, make it extremely easy to view any block, transaction or smart contract on the blockchain Ethereum (Etherscan, 2022).

Although it is possible to stand out with an innovative algorithm, and therefore to be very successful, it is necessary to keep in mind that this success cannot be translated into a technological advantage in the long term, since there is no secret (Edwards A., 2021). Of course, what is around the smart contracts (the

website, the marketing, etc.) can be the subject of technological secrets (the functioning of a website for example), since all that is located on the WEB2 and thus functions like any traditional company. But the part located on the blockchain, which is the heart of any DApp (or else the company is not a WEB3 DApp but a traditional company) has to face the open source rules of the blockchain technology. It is therefore impossible (or very difficult) to build a business solely on a strategy of technological advantage in the long term, which can be overtaken at any time (Chapelle P., 2022).

The economic situation of monopoly

Strictly speaking, a monopoly is a situation in which a supplier has an exclusive position on a product or service offered to a multitude of buyers (Linternaute, 2022). This situation, when it is legal (since monopolies are strongly regulated by governments to prevent any abuse), is extremely comfortable for the company in a monopoly situation. The advantages that can be derived from this are multiple: supremacy on its market, very high market power, free pricing, as it is not subject to competition, strong negotiating power towards employees, customers and suppliers, absence of competitors, etc (Lévêque F., 2019).

To show the differences between WEB2 and WEB3, we will take the example of the company Meta (formerly Facebook). After its creation in 2004, the company, a pioneer in its field, quickly became the market leader in social networks. In its wake, other social networks have tried to emerge, but because of Facebook's quasi-monopoly position, it has never been easy (Adkens S., 2020). A potential competitor often faces two barriers when trying to innovate to compete with Meta: either the inability to migrate enough users to its service, or a takeover by Meta. This was the case with the promising Instagram in 2012, WhatsApp in 2014, and an attempted takeover of Snapchat in 2013 (ibid). It is extremely difficult to stand up to such an economic giant. According to Chris Hughes, "Zuckerberg's company controls more than 80 percent of the world's social networking revenue. It attracts 2.3 billion users each month (Vittori J-M., 2019). The group's other networks further strengthen its power: 1.6 billion customers for the cell phone application WhatsApp, 1.3

billion for instant messenger Messenger, 1 billion for image sharing Instagram. (Vittori J-M. , 2019).

Facebook's overwhelming presence makes it nearly impossible for a competitor to emerge. In WEB2, if a user is not satisfied with the service that Facebook offers and would like to make a change by offering a slightly modified Facebook as an alternative, it is impossible. But in WEB3, at any time, it is possible. You just have to create a "fork" (Boyer R., 2022).

A fork is an event on a blockchain that copies the original software and adds the desired changes (ibid). It is what we could call an "update", with the difference that it is not necessarily initiated by the owner of the software, since there is no real owner of the software on the blockchain (it is all the owners of tokens who, in a way, own the software). Since the two blockchains cannot coexist (the "initial" one and the "modified" one), the new blockchain splits into two branches, forming a fork-like detour from the main blockchain (ibid).

In our example of Meta, this would mean, for example, as a user of the service who is not completely satisfied with the software, copying and pasting the Facebook code with a slight modification (limiting the number of comments under a post for example). On the WEB3, if a fork is successful because it corresponds more to the needs of the users, or because it is more promising, it can even attract more people, and end up overtaking the initial software, becoming the reference.

This fork logic ("hard fork" or "soft fork" depending on the importance and compatibility of the changes, and if they affect the consensus rules), combined with the transparency of information, does not prevent the formation of monopolies. However, a monopoly will only be a monopoly if it is the best and only solution, and not because it prevents the emergence of its competitors (like Facebook with the purchase of its potential rivals). Relying on its monopoly (or quasi-monopoly) to crush present competition and prevent any future competition is therefore not a viable strategy on the WEB3 (Joshi R., 2021).

The exploitation of users' personal data.

To finish this study of the current economic strategies of the WEB2, which do not work on the WEB3 (or at least would not be viable), we will look at the

user data. When we browse the Internet, our activity leaves traces and characteristics that are exploited by a lot of companies (Bastien L., 2022). Email address, date of birth, weight or even musical tastes, love situation, sexual orientation allow to draw up a rather precise profile of our personality. In an economy based on digital development, data is the new raw material that digital companies are looking for. The most common business model is the one of free software, whose revenues are generated by the selling or renting of our user data (ibid). As they say: "if it's free, you are the product". There are many examples: Google, Facebook, Apple, Amazon, harvest our personal data and trade it, but they are not the only ones. It is important to understand that any activity on the web, generates data, and that any data (personal or not), has a value and can be sold. Typing a search in Google, clicking on an image, listening to music on YouTube, stopping my cursor on an Amazon product, the time at which I buy my train ticket on an application, the location from which I place my food order, etc. All this information, coming from my activity on the Internet, is of interest to companies. Whether it's for targeted advertising, identifying new trends or customizing a user experience, it can be used. This is how WEB2 works: seemingly free services, because the user is not aware of the wealth he creates at any given moment, simply by surfing the web (ibid).

But it doesn't work the same way on the decentralized WEB3. The very principle of WEB3 is to give back to the users the control of their data (Ethereum, 2022). Because they are no longer obliged to go through central authorities concentrating power and sucking up data, they can now recover the added value they create by surfing the web (Joshi R., 2021). Let's take a concrete example with the Google Chrome browser. Using this search engine is free, but the first search results are always sponsored content, and the data resulting from my search (what I am interested in, what words I have associated together, what date or place I have searched, what recipe, etc.) are retrieved by Google which can then rent them to third-party companies. In WEB3, if I use a decentralized search engine such as Brave (already mentioned above), I get back the value of the data I contributed to create as a token. I can then, as a user, distribute these tokens as I see fit (ibid).

Now that we have seen that some classic WEB2 strategies cannot always be used successfully in WEB3, we will try to clarify the reasons for this difference.

Those reasons come from the specific technological functioning of blockchain technology. We will quickly go over some of these characteristics.

2. Specificities of WEB3 at the origin of these differences

Transparency of information

This is the very principle of a blockchain: any user has access to the history of transactions, and can verify the content of the blocks of the blockchain itself. But from an economic point of view, the implications are numerous. This "transparency", which brings us closer to an economic market of pure and perfect competition, removes any bias of information and forces companies and consumers to play cards on the table (Pignot L., 2022). The WEB3 economy is not and will not be a war of information and information asymmetry, but an economy based on transparency, which forces competition to shift to other strategic dimensions, such as profitability, quality or innovation.

Transaction security

This second technological aspect is probably the most emphasized characteristic of blockchain technology. Security is at the heart of blockchain's ideology and operation. It allows to remove an important economic constraint: trust in others (Pignot L., 2022). Where WEB2 could have trust issues on some second hand, niche or emerging markets, regarding the risk of being ripped off, WEB3 guarantees a perfect value exchange. No matter who the buyer or seller is, the guarantee that the transfer of value from one to the other will take place without any hindrance allows to considerably enlarge the economic possibilities (ibid). For example, anyone can become a creditor of another individual, without worrying about whether he or she will be repaid, or whether the contracting party is secure, validated and backed by banks and

insurance companies. The possibilities of economic exchange are multiplied, while promising extreme security in any occasion (Ethereum, 2022).

Decentralization of power towards the consumer

The third and final point we wish to address concerns not only the decentralized nature of the WEB3 , technologically, but also its ideology of putting value in the hands of the users (Ethereum, 2022).

This is the keystone of WEB3: the end user owns the added value he contributes to create. The power of decision shifts from the company, all powerful and central in WEB2, to the user in WEB3. The user can no longer be constrained, captured or dependent on the company. On the contrary, it is the user who decides the value of a DApp, by buying and selling directly the tokens of the latter (ibid). The whole strategy is then turned towards a single economic factor: the final satisfaction of the user. It doesn't matter how strong a DApp is, how old it is or how big it is: what matters is its value proposition for the end user. If its added value is acknowledged, then it will gain popularity, increase its community, the value of its token and grow. If not, its token will lose value and the DApp will be forgotten. No matter how strong the market is, the interest of the final consumer is the only judge that counts on the WEB3, it makes the law (Strøm J., 2022).

These characteristics of the WEB3 environment and the impact they have on business strategies are the reason why studying and understanding the strategic changes needed to adapt them to DApps is crucial. After defining precisely what we call "WEB3 strategies", and the criteria according to which we evaluate them, we will try to categorize the different strategies of the decentralized economy that we have encountered.

3. Criterias and definition of DApp strategies

Our objective is to take the DApps as a subject of investigation, and to study the different strategies that are available to them in order to be successful in this new environment. We aim to study the different strategies, that is to say the different choices in several domains that the creators of these companies have to make in the process of creating their decentralized application. In

short, our goal is to study the development process of a DApp and to identify the best choices to make. The objective is also to highlight the strategic distinctions between a purely WEB2 company and a WEB3 company. A DApp can be seen as any start up. Thus, it needs a person who has an idea and who will then convince and recruit a team (Lepage T., 2022). This person must therefore first answer certain basic questions, such as what is his or her value proposition, how will he or she develop it, what are the target users, and, in the case of WEB3, this person must also be able to justify the usefulness and added value of WEB3. Indeed, choosing the WEB3 implies evolving in a very specific environment, and sometimes too few people really ask themselves the question of the WEB3 utility. WEB3 can be perceived as an opportunity, but it can also create certain constraints (ibid.).

Some of these criteria are classic and common to WEB 2 companies, but WEB 3 requires a different approach because the environment is different. Others are totally related to WEB 3 (technical and governance choices for instance). Thus, among the choices that lead to different possible strategies, we can mention : the usefulness of WEB3 with respect to the project, the structure of the company (the actors, the organization), the technological choices, the funding, the implementation of a governance system, the marketing strategy.

Finally, we can differentiate the strategies put in place before the launch of the DApp, such as the marketing release strategy, the organization of the company and the value proposition, from the strategies developed over the long term, throughout the life of the company. That is, once the DApp is created, what are the means to make it last over time? Insofar as smart contracts are not modifiable, how does this impact the company's strategy? How can the company adapt to an extremely fast-moving technological environment?

In order to make the right choices, it is also necessary to take into account the environment of DApps, i.e. WEB3. What are the characteristics of this environment? How can we describe the competition? What are the different types of DApps?

These criterias are defined in order for the DApp to be successful. We have chosen to interpret the success of a company by its capacity to last in time, i.e. to succeed in gathering enough customers and users in the long term. Indeed, it is not only a question of being able to raise millions, or to acquire value

(market cap) very quickly for the company to be truly successful, these are indicators of success, but of an ephemeral success. This is even more true in the field of WEB3, which is evolving at a very fast pace, where thousands of projects are being developed, and which is characterized by a particularly high price volatility.

According to State of the DApp data published in June 2022, of all DApps launched or being created, only 52.3% of them are live. And almost 25% have been abandoned. This means that today, 1/4 of all WEB3 projects fail. This may not seem like much when you know that between 80 and 90% of classic startups fail (Muriuki P., 2021). But it still represents a significant percentage. Our objective is to understand the reasons why these DApps were abandoned, if they are particular to WEB3 or not, if they are similar reasons. We can notice that there are also 1,3% of broken DApps, which means that they also sometimes face technical difficulties. Furthermore, we can note the high share of DApps in development, almost ¼ are either in Beta phase, WIP phase or only prototypes. This shows that the sector is extremely dynamic and that the number of new DApps is constantly increasing.

4. What are the WEB3 strategies ?

In the following section, we will analyze the data we have collected, especially during our various interviews. Our purpose is to identify the different business strategies that WEB3 companies are facing. We have classified these strategies as follows:

1) Company organization related strategies
2) Technology related strategies
3) Finance related strategies
4) DAOs & governance related strategies
5) Community related strategies

Before we discuss these five strategic areas in detail, we would like to address the issue of the type of project selection, which is done before any other WEB3 strategy, and is a strategy by itself. By mapping the DApp market in the second part of our thesis, we detailed the different sectors in which WEB3 was the

most successful. These include Gaming and Finance (DeFi), which attract the most users, make the most exchanges, and the most profit (DApp Radar, 2022).

Three main areas of projects

We have identified a total of three main areas of projects on the WEB3 : decentralized goods and services, decentralized finance (strongly linked to pure speculation), and the experience of an entertaining environment.

First of all, it allows decentralized goods and services, without intermediaries, which result in rethinking the place of the user by really considering them at the center of the project. This is among other things the objective of DeFi, which is offering to replace the current financial system by eliminating all trusted third parties (in this case banks) (Jeanneau C.,2019). This is also the case of several social networks that are being developed on WEB3. The idea here is that the user is the owner of his content and his data, unlike current social networks. For example, VojVoj, a Norwegian Dapp under development, aims to create a "responsible social network" insofar as the application does not own any content, there is no sale of any data to a third party, and the user owns its content (Strøm J., 2022).

Another interest that users can come to look for via a blockchain project is of course speculation, and especially since the success of NFTs this year. WEB3 is perceived as a set of projects in which it is particularly profitable to invest. This speculative craze is also visible through the numerous and important fundraising campaigns carried out by WEB3 start-ups (Lepage T., 2022). However, even if it is true that some projects become very profitable and lucrative, it is sometimes difficult to detect a project that will be successful. These are investments that are quite risky and the value of some crypto-currencies are sometimes very volatile. For example, the blockchain expert and professor at the Isae-Supaero school in Toulouse, Jérôme Lacan, told us that it was actually quite complicated to identify a successful project. He himself witnessed a very promising project, developed by a very famous cryptographer, which had managed to raise millions of dollars, only to fail very quickly after.

Finally, the last service that WEB3 provides is entertainment. Notably through video games, which represent a large part of the DApps developed today, but also more recently with the enthusiasm around the Metaverse.

The question now is to ask ourselves how these different types of projects impact the strategies pursued by DApp creators. For example, if the objective is to create a gaming DApp, are there any strategies to favor? A type of blockchain to choose more than another? A marketing strategy to follow? In other words, what are the different strategic implications depending on these three types of projects?

1) *Company organization related strategies*

How does the structure of a DApp differ from other WEB 2 companies?
What are the choices that the founders face when they create a company and need to recruit a team? Are there better choices than others and are there constraints? Our study is partly based on a study conducted by "Women in Blockchain" and "ValuesIndex" in 2021 and 2022, entitled "Know your worth in WEB3", which was completed by 219 people working in the WEB3 environment. Among the questions asked were mainly questions around income, but also information on the way of working and organization of the companies concerned. We had access to the raw data which is open data, which we then exploited and analyzed.

Who does a DApp need ?

Compared to a classic startup, a DApp needs one or more blockchain developers. According to the study conducted by Women in Blockchain and ValuesIndex, WEB3 companies are composed of more than 35% of developers. These are highly rare people to find, as there are very few of them, especially in Europe, most are located in the United States (Lepage T., 2022). Especially since DApps often need several developers at the same time. For example, the startup NXT Pop is composed of 25 full-time developers (Lepage T., 2022). This scarcity is explained by the fact that the technology is still quite recent, thus it is still a niche sector. Another reason is that the technology is also evolving very quickly, and that developers need to keep up with it, and

follow the evolution of the technological environment very closely (ibid). The majority of blockchain developers have requests either from start-ups or from individuals (Chapelle P., 2022). The requests they have to answer are systematically to code one or several smart contracts, more or less complex, and in different languages depending on the blockchain on which they are deployed (Ibid.). Today we see more and more No Code tools emerging that allow to easily add WEB3 in an application, like the company Starton which managed to raise 4,5M recently (Lepage T., 2022). This allows to facilitate and make the WEB3 more accessible, and partially solves the problem of scarcity of developers. However, if someone really wants to understand and master the development of the technology, it remains extremely complex and not very accessible.

The other needs of a DApp are relatively more traditional, i.e., people working to develop the business: 24% (Women in Blockchain and ValuesIndex, 2022), designers in order to design the web interface or the NFT if it is an NFT business (Lepage T., 2022). We can also emphasize the importance of marketing teams, especially web marketing and community managers who have the task of gathering the community, especially via tools such as Discord and Twitter. They represent more than 23% of people working in WEB3 (Women in Blockchain and ValuesIndex, 2022). Insofar as the environment is extremely competitive and very particular, gathering a community can be especially long and complicated (Lepage T., 2022). Thus, some community managers and community builders are specialized in WEB3 and are paid a fortune; their objective is to establish links between the DApp and other communities to which they have access (Ibid.). It should be noted that the marketing strategy of DApps will be developed further later.
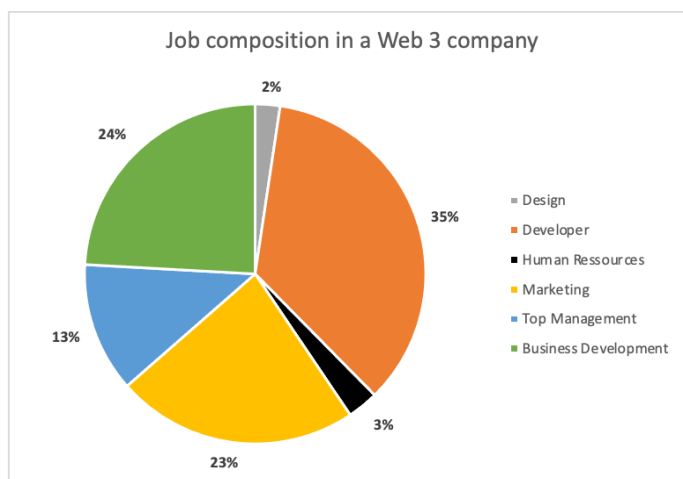
Internal organization of the company: physical decentralization

The main characteristic of these companies is that they are totally decentralized, also physically and in the way their teams are organized. Employees are often recruited on a full time basis but can in most cases work 100% remotely. According to the survey conducted by Women in Blockchain and ValuesIndex, 82% of people work full time and 11% freelance (others are interns or part-time employed). According to the same survey, 70% of respondents work 100% remotely, and 18% in hybrid, leaving only 12% of employees working on site.

Similarly, on the scale of France, traditionally very centralized around Paris, especially on the economic level, the blockchain ecosystem tends to be more and more decentralized year after year (Wavestone, 2021). In addition to the Start Ups relatively present in the Paris region, real incubators such as Just Mining, IExec or KeeeX are developing in other cities such as Lyon, Marseille or Nantes (Ibid.).

This particular organization is primarily due to the nature of the company, which is inherently decentralized. It is therefore logical that DApps are also physically decentralized. It is also a type of business that was born from the beginning in this way. So there is no problem here to move from a face-to-face to a remote mode as many classical companies have experienced since the health crisis. It is thus a new vision and way of perceiving the company that is emerging here.

This mode of operation is further reinforced by the context, which is the scarcity of talent, especially blockchain and smart contract developers. They are often freelance employees and work for several companies and projects at once.
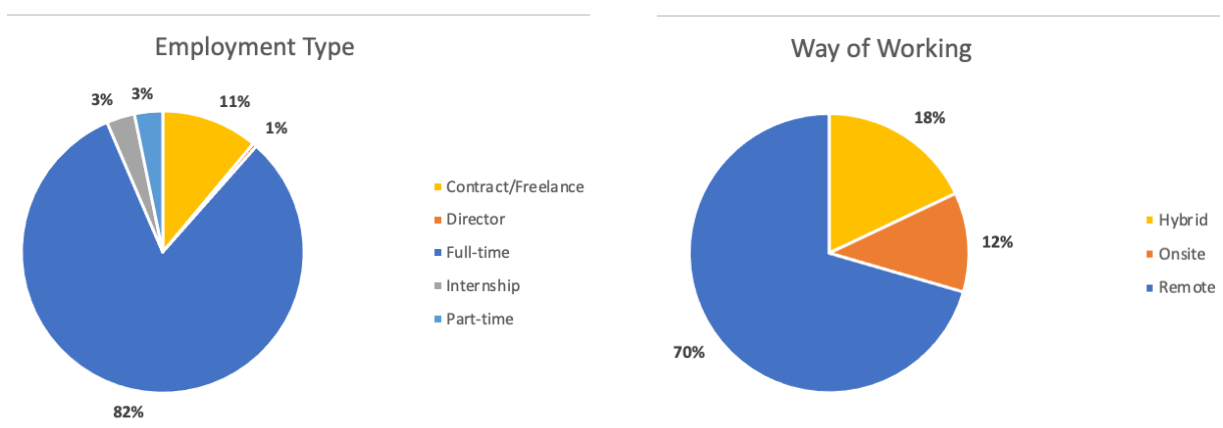
2) Technology related strategies

We are talking here about the business strategies of DApps, decentralized applications evolving on a blockchain. It is not surprising, in such a particular environment, that technology is an important dimension, if not the most important, of WEB3 companies (J. Strøm, 2022).

Strategic decisions related to technology touch two main dimensions of the DApp:

- the choice of blockchain
- the choice of consensus

The choice of blockchain

This is a crucial question for any DApp project. The choice of blockchain has many consequences. To understand them well, we need to look at the blockchain trilemma.

Defined by Vitalik Buterin (Buterin V., 2014), The Blockchain Trilemma addresses the challenges developers face in creating a scalable, decentralized and secure blockchain without compromising on any aspect.

Blockchains are often forced to make compromises that prevent them from achieving all three aspects:

1. Decentralized: creating a blockchain system that does not rely on a central control point.
2. Scalability: the ability of a blockchain system to handle a growing number of transactions.
3. Security: the ability of the blockchain system to function as intended, defending against attacks, bugs and other unforeseen problems (Buterin V., 2014).

Source: Ledger

35
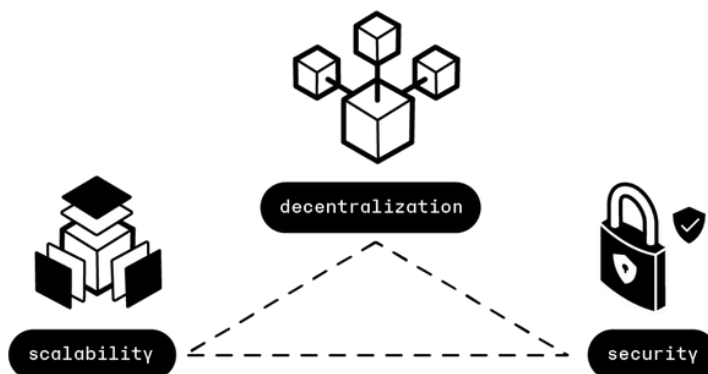
Any blockchain attempts to address all three of these aspects, but all three are difficult to achieve (The Dapp List, 2020). Most often, a blockchain succeeds in addressing two of these three criteria, at the cost of the third one. Very high scalability is often at the expense of high security, very high decentralization can be detrimental to scalability, etc (Shrimpy Team, 2021). The Solana blockchain, for example, is known for its scalability. It can perform 50,000 transactions per second, more than 7,000 times more than the bitcoin blockchain (Solana, 2022). On the other hand, it is less secure than Bitcoin or Ethereum, and more prone to bugs or attacks. Bitcoin and Ethereum have succeeded in being extremely secure and decentralized blockchains, but their scalability is extremely poor, and the growing number of users makes the cost of transactions increasingly high (Fabien, 2021).

As you can see, the choice of the blockchain on which to develop a DApp has a huge influence on its future use (J. Strøm, 2022) . Choosing security, for a financial DApp for example, will most often be at the expense of greater scalability. Choosing an extremely scalable blockchain, to reach a maximum of people, and to benefit from a strong growth, is done at the expense of a greater decentralization and increases the risks of being exposed to a security problem. Although choosing to develop a DApp on a blockchain already existing, functional and having already its community is the easiest and fastest, there is also the possibility to deploy its own blockchain. Requiring a higher technical knowledge, and therefore more financial, human and time resources, this choice offers the advantage of being able to create a custom blockchain perfectly adapted to the needs of the DApp (Iredal, G., 2021).

The choice of consensus

Furthermore, the choice of blockchain also decides which consensus algorithm will be used. As mentioned above, the main ones are Proof of Work (PoW) and Proof of Stake (PoS). Each has its own advantages and disadvantages (Grings, 2021).

- *PoW advantages*

The PoW algorithm is the more secure of the two. Indeed, it would require an attack mobilizing at least 51% of the power before being able to hack the network, which is almost impossible as soon as the network size is sufficient.

- *PoW disadvantages*

The PoW algorithm is extremely energy intensive, due to the ever increasing difficulty of mining. This also poses a problem of decentralization, because by increasing the difficulty of the mathematical problems, we see the emergence of huge mining pools (grouping of miners) that hold a large part of the power of the network (Grings, 2021).

- *PoS advantages*

This algorithm is more recent, and also aims to correct some of the shortcomings of the Proof of work. Thus, it offers a better scalability (capacity of adaptation of a network to a strong demand) with much faster transactions, and at lower cost (Frankenfield J., 2022). In addition, the Proof of Stake algorithm requires significantly less energy and is therefore much more environmentally friendly.

- *PoS disadvantages*

Contrary to PoW, which is very secure, for PoS it is only necessary for a malicious entity (which can be a group of users) to gather 51% of the issued tokens, and it will become almost untouchable and will be able to attack the network. Moreover, to be able to forge blocks in PoS, it is necessary to put a minimum number of tokens into play. If this minimum is too high, especially in terms of price (e.g. minimum 32 ETH= ~$60,000), only those who can afford it or the pools (grouping of forgers) will be able to build blocks, which is a limit to the decentralization of the network (Frankenfield J., 2022).

Beyond the technical specificities of the blockchain (scalability, security, decentralization, which consensus algorithm), the choice of the blockchain also takes into account the community that evolves on it. We will come back later on to the importance of the community for the success of a DApp project, but it is already important to understand that the more the community evolving on a specific blockchain is important, the more the number of potential users and

the volume of transactions on the DApp will be important. This will have a strong impact on the success and growth of the DApp (Pierre Chapelle, 2022).

Finally, the last point concerns the links between the different blockchains, called "bridges". Bridges are links between blockchains, which allow tokens from blockchain A to be exchanged and used on blockchain B. Although this is rare, some blockchains are bridged with very few other blockchains, and this can bring the risk of isolating the blockchain, and limiting the use of tokens and the attraction of new users (Blockchain bridges, 2022).

Comparing Different Blockchains

nft now	Ethereum	Solana	Binance Smart Chain	Tezos
Native Token	ETH	SOL	BNB	XTZ
Year Founded	2013	2017	2021	2017
Block time	12 sec	400 ms	3 sec	30 sec
Transactions per second (actual)	13-15	3000	60	40
Programming Language	Solidity, Vyper	Rust, C+, C++	Solidity, Vyper	Michelson* LIGO
Consensus mechanism	PoW**	PoH, PoS	PoSA	LPoS
Scalability	Limited scalability	High performance protocol for scalability	Multi-chain solution offers better scalability	Medium scalability
Fees	High	Low	Medium	Medium

*there is also SmartPy, a development tool that enable the production of smart contracts (scripts in Michelson)
**Ethereum 2.0 will migrate to Proof of Stake

Source: NFT Now

3) Finance related strategies

We will now focus on strategies related to the financing of DApps. Due to the decentralized architecture of the blockchain environment, the financing of a DApp is done by raising funds in exchange of DApp tokens, allowing not to concentrate all the tokens in the hands of a single actor. This is called an ICO (Initial Coin Offering). We will see in detail how it works, and what are the different types of ICO and their advantages and disadvantages.

An ICO is the equivalent of an IPO (Initial Public Offering) but in the crypto-currency world (Herbst T., 2022). Unlike an IPO, no need for a lawyer, no need for a bank loan, not even a license or to follow any regulations, just a crypto wallet is enough. More generally and without comparison to the stock market, an ICO is a fundraising in crypto-currency whose counterparty corresponds to tokens or cryptos specific to the funded DApp project (ibid). This financing system radically changes the way funds are raised.

(For more details on the history of ICOs and examples, see Appendix 1.1)

There are 3 main categories of ICO: private ICO, public ICO on a launchpad, and public ICO on the market. We will see the characteristics of each in detail.

● Private ICO

A private ICO offers pre-issued tokens to a limited and selected group of investors, often in a pre-sale event ahead of a public ICO. It is not announced publicly on the networks, and only the experts in the field, who follow everything that happens, are aware of it and participate in the fundraising (Herbst T., 2022).

It has the advantage of attracting WEB3 experts, often ready to invest large sums of money, and if it goes well, it is usually a quality signal for future investors. It is also a way to investigate the market for the DApp project. A private ICO that does not raise enough funds will not suffer too much from public opinion, and can improve its offer before trying a future ICO.

Not all DApps do private ICOs, and a private ICO is not always followed by a public ICO, although this is often the case.

- Public ICO on a launchpad

The Launchpad, is an investment environment specific to ICOs on the WEB3. They are places (online) where new DApp projects sell a certain amount of tokens at a low price, as long as the company is still in its launch phase (Eyebe P., 2022). Investors who buy these tokens will be able to make a profit if the company continues to grow as promised. The process is similar to a private ICO, except that investors must be members of the launchpad on which the ICO is taking place. A Launchpad is publicly open to everyone.

Investors who wish to do so can become a "member" of the launchpad, for a financial entry fee, which allows them to access the ICO projects of the launchpad (Zonebitcoin, 2021). Several levels of membership exist, allowing to participate in the ICO earlier or later, and to invest more or less important maximum amounts.

The best known launchpad at the present time is DAO Maker, with over 85,000 new users in 2021 (Florent C., 2021). Like most launchpads, DAO Maker requires the user to have a certain number of DAO tokens, in order to participate in funding a project on the launchpad. Currently a minimum of 2000 DAO tokens is required (valued at about $2628 in June 2022) (Evans J., 2022). Each DAO token gives the right to one unit of "DAO Power". Then, users invest their DAO Power in the DApp projects for which they want to participate in the ICO. All users who have allocated DAO Power in an ICO then participate in a huge lottery, to determine who will receive DAO tokens. The more DAO Power that is allocated, the higher up the lottery the user reaches and the more likely they are to win tokens from the DApp in question (ibid).

Tranche	Lower Bound (Inclusive)	Upper Bound (Exclusive)
Tranche 5	50,000 DAO	-
Tranche 4	25,000 DAO	50,000 DAO
Tranche 3	10,000 DAO	25,000 DAO
Tranche 2	4,000 DAO	10,000 DAO
Tranche 1	2,000 DAO	4,000 DAO

Source: Medium

Launchpads are not only opportunities for investors, they are also very attractive for DApps. Indeed, launchpads are a security guarantee for investors, who know that the DApp they are going to invest in is not a scam (even if they have no guarantee that the DApp's tokens will increase in value). They are therefore more likely to choose to invest in the DApp, and in larger amounts (Florent C., 2021).

But the main advantage of using a launchpad for a DApp is that the launchpad brings them a community by taking care of all the communication and marketing part of the project. To participate in an ICO, launchpads usually ask the investor to share posts of the DApp on Twitter, to join a Discord or Telegram network, and to answer a Google Form survey (ibid).

● Public ICO on the market

Public ICOs on the market are numerous, but have a very bad reputation. There is a high risk of scamming, with DApps disappearing overnight, having successfully raised funds and sold all their tokens, resulting in a crash in the value of investors' tokens (Grobys K., 2020). It is therefore strongly discouraged to try to finance your DApp with a public ICO fundraising on the market, the general opinion of the WEB3 communities on the subject being pretty negative.

● Flash Loans

Another way to raise funds is through a Flash-loan. However, this is more like a very short-term loan than a growth fundraiser.

The Flash-loan is an instantaneous loan with no counterparty risk, which requires no collateral, provided that it is repaid in a single transaction on the blockchain (Barthelemi S., 2020).

In practical terms, this means executing a financial transaction smart contract, in which the user borrows a large sum of money, without collateral, because the smart contract continuation uses this sum in a financial operation intended to make profit (Vasile I., 2022). Most often this means buying and selling a large number of tokens in a short period of time, betting that their value will increase in the market during the interval. Being able to make an immediate loan without collateral is a huge advantage, but the risks involved in such a practice are high (ibid), so it is not recommended to rely on this innovation, even less in a perspective of long-term growth of a DApp.
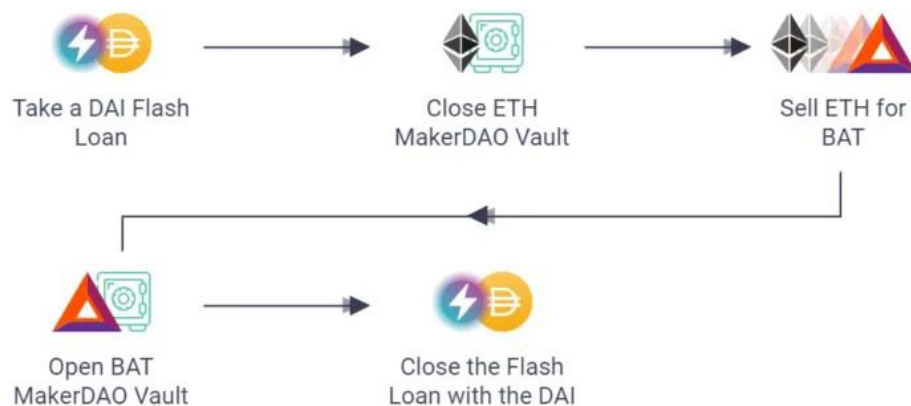
Source: BeinCrypto

● Tokenomics

Finally, the last purely financial dimension linked to DApps strategies concerns tokens. This economy of tokens is called "Tokenomics".

What is called Tokenomics (composed of the words Token and Economy) represents, for a crypto project, the way in which the creation of tokens for the proper functioning of the project will be managed (Aymar, 2022). There are three essential components to the token economy : total supply, emission, distribution.

- Total supply

The total supply represents the maximum quantity of tokens that can be issued by the DApp, in accordance with the functioning of its smart contracts on the blockchain (Aymar, 2022). In this case, a distinction must be made between available quantity and total quantity. The available quantity represents the number of tokens already issued at a given time "t", which anyone can buy on the market. The total quantity represents the maximum quantity that the number of tokens in circulation will eventually reach. For example, in the case of Bitcoin, 21 million tokens will be mined on this blockchain, no more, no less.

- Emission

It is the quantity of tokens created and paid out to the validators of a blockchain according to a determined period of time (Aymar, 2022). Indeed, the validators of a blockchain network earn rewards for their participation in the operation of the network: first, a certain amount of tokens issued for each new block created, and second, the transaction fees paid by the network user.

- Distribution

Most public blockchain projects provide for the distribution of a share of the total supply to certain actors or for certain specific uses (Aymar, 2022). This is especially the case in the case of ICOs, aimed at investors, but it can also happen through the use of DApp services to reward active users, or reward loyal users over the long term, users participating in the development of the DApp, etc. Several distribution models often coexist.
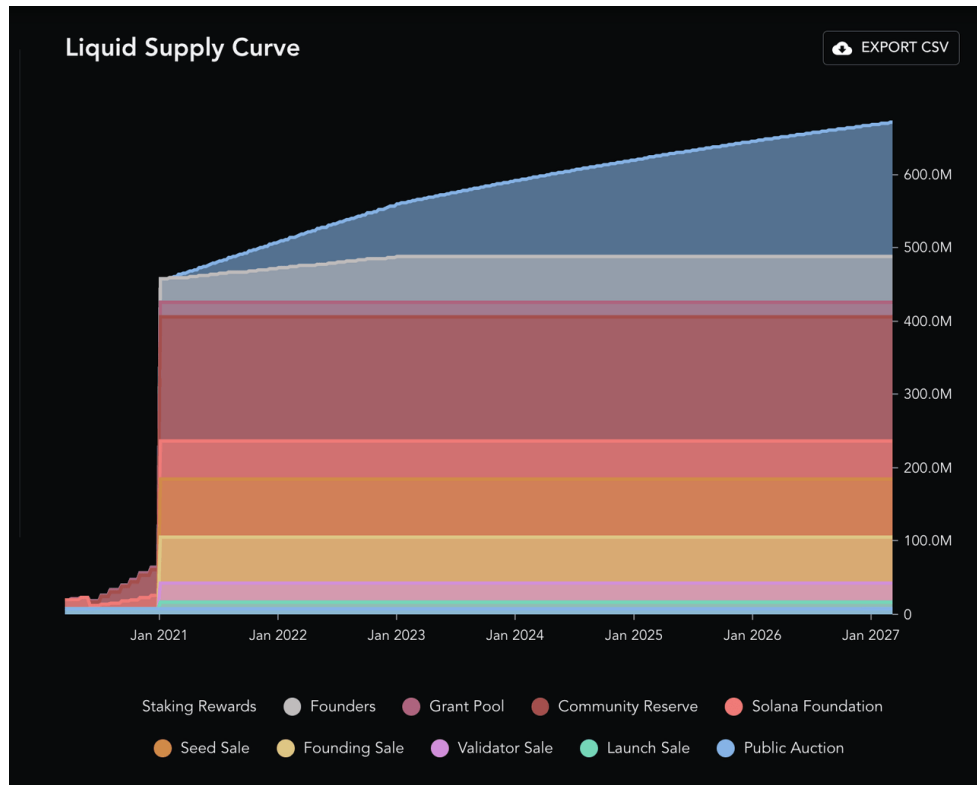
Example of distribution on the Solana blockchain (*Source: [SeekingAlpha](#)*)

- Two predominant token economy models

There are many different token strategies, using these three dimensions in different ways. In this paper we will focus on the two most common ones.

1. The quantity-limited disinflationary model

It consists in having a limited quantity of tokens associated with a monetary issue that becomes less and less important over time (Skalex, 2018). This is the way Bitcoin works, but many cryptocurrencies are governed by this model, it is possible to mention Solana, Litecoin, BAT, Tron, etc.

2. The inflationary balance model

Many blockchains have been created without defining a limited amount of token issuance. This choice can be made for various reasons, usually involving the use to be made of the blockchain in question. For example, the Ethereum protocol operates under this model. However, some mechanisms are put in place to limit inflation, or even to create a deflationary system (Cassidy, 2019). The most common system is the "burn" system, in which a part of the fees paid

by Ethereum users will not be returned to the validator, but simply removed. This could not only achieve an equilibrium with the rate of issuance, but potentially lead to a decrease in the amount of tokens in circulation in case of high network usage (ibid).
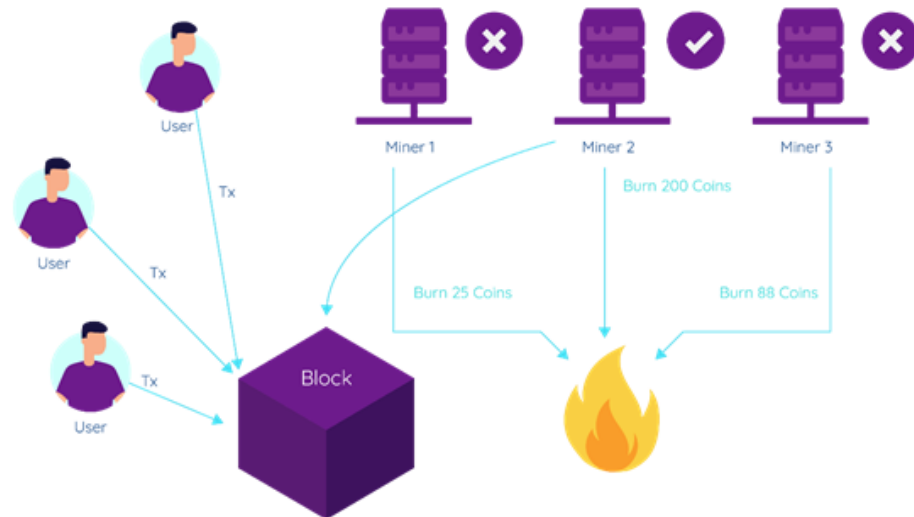
The Theory of Burning in Crypto Tokenomics (*Source: [WazirX](#)*)

Both models have their strengths and weaknesses, but we will not go into more financial details about them. An example of advantage, concerning Ethereum, is that the white paper of its creator indicates that a stable emission rate would allow to avoid the too strong concentration of wealth in the hands of a few actors/validators.

4) *DAOs & governance related strategies*

Definition and technical explanation

A decentralized autonomous organization (DAO) is an entity without any central governance, hosted on a public blockchain. Decisions are made by a community through an electronic voting system, and a set of defined rules (Ferec A., 2022).

DAOs open the door to many opportunities for collaboration through a decentralized governance mechanism. Indeed, the fact that they are hosted on a blockchain allows them to have special characteristics. For example, no one can manipulate the financial accounts if the DAO is properly programmed and

secured. The whole process is transparent. The trust of the stakeholders lies in the computer code, which is fact-based, objective, and simply performs the tasks requested (Ferec A., 2022).

Thus, DAOs, in theory, do not represent a single application but rather a firm that does not have a typical physical structure. The idea is that it runs entirely autonomously, with humans (as users) having voting power in some procedures. DAOs, unlike conditional transactional programs, are not built and maintained by firms with profit motives because they are "owned" by the users (Cointelegraph, 2022). In other words, it is a large-scale collaboration tool, totally decentralized (Lepage T., 2022).

Technically, smart contracts are used to build the DAO's rules chosen by a core team of community members. These smart contracts set the foundation for the DAO's activities. They are obvious, verifiable and publicly auditable, allowing any potential member to comprehend how the protocol will operate at all times fully. After that, a DAO treasury is financed by issuing tokens, granting token holders the right to vote on the project's governance issues. Finally, a DAO is deployed after the financing part is finished (Cointelegraph, 2022).

Here is a comparative table that highlights the different characteristics of DAOs compared to traditional companies.

DAO	Traditional Organization
Horizontal hierarchy, more democratic	Pyramidal management, strict hierarchy
Members vote on each suggested change in the DAO	Voting is not always required, depending on the type of organization.
Once the vote is done, the changes are implemented automatically, without depending on a third party	After a vote, a person or team is responsible for implementing the decision
The services offered are decentralized and executed autonomously	A human intervention is necessary to validate the actions and execute the requested actions
All activities are public. The data is available in a transparent way	Access to information is limited, some activities may be private

Different types of governance

The majority of DAOs work through a system of governance tokens, which are crypto-assets. Thus, owning governance cryptos allows you to vote during proposals, the more governance tokens you own, the more important your vote is, these cryptos are bought and sold on exchange platforms and it is possible to obtain governance tokens using the services of the DAO in question (Ferec A., 2022).

Pierre Chapelle, whom we interviewed, created his own DAO on this system and described the different stages of collective decision making: "I integrated a voting system to make decisions. Each person in the vote has a different weight. The more Ethers you have, the more weight your vote has. Every time a decision has to be made, we put the decision down, and everyone votes." He summarized the process in five different steps:

1) The DAO collects the investors' money in Ether, this allows to define the weight of the votes

2) Each participant follows the contribution of the investors in relation to their shares, in other words, everybody visualizes the weight of each investor.

3) Investors are allowed to create proposals. This can be any type of proposal: increase the total number of tokens, change the name of the Dapp…

4) Investors are given the opportunity to vote.

5) Finally, the proposal that wins the vote is executed.

Voting can be done in different ways. The simplest system is to tell investors to go to Discord, an online platform widely used by gamers, to vote on a private channel. The reactions expressed on this private channel are then counted as votes (Lepage T., 2022). Afterwards, we can have more advanced systems with holographic consensus, which will succeed in compiling the scalability, resilience of voting systems (Ibid.).

Different types of DAOs

The first DAO was created in 2016, called "The DAO", developed on Ethereum, it realized at the time a fundraising of $150M. The objective was to

create a capital fund whose risk is controlled directly by investors through specific tokens publicly available. This allowed individuals to invest in a venture capital fund by buying tokens made available by the platform, but also allowed them to vote for which startup they wanted to invest in. The application offered a new governance system, decentralized, democratic, transparent, and automatic. This allowed it to have a huge success from the beginning, and the DAO gathered 14% of the ether in circulation at the time, which would represent several tens of billions of dollars today. However, the technology was not yet fully developed, and the smart contracts had not been sufficiently tested and audited. The application was the target of an attack by hackers who exploited a flaw in the code. This caused a very important fall of the Ether, and even the creation of a hard fork which permitted to split the blockchain in two parallel versions. This event permanently shook investor confidence in the DAO and Ether (Money Radar, 2022).

Even today, the most important DAOs are still evolving in the DeFi world. Such as Maker DAO, created in 2014, today the 2nd most valued DAO; allows its users to borrow and repay loans. One of the crucial interests of DAI (its token), is the flexibility and interoperability of its protocol, i.e. its ability to automatically interact with other smart contracts. Thus, third-party applications can use Maker's service loans to build their own use cases. The platform also has a governance token, the MKR, which allows its holders to vote on certain parameters of the protocol, such as loan collateralization rates. This system allows to keep an active and committed community in its maintenance (Ibid).

Other projects are emerging in different areas. For example, the Crew 3 project, currently under development, is a productivity tool aiming at the completion of several tasks. Thus, a certain number of tokens will be released when a task is completed, and there is a peer review that informs the tool if the task is completed or not. If it was used in a company, we could think of a system without a fixed salary, where each collaborator would work at the hourly level he wants, knowing that he will be paid as much for a task. The token is here a way to quantify people's collaboration (Lepage T., 2022).

Finally, we are now seeing more and more charitable DAOs whose objective is to fund projects. This results in an increase in the influence of NGOs and their ability to take concrete action. By distributing tokens, these organizations encourage users to contribute in a selfless way, as traditional NGOs do. The fact that tokens retain a market value after they are issued also provides an opportunity for investors to generate value by reselling them, creating a double incentive. One example is the still-developing DAO Krause House, which aims to acquire and democratically govern an NBA team (Money Radar, 2022).

Objectives and interest

DAOs can thus be considered as the next step of human collaboration, after companies. For example, if we push the idea to the end, we could see a country as a DAO (Lepage T., 2022). The country would be organized in such a way that everyone would see where their taxes are going, each citizen would have a different decision-making power depending on their knowledge and the level of impact a decision would have for example (Ibid).

The technology is not yet developed enough to see DAOs develop on this scale in the near future, but we can very well see DAOs developing as mission driven projects where there is a mission, funds allocated, and lots of sub-projects inside, prioritized and organized and in which anyone can get involved (Ibid.). It is thus a very ambitious model, full of promise, with the potential to change the societies in which we live.

Finally, other people are less enthusiastic about this. According to them, the concept is not revolutionary, and it already exists on platforms like Discord where many projects ask for regular feedback from the community on development options. Moreover, some limitations make these organizations sometimes unstable (Chauvin A., 2022).

Limitations of DAOs

Indeed, there are still a few blind spots.

First, these completely digital organizations are also more susceptible to hacking. Nobody is really responsible for security, since everything is decentralized. Moreover, few investors are really able to identify whether a smart contract is completely secure. That's why it's crucial to learn about DAO

audits performed by independent experts (Binance Academy, 2022). So, is the technology mature enough to offer a sufficient level of security to protect its organizations in case of attacks? Today, DAOs do not have traditional finance security nets, the code is the law. This puts a lot of pressure on the shoulders of programmers since the slightest flaw can put applications at existential risk (Money Radar, 2022).

A second limitation is the legal status of these companies (Ibid.). Indeed, the regulatory environment surrounding DAOs is completely uncertain. It remains to be seen how different jurisdictions will create the regulatory framework around these new types of organizations. However, this still uncertain regulatory landscape could also be a significant barrier to the adoption of DAOs (Binance academy, 2022).

The level of decentralization of a DAO can also be questioned. Indeed, DAOs allow more participants to collaborate than ever before, but the governance rules defined in the protocol will always be a point of centralization (Ferec A., 2022). In addition, if a small number of members own most of the tokens (and thus "votes"), and only a few big wallets control the DAO, an imbalance may be created that limits the positive effects of decentralization (Chauvin A., 2022).

Finally, DAOs may be less efficient than traditional organizations. Because decision-making in a DAO is based on consensus - through voting - decisions can be slow. This can delay the completion of tasks and reduce the productivity of the organization (Ferec A., 2022).

5) Community related strategies

We are now going to consider the building process of a community when creating a DApp. To succeed in gathering a community of users and to maintain it in the long term is for DApps a crucial strategic stake, not to say the most important. There is therefore a double objective:

(1) How to attract users in the first place?

(2) How to maintain users on the platform and retain them in the long run?

To do so, DApps need to implement a specific marketing and communication strategy that we will examine in this section.

A niche market: indeed, few people are finally particularly interested in this market, the majority of users correspond to a particular type of customer. For instance, only 5% of the population owns a wallet (Strøm J., 2022). For the moment, it is difficult to target the general public, even if with the NFT boom this year, the market is growing a little. But it remains a niche market because first of all there is a barrier of technological understanding at the entrance which is still not negligible. You need to have a certain affinity and knowledge of the WEB3 and crypto world to have access to it, just to create a wallet for example. In addition to having the knowledge, you need to be interested and convinced enough to invest in projects (Chapelle P., 2022).

The offer is rapidly expanding: as mentioned before, the number of DApps is exponentially increasing especially since this year with the increase of NFTs projects. This results in a multiplication of the offer. Potential users are therefore faced with a very, even too large number of proposals. WEB3 projects must therefore be able to distinguish themselves from the others, from the crowd (Lepage T., 2022).

Projects are facing a very short timing: it is a market where everything goes very fast, especially from a technological point of view. It is necessary that the development of the DApp, as well as the marketing campaign is set up in a very very fast way. This issue is all the more complicated to master as gathering a community is the longest, most tedious and risky part of developing a WEB3 project (Lepage T., 2022).

An environment that changes the codes of classic marketing : As it has been developed before, because everything is transparent and accessible to all users. It is as if all the customers of a brand had access to all the results of the company. The idea is that you can't really hide anything from the users (ibid.). For example, if a DApp didn't manage to sell a whole collection of NFT, this information is visible to everyone. The trust of the users is therefore more complicated to acquire, and especially to maintain. Another important aspect is

that, contrary to WEB2, users fully own their data, and it cannot be exploited without their authorization. WEB3 companies must rethink the user, and not see him/her as a simple number in a database. This configuration forces businesses to create a direct and stronger relationship with their customers, and especially to show them how they are also winners within this relationship.

Thus, the marketing strategy of a DApp is not only crucial to its survival, but above all very complicated to implement and manage successfully, because of this very particular environment, in which distinguishing oneself from others is more complicated, and where it is as crucial as it is difficult to gain the trust of users (E. Couvat, 2022). Thus, the marketing put in place by a team must be substantial otherwise it will be difficult for them to make a place for themselves in the crypto space (Chauvin A., 2022).

This is illustrated by the large proportion of people working in marketing according to the survey conducted by "Women in Blockchain" and "ValuesIndex" in 2021 and 2022. Indeed, it is the second largest job position with nearly 23% of the workforce.

Job composition in a Web 3 company
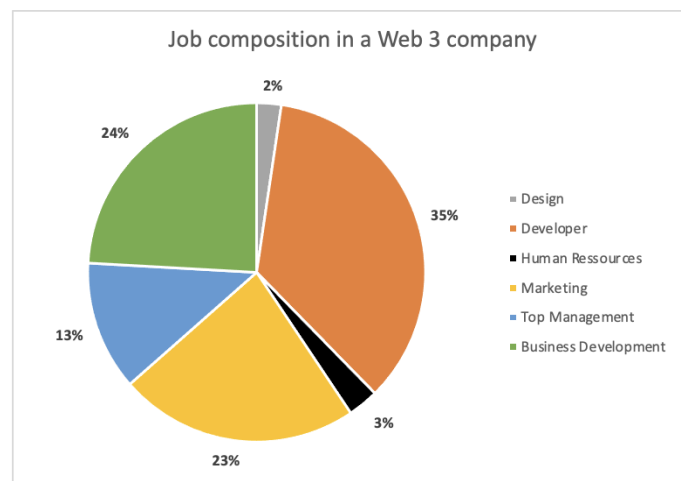
Targeted Users

Before elaborating on the marketing strategies, we decided to analyze the different types of users that a DApp can target. We have identified 2 types of users.

First, we can target a WEB3 user, interested and convinced of the interest of investing in this kind of asset. He has already assimilated and acquired a

speculative interest but not necessarily an attraction for a particular type of product. He is particularly sensitive to certain criteria such as the reliability of the technology, the value of the DApp's token, the added value of the project or the promise of a gain in the more or less long term, and the notoriety of the project within a community. The challenge here is to convince them to invest in a DApp and not in another. It is therefore necessary to succeed in making a good communication around the project and the added value proposed.

Then, we can target external users to WEB3, who do not have any knowledge of this environment but who have an affinity to the offered project. For example, fashion or gaming. Several objectives must then be met. First, the project must be communicated, then it must be convinced of the added value of the project compared to traditional WEB2 companies. Finally, the WEB3 project must be easy to access for users (user friendly).

Marketing and Communication Strategies

The marketing strategies used to capture these two types of users can be divided into three axes, or three different needs, all three of which must be properly executed.

First, the community management. It is about creating content on different platforms around the project, in order to manage the existing community, thus making it last in time, but also to make it grow. The tools used are different depending on the targets we aim at. For example, for the first type of user described above, it will be a process of managing the community on platforms such as Discord, Telegraph or CryptoTalk, which are very much used in the WEB3 environment (Lepage T., 2022). More precisely, community managers will be in charge of moderating the application's chat on these platforms, informing customers about the application (such as NFT's launches, for example) and exchanging ideas about their expectations. These people, specialized in WEB3, are also quite rare to find, very much demanded on the market, and paid a fortune (Ibid). In this case, it is therefore a very direct communication, which is targeted in a very precise way to a particular type of person. Regarding the second type of user, the objective is to generate content on social networks, and manage the social media accounts in a more traditional

way. The social platforms mainly used are Facebook, Instagram, Medium, Twitter or the LinkedIn corporate page (Ibid.).

The second objective will be to generate traffic, and to build customer loyalty. The tools used for this are more classic. Indeed, it will be a question of creating and managing advertising campaigns on several specific WEB2 sites. Among the targeted sites we find the classic Facebook, Twitter, Instagram and Linkedin, but also websites specialized in the WEB3 environment such as Etherscan, DAppRadar and Bscscan. There are also broader media platforms such as Reddit or Medium (Lepage T., 2022). DApps can also make their project known by signing partnerships with influencers or well-known personalities in the targeted environment. For example, VojVoj, a Norwegian DApp currently in development, suggests creating a social media only for skateboarders. To develop and boost their user base, they regularly contact well-known skateboarders to create partnerships or content directly on their platform (Strøm J, 2022). So we can see that in this case, traditional WEB2 marketing strategies are also used.

Finally, the creation of content and an efficient and ergonomic packaging is the last brick to conduct a complete and successful marketing strategy on the WEB3. Indeed, having a successful user interface is, as for any company of the WEB 2, the element that will make the link between the customer and the company, it is the window of the company. It is therefore a central element to attract customers and to guarantee the quality of the company. It is a tool that is all the more crucial for WEB 3 because it is a way to reduce the barriers to entry for users who are not familiar with it, and to allow a much more massive adoption in the years to come (Chapelle P., 2022). In particular, this requires a simplified interface, and features that will eventually allow the user to do away with certain steps, such as creating a wallet (ibid). For example, the company Flexe was in charge of the implementation of the marketing strategy for the DECA DApp, which offers a decentralized economy based on carbon credits. The creation of the user interface has increased the number of followers by 1.7K and the number of views by 2K (Flexe Official Website). The interface is very ergonomic. The following information can be found : presentation of the

project and the problems to which it brings a solution, the evolution of the carbon market, the information on the token of the DApp (DECA Official Website). As it can be seen in the picture below, in the Metamask tab, there is a guide to buy the DApp's token via Metamask, i.e. the steps to create a wallet, install Metamask, and finally invest in the desired token (Ibid.).
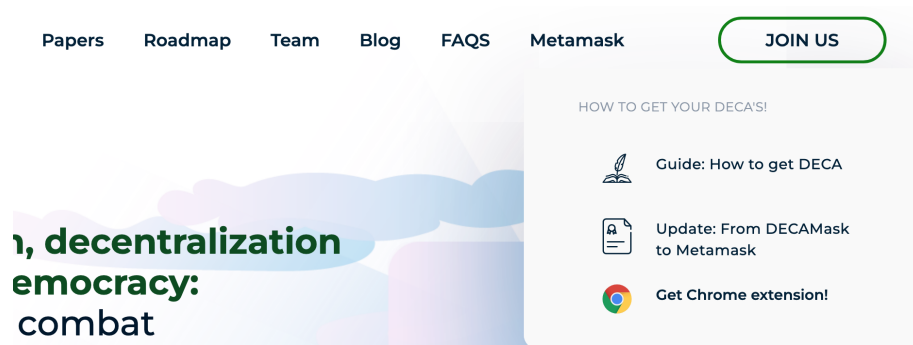
There are other specific marketing strategies to overcome these barriers to entry in WEB3 and capture users who are not part of this environment. For example, the Voj Voj project, which has already been mentioned above, has a strategy of first developing the app on WEB2, in order to build its own community, and then gradually move to WEB3, once the number of users is sufficient and the social network has enough traffic (Strøm J., 2022). Indeed, the start-up aims at a very precise target, namely young people between 12 and 16 years old, who are passionate about skateboarding. The age group being very young, users are not legally allowed to own a wallet, which makes it impossible to be 100% a DApp at least at the beginning (Ibid.). The goal is to eventually migrate part or all of the application to the WEB3. A first step would be to allow users to connect their wallet. The challenge here will be to move the users from WEB2 to WEB3. For this, the creator of the application is convinced that they will be able to convince users of the usefulness of WEB3. He is also thinking of setting up an incentive system with bonuses at first (Ibid.).

Thus, mastering its marketing and communication strategy is essential for WEB3 projects. According to Antoine Chauvin, an expert in WEB3 whom we interviewed, the notoriety of a project is the first criteria to make an

investment: "Knowing who has invested, who talks about it and noticing a community is so important! It works for NFT, for cryptos, for everything. For example, if you see coinbase venture on a project you can go with your eyes closed, if everyone talks about an ICO on twitter it smells good, if some launchpads incubate it it's a guarantee of value, the reactivity of mods on telegram or discord is also a very important indicator".

IV. Findings

After having looked at and studied in depth the various strategic points of the applications developing on the WEB3, we have identified four major issues of analysis which allow to properly apprehend the WEB3. These four points constitute in essence our findings for this thesis. They are the following:

1. Grasping correctly the decentralized ideology, that is at the center of everything.
2. Acknowledge the significance of the technology, on which everything is based.
3. Being able to react quickly while aiming for the long term; two-speed strategies.
4. Succeeding in going beyond market niche status.

1) An ideology not to betray

Our first recommendation is a general one, which applies to all other strategic aspects related to a DApp. As we have seen in detail in this paper, the WEB3 is a unique environment in many ways. The business strategies of the DApps that evolve in it must therefore be strongly adapted to it. We therefore recommend first of all to understand in depth the specificities of WEB3, as these will influence all other decisions. What we mean by specificities is of course the technical functioning of blockchain technology, the token economy and a thorough knowledge of the different blockchain protocols and actors of the centralized economy.

But according to our understanding of WEB3 and what we have learned from the numerous exchanges with the players in the field, this is not enough. Understanding the ideology of WEB3 is crucial to grasp the rules that govern this very particular environment.

WEB3 was born from a desire to get rid of the powerful centralized control organizations that reign over WEB2 (in particular the large international banking institutions and the GAFAMs, to name but a few), by giving control and value back to the web users (Vitalik Buterin, 2014). It is from this premise that WEB3 was born, based on blockchain technology, and it is this ideology and its main principles that must be carried into any DApp project. A DApp whose only vocation is profit or speculation, partly misses this will of the economy of sharing the value with those who create it. The last few months have seen this speculative madness take hold of the WEB3, with a wider public becoming aware of the profit possibilities it represents. This was particularly reflected in the mass issuance of artistic NFTs, with prices exceeding all logic. One example is the collection of "Bored Ape Yacht Club" NFTs on the Ethereum blockchain, whose 10,000 NFTs are valued at over $2.9 billion. Such speculation on tokens decorrelated from any intrinsic value does not allow building a stable decentralized economy in the long run. The recent crypto crash of May 2022 has confirmed this overestimated artificial economic trend.

A DApp project must first and foremost seek to create long-term value for WEB3 users. This value must exist because it brings its brick to the decentralized economy and not only because it is based on financial profit speculation. It is crucial for any DApp project to understand this philosophy at the heart of WEB3: the user and the maximization of his value in the long term is what determines the success or not of a strategy. A strategy that does not seek to increase the utility that users get from a DApp has no chance of allowing the DApp to impose itself on the WEB3, which is governed by the end users. If they find it useful, then they will want to use a DApp, and will therefore make it grow by increasing the value of its tokens. In the same way, if the utility provided by the DApp to the end-users does not aim at the long term (typically a speculative strategy of buying and selling NFTs over a very short period of time), then the DApp will certainly be able to grow strongly, but this growth will be as fugitive as the utility that the users will find in it (i.e.

the time they will keep the tokens before reselling them), and the DApp will not be able to grow in a perennial way.

And the very functioning of WEB3 forbids any attempt to "cheat" on this philosophy. For example, many DApps have tried to lie to their users by making them believe that their tokens were sold out, in order to increase their value. The truth is that they have resorted to a flash loan (discussed earlier, in the strategies related to the financing of DApps) to buy back the unsold tokens themselves, with the help of artificial wallets created for this purpose. But blockchain technology is by nature open-source and transparent, and such an approach does not go unnoticed, since it is possible to observe all transactions made on the WEB3. Recently, "rating" DApps (For example "Atadia - Trust Scoring Engine") have been developed, in the form of algorithms giving a rating to WEB3 actors, and allowing to pinpoint those having a suspicious behavior, trying to deceive their peers.

To conclude on this first recommendation, we will say that any business strategy on the WEB3 must have as a priority at the heart of its objectives the increase of added value on the long term for all users of the decentralized economy. Neither the search only for profit (creating an artificial growth, until the next crash), nor the search for short term utility for a few (not sustainable in the long term), allow the implementation of really successful strategies for DApps.

2) "Code is law" and the foundation of everything

Our second recommendation concerns the technological level of WEB3. Often incompletely or partially popularized, the technical complexity of blockchain technology and its applications to the decentralized economy should not be underestimated. The strength of the immutability of transactions and smart contracts on the blockchain (once deployed no one can stop them) also makes it a dangerous pitfall. A code error or a malfunction cannot be corrected as easily as for a WEB2 application that is not on a blockchain. The novelty (remember that WEB3 is barely 15 years old), the speed of development and

the technical complexity behind WEB3 make it a dangerous tool to manipulate for the uninitiated.

New uses of blockchain technology, new cryptographic methods, new application ideas, new programming languages dedicated specifically to WEB3, an ever increasing demand for services... all this leads to ever more complex technological knowledge needs. The demand for cryptographic experts but especially for blockchain developers (i.e. developers mastering both the technical functioning of blockchain and a programming language used to code smart contracts on a blockchain protocol) has never been so high, and the number of talent is not sufficient to meet the demand (as confirmed by the cryptographer J. Lacan and the blockchain developer Pierre Chapelle during their interviews).

However, a perfect mastery of these technologies is essential to succeed in evolving in a sustainable way on the blockchain. The environment is so driven by technology that the slightest mistake can be fatal. Recently, in May 2022, a simple algorithmic error in a single smart contract on a single blockchain protocol (the Terra-Luna blockchain) managed to create the biggest crypto crash in WEB3 history. This shows that the robustness of the decentralized economy is also its weakness. Betting everything on its security also means relying entirely on it and not considering that the system could fail. However, it is necessary for the decentralized economy of the WEB3 to be able to rely on its technology with complete confidence. Indeed, without a trusted third party to validate the transactions, the algorithms are all powerful: "Code is law" as Lawrence Lessig said in 2000. Technology is the absolute master of the blockchain, and to trust it, it is essential to be able to offer robust DApps.

Therefore, our second recommendation concerns the blockchain technology: any DApp requires a technical development by developers, whether it is for the WEB2 site, or the smart contracts on the WEB3. Therefore, the technological complexity of this task should not be underestimated, and it is important not only to be surrounded by experts in the field, but also to master yourself (to some extent) the basic principles of smart contracts and the blockchain chosen. The computer code of the DApp is the foundation of the whole enterprise, and

the slightest mistake would put an end to the whole project, without any possible adjustment.

3) A two speed strategy

Another major strategic challenge for DApps is to survive over time, and not to be too ephemeral in their success, as it is the case for many DApp today, that only seek to make quick money. In order to be viable in time in the specific environment that is WEB3, it is necessary for DApps to create, maintain and implement a two-speed strategy:

- A long term strategy, global, thoughtful, which corresponds to a vision of WEB3 in its entirety. This does not necessarily reflect the current state of the market, which is bound to change very quickly.
- A short-term strategy that must be particularly flexible and adapt to the frequent and brutal movements of the market.

Indeed, the blockchain and WEB3 environment is characterized by an incredible velocity. Everything changes at high speed: projects, companies, technologies used. The technological advance alone is developing at an incredible speed and often involves major changes that companies must adapt to. The technological choices that a DApp makes when it is created will undoubtedly have to be totally reviewed in the first years of the company's life. For example, we've been waiting for years for Ethereum to become proof of stake by making its update, which keeps being postponed. Now scheduled for the 3rd quarter of 2022, some blockchains are already adopting other consensus mechanisms such as DPOS, which appear to be even more efficient. We can wonder if Ethereum will be able to keep up with these technical advances and catch up one day.

This flexibility is also justified by the sometimes uncertain nature of the environment. As developed just above, we saw this in May 2022 with the collapse of the Terra Luna blockchain, which shook the entire sector, causing the entire ecosystem to crash.

Furthermore, if it is necessary for DApps to also develop a strategy that is consistent with a longer-term vision, it is because the market is not mature today. It is not mature because the projects that are being developed are mainly speculative and have only a short-term vision. Here we can quote Jan Strøm, who told us about this during his interview: "I saw a lot of these people at a crypto summit in Dubai, they don't really have any value to bring to the table, they just want to make money on this trend, and not build something for the future. This will end up slowing WEB3 down a bit at first, then the real value will start to be created. It's still a testing phase, everyone is throwing things into the mix, and some will work, some won't. But in three to five years, we will have learned what works, what was just a scam."

Finally, the market is also not mature in terms of legislation. Indeed, the other major source of change that DApps must prepare for is the reaction of institutions to the sector. It has to be understood that there is a huge discrepancy between the speed of the market and the regulations put in place by the institutions. It is now impossible for governments and institutions not to take a position and set up some regulations. These regulations will undoubtedly take time to be put in place, in a progressive way, and sometimes differently depending on the country. In any case, it is sure that this legislative vacuum will not last long, and that DApps will have to adapt quickly.

4) Extend the market to a wider audience

Finally, the biggest challenge for WEB3 today is to democratize, and manage to target a much wider audience. Since the creation of bitcoin in 2008, WEB3 and cryptocurrencies remain a niche market.

As a reminder, according to the Pew Research Center, only 16% of Americans, or about 52 million people, have ever invested in or used a cryptocurrency, or in other words, created their own wallet. Knowing that it is common for a person to create several different wallets, and that the United States is the most advanced country in this area, we can imagine that the percentage drops to less than 10% if we take into account a more global market. The paradox is that today, everyone has heard of Bitcoin, but not only without understanding

much, but also often having a negative perception of the blockchain because it is associated with a mostly speculative system. According to Jan Støm, "WEB3 is not for everybody at the moment, a lot of people are just chasing the fast money and everybody is doing the same thing".

There are several reasons why the market remains closed.

First, it should be noted that initially, and for several years, the technology was not mature enough to support too many users, blocking mass adoption.

Today, the main blocking point concerns the technological barriers that remain far too high. As a result, WEB3.0 blockchain technology is struggling to reach its potential customers due to limited knowledge about the subject, and thus about its benefits.

This results in a lack of awareness of the WEB3 environment, which is mostly perceived as exclusively speculative and highly volatile. Thus, suffering from a bad image, the interests and added value that WEB3 can bring is sometimes difficult to be perceived by the public.

These barriers to entry are reinforced by the fact that today, the majority of blockchain projects set up are led by companies, which create private blockchains only to improve internal projects. For example, in 2021, LVMH joined forces with other major luxury brands on Aura, the first international luxury blockchain in order to achieve high transparency and traceability throughout the life cycle of certain products.

Finally, the last sticking point concerns the user experience, which is still too far behind today. We can for example mention some video games of the WEB3, whose design is largely less developed than other traditional games.

Nevertheless, it is crucial that the market opens up. First, when we see its exponential growth and its valuation which is too important for the number of players. Secondly, because of the type of players that are becoming more and more involved, like banks and some countries or companies.

It is the actors of WEB3 who have a crucial role in the democratization process of WEB3.

First of all, the objective is to make the whole population aware of the interest of WEB3. In other words, they have to be convinced of the added value they will find. As if it was about convincing any customer to buy a product. To do this, WEB3 actors must succeed in proposing interesting projects that use WEB3 as a whole, as developed in the first part of the recommendations. WEB3 must overcome its reductive image limited to cryptocurrencies and Metavers. Moreover, it is necessary to set up effective communication, on the advantages that these applications can bring, and on the functioning and the objectives of WEB3.

The WEB3 actors must also do everything possible to improve the user experience. The objective is to make WEB3 accessible and understandable. This requires first of all a much more developed marketing strategy, and technological tools that are much more accessible. For example, we can mention MetaMask, an extension for Web browsers that allows users to interact easily with DApps. MetaMask acts as a bridge between DApps and Web browsers, making them much easier to use.

The key tool in this issue is the use of WEB2. WEB2 is not in competition with WEB3. It is an indispensable element for it, and the thinner the boundary between WEB2 and WEB3, the more beneficial it will be for WEB3. For example, Cynthia Huang, head of growth of a dApp, thinks that we will need an intermediate stage, a kind of "WEB2.5", which will act as a bridge to WEB3 applications. These applications will have the advantages of WEB3, but will have similarities and the same design patterns as WEB2. This will allow anyone to use it, even without prior knowledge or experience with WEB3.

V. Conclusion

Starting from the observation that the specificities of the decentralized economy of the WEB3 do not allow the implementation of a number of strategies studied in class, we decided to analyze in depth the way in which the specificities of the WEB3 impact the companies that evolve in it, called DApps, and more precisely their development strategies.

After having studied in depth the WEB3 organization, and especially the technical functioning of the blockchain technology on which it is based, we were able to draw several conclusions concerning the economic differences between the traditional centralized WEB2 economy and the decentralized WEB3 economy.

First of all, because of its intrinsic transparency, the blockchain makes the logic of technological advantage unnecessary. Furthermore, its open source dimension, allowing anyone to legally appropriate the ideas of others to improve them, the creation of monopolies based on a technical advance, preventing the emergence of any fair competition, is no longer possible. In the same way, the decentralized ecosystem of the WEB3 makes the logic of "economic power", such as that of the GAFAMs nowadays on the WEB2, completely non-existent. The real decision-making power lies in the hands of the users, in a peer-to-peer logic and no longer top-down. This new "user CEO" is the one who judges the usefulness of each DApp, and can make a real choice about the company he wants to use, and thus support, instead of being imposed by the market leaders. Finally, the reappropriation by the consumer of the value he produces through his data, forces companies not to abuse strategies exploiting user data, but rather to attract it through the quality of their services and the respect of its privacy through their operation.

These findings enabled us to better understand the different strategies used by DApps and to categorize them into 5 main themes: those related to technological choices, those related to the financing of DApps, those related to the organization of the WEB3 company, strategies related to DAOs and the field of governance and finally those related to the creation of a community through marketing and communication.

The analysis of these different strategies used on the WEB3 allowed us to understand in depth the specificities of the decentralized economy, and we were able to put them in perspective with the traditional strategies, and to draw 4 fundamental strategic principles. The most important of these, which is the foundation of all the others, and which represents the quintessence of our thesis, is the following:

"Any strategy aimed at developing a DApp on a blockchain that does not have as its goal and direct consequence the net and perennial increase of the final utility of all users of the decentralized WEB3 economy, is doomed to failure in the long run."

The Gautier-Roussel Law

This strategy is in line with the original ideology of the WEB3, which is to give power back to users by decentralizing economic power, and which remains at the heart of the WEB3 today. It is by pursuing this strategy of maximizing user satisfaction, and only in this way, that we believe a DApp will succeed in the long term.

Our second recommendation is the importance of technical expertise and in particular the computer code of any DApp, as the main and indispensable foundation of any blockchain project. Our third recommendation is the importance of successfully leading a two-speed business strategy: flexible enough to adapt to the drastic and continuous changes of the WEB3, which is constantly evolving, especially in the last few years, while managing to keep in focus a robust enough development to survive and grow in the long term. Finally, our last recommendation is to allocate as many resources as possible to reducing the barriers to entry of WEB3, by communicating, improving and facilitating the user experience, and democratizing this niche market to a larger number of people. This strategy will benefit both the DApp by expanding its community, the main resource for long-term growth, and the WEB3 as a whole by improving the behavior of players by increasing their number and diversifying their behavior.

Appendix

Appendix 1 - Detailed technical functioning of the blockchain technology

1. Proof of Work (PoW)

<u>*How does it work ?*</u> Proof of work is the original crypto consensus mechanism, first used by Bitcoin. POW is work done by miners that have a number of new transactions, previously located in the pool, to be validated. In order to do that, they have to complete a mathematical calculation for these to be approved. It is the block of the first successful miner that will be approved and added to the blockchain (Ethereum Development Documentation, 2022).

What is this calculation ? The calculation to be solved is an equation. They must find a hash such that it meets a certain difficulty. In general, this difficulty is that the hash of the block must begin with a certain number of 0s (G. Gensler, 2018).

In other words, let v be a random value, and SHA256 the hash function, N a random block : SHA256(block N) must be < v for the block to be accepted.

SHA256(block N) = SHA256 ((Hash bock N-1) + Data to be added + Nonce)

$$= \text{Hash Block N}$$

The variable to which the SHA256 function is applied is the sum of the hash of the previous block, the transactions to be validated, and a random number called the Nonce. As the hash of the previous block and the transactions to be validated are constants, the miner's objective is simply to find the right "Nonce" to solve the equation. The process therefore consists of varying the "Nonce" a very large number of times until the right solution is found (ibid.).

A single miner could never solve the calculation by himself because he does not have enough computing power and it would take too much time. So, if someone manages to find a solution, it is because there are many other people trying to solve the same calculation at the same time. The more miners there are, the faster the blocks will be mined. Thus, the difficulty of the calculation (v) can be modulated according to the number of miners involved in order to stabilize the speed at which blocks are added to the blockchain. On the bitcoin

blockchain, v changes so that a block is mined every 10 minutes (F. Bobée, 2022).
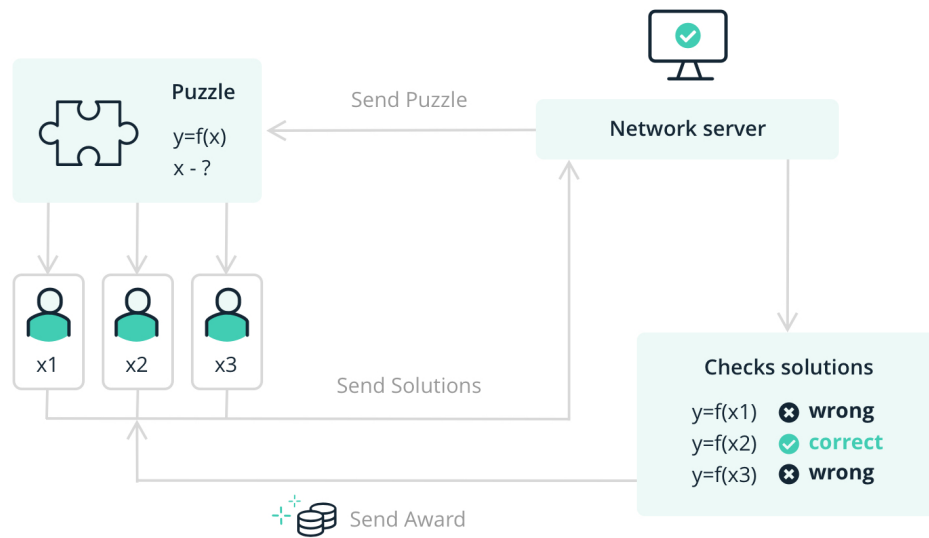
Benefits

- **Security** : the fact that the hash of the previous block is present in the next block implies that changing the data of one block requires the modification of the whole chain and therefore requires the computing power of all miners combined, which is merely impossible. The volume of users therefore also contributes to the robustness and security of the system (F. Bobée, 2022).

- **Consensus stabilization** : mathematically, it is possible for blocks to be accepted at the same time. This is a very rare phenomenon but it has happened. Thus, the chain splits in two, and a fork is created. The consensus defined by the blockchain is that the longer blockchain prevails so that only one chain remains at the end. Stabilization occurs quickly because the probability of two other miners being approved at the same time twice in a row is very low. The smallest chain, composed of orphan or staled blocks, will therefore be ignored and will have no value (G. Gensler, 2018). Thus, the POW consensus, at the heart of blockchain technology, ensures the decentralization of the system, as well as its security. It's a proven, robust way of maintaining a secure

decentralized blockchain. As the value of a cryptocurrency grows, more miners are incentivized to join the network, increasing its power and security.

Limits The main issue with POW is its high power consumption : it's an energy-intensive process that can have trouble scaling to accommodate the vast number of transactions, especially with smart contracts. And so alternatives have been developed, the most popular of which is called proof of stake (F. Bobée, 2022).

2. Proof of Stake (PoS)

Mechanism of validator selection

Users that want to participate in the forging process, must lock a certain amount of coin into the network that will represent their stake. The size of the stake determines the chances of a node being selected as the next validator to forge the next block. Thus, the greater the stake, the greater the chances to be selected (Coinbase, 2022).

In order for the process not to favor only the wealthiest, the selection process can use a combination of other factors including : the staking age, randomisation, the strength of the knot.

- randomized block selection : validators are selected by searching for nodes with a combination of the lowest hash value with the highest stake. This contributes to making the network more decentralized.
- Coin age selection : chooses nodes based on the time their tokens have been staked for.

Each crypto has its own rules for what it thinks is the best possible combination for it and its users (V. Buterin, 2013).

Validating process

When a node is chosen to forge the next block, it will check if the transactions are valid, sign the block, and add it to the blockchain. As a reward, the node receives a transaction fee in relation to the transaction in the block.

The reward will be released a certain period of time after, to give the time to other nodes to verify if there has been no fraudulent blocks added to the blockchain by the node. If it's the case, the node will lose its stake, and the right to participate in the future (Coinbase 2022).

Source: Educative.io

Benefits

The benefits of this consensus mechanism are that it's a faster and **less resource intensive** consensus mechanism. Compared to the POW, the goal is to maximize speed and efficiency while lowering fees and maintaining the same level of security. Because proof-of-stake blockchains don't require miners to spend electricity on duplicative processes (competing to solve the same puzzle), proof of stake allows networks to operate with substantially lower resource consumption (Ethereum Development Documentation, 2022).

Another advantage is that crypto-currencies are **less likely to be inflationary** as there is no need to create new tokens in large quantities to keep validators motivated: whatever happens, they will always benefit from contributing to the security of the network.

Lastly, compared to POW, POS also **reduces the risks of centralisation,** as it does not provide the same economies of scale as investing in a large amount of mining hardware. Thus, while it is possible for over-equipped mining farms to successfully crowd out individual miners, such a disproportionate advantage is less likely to occur with a PoS consensus (Ethereum Development Documentation, 2022).

Proof of Work VS Proof of Stake

Mining capacity depends on computational power

Validating capacity depends on the stake in the network

Miners receive block rewards to solve a cryptographic puzzle

Validators do not receive a block reward, instead, they collect transaction fees as reward

Hackers would need to have a computer powerful than 51% of the network to add a malicious block, leading to 51% attack

Hacker would need to own 51% of all the cryptocurrency on the network, which is practically impossible and therefore, making 51% attacks impossible.

Source: DZone

3. The variant of the Delegated Proof of Stake (DPoS)

The Delegated Proof of Stake (DPoS) mechanism is a variant of the Proof of Stake (PoS), which was itself developed to address the various centralization and energy consumption issues posed by Proof of Work (PoW) protocols. Today, DPoS appears to be one of the most consensual blockchain protocols for achieving a balance between the requirements of security, decentralization and scalability - the famous "Blockchain Trilemma". The DPoS method was first deployed by the BitShares blockchain. Since then, other blockchains like Lisk or EOS have also implemented similar DPoS protocols.

The best way to understand the Delegated Proof of Stake is to compare it to the traditional Proof of Stake test. The difference between the two lies in the rules of governance, which the Delegated Proof of Stake seeks to improve by improving the Proof of Stake protocol.

Based on a political analogy, we could compare the traditional PoS protocol to a form of direct democracy, while DPoS, on the other hand, is a form of participatory democracy. While the Proof of Stake consensus allows any member of the network to validate blocks if they have a minimum amount of

crypto-currencies, the Delegated Proof of Stake consensus introduces a voting system in which platform users will have to vote for representatives who will validate blocks on their behalf.

The delegates will validate transactions by signing each new block with their private key, which ensures that the data in the ledger is tamper-proof and that fees are collected for transactions recorded on the block. They will also be responsible for jointly making important decisions on implementation changes that may affect the network.

Within the DPoS network, users' voting rights are proportional to the amount of cryptocurrencies they own. In some systems, such as the Lisk blockchain, delegates pay back a portion of their reward to voters. Other systems, such as BitShares, involve burning a portion of the rewards instead of paying voters directly in order to rarefy the token and increase its value.
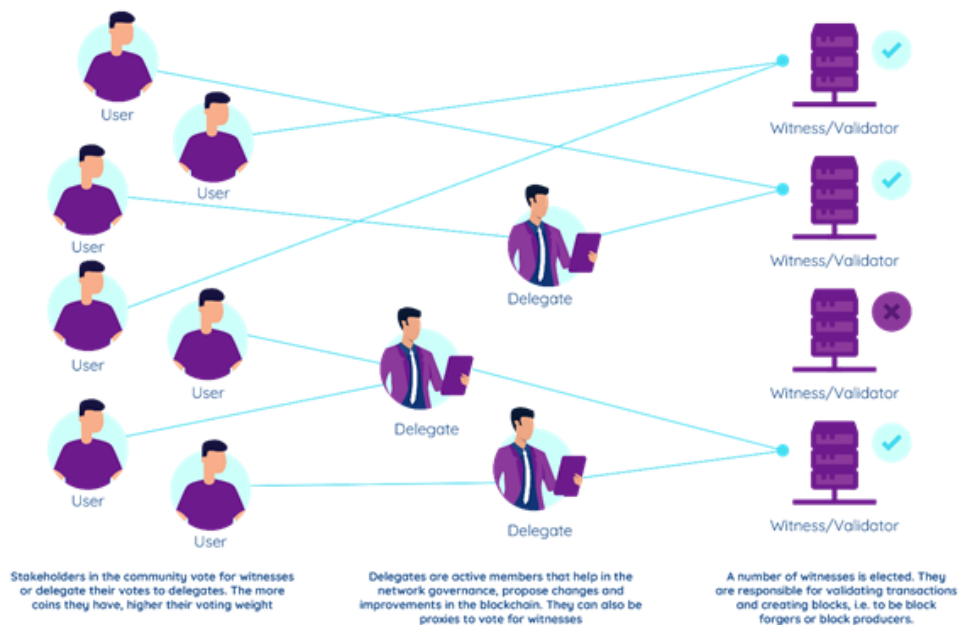
Source: Level Up Coding

Appendix 1.1 - History of ICOs and examples

Historically, one of the first ICOs to have emerged is Ethereum and dates back to 2014. The founders of this crypto-currency offered to exchange bitcoins for Ether (the corner of the Ethereum blockchain) in order to finance their development. The number of bitcoins collected exceeded 25,000 propelling Ethereum to the 8th place in terms of capitalization, right from its launch, with a valuation of over $17 million (Cryptopedia, 2022).

Number of Initial Coin Offerings

Source: Medium

ICO Funds raised in Mio. USD / ETH Price in USD
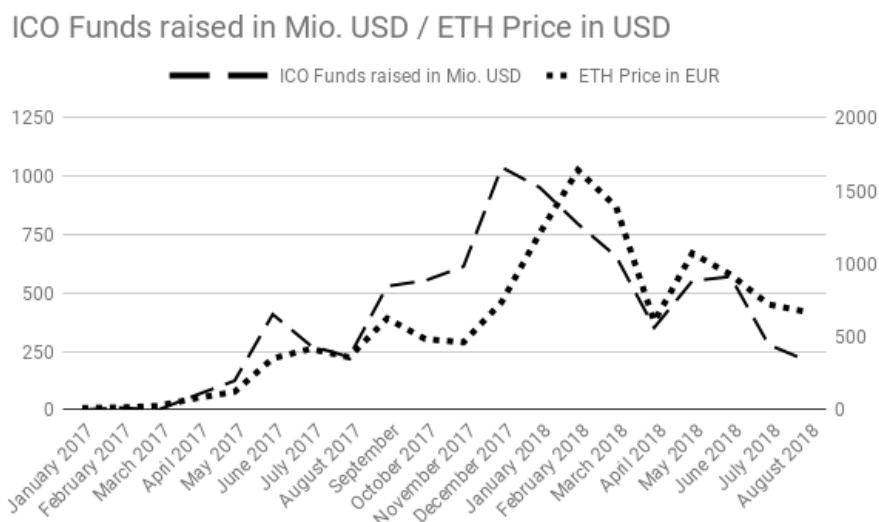
Source: Research Gate

Since then, the number of ICOs and their volume has increased drastically, attracting more investors and more projects. Obviously, like any financial

investment, an ICO is not without risk for investors. But it is also very advantageous, because if the DApp project takes off, the valuation of the tokens bought at low prices during the fundraising also explodes. Concerning the speculative side, the sale of the ICO reaches a small number of investors, and is executed at a fixed price. We can assume that these investors will be able to sell the token in the future at a higher price than the one they bought it at. If there is a high demand, a significant capital gain can be expected. In addition, the majority of ICOs offer discounts for buyers of the tokens, with promotions ranging from 5 to 25% and generally decreasing over time.

Let's take the example of the ICO launch of the Ethereum blockchain. In July 2014, during the presale of Ether tokens, during the ICO of the Ethereum blockchain, it was possible to buy 2,000 ETH (Ether) for 1BTC (Bictoin), or about 600 US dollars (Ethereum StockExchange, 2016). This amounts to about 30 cents per Ether. In comparison, the price of Ether in June 2021 is about 1,220 dollars, and reached a peak of about 4,600 dollars in November 2021.

1. 22 July to 5 August 2014:   2000 ETH   = 1 BTC = 572-632 USD

A line from the smart contract of the Ethereum blockchain ICO in 2014 (ibid)

Appendix 2 - Pierre Chapelle - 11/03/2022

- Raphaël : Would you like us to introduce ourselves and then let you introduce yourself and tell us what you do?
- Pierre Chapelle : Yes, as you wish.
- Raphaël: So, we are Mathilde and Raphaël. We are in a business school in Lille and we are on exchange in Norway for a year in Oslo. We're doing a master's degree in strategy and we've chosen to do our master thesis on blockchain technology and more specifically on DApps. But from the angle of their development strategy. We realized, after digging a bit, that compared to more traditional companies and start-ups, the stakes were not the same, the same objectives. We don't have all the notions of patent monopolies, capturing the user, all that, so it's not necessarily going to be the same strategies as classic companies.
- Pierre Chapelle: OK, for you then, it's more of a business angle.
- Raphaël: Of course, there's a bit of technique involved, we're not necessarily interested in how much it pays, what happens, all that, but

rather in what choices we're going to make when we want to create a Dapps, such as which blockchain we're going to use, what mode of governance we're going to adopt, who we're going to contact?

- Mathilde: Thus, it's a bit of a mix between business and technology.

- Pierre Chapelle: I'll be able to answer you more about the technical part because it's my core business. I graduated from an engineering school in 2009 and specialized in networks and telecoms. I spent 10 years working in this field and at the beginning of 2019, I became interested in blockchain. I have read several books on the subject and I found it super interesting and I understood the potential of the technology. And so I decided to finally get into this field in 2019. In the same year, I started to learn web development because it's the minimum to know how to develop DApps. I also started learning Solidity, which is the language of smart contracts in the Ethereum ecosystem. I say ecosystem because it wasn't just one blockchain, it's a whole set of blockchains that use the same technology and the same programming language. In fact, if you know how to code smart contracts on Ethereum, you can code smart contracts on any other blockchain. These blockchains are said to be based on EVM. EVM is the underlying technology of Ethereum. It stands for Ethereum Virtual Machine. In fact, you can think of it as a virtual processor. There is among others the Binance Smart Chain, and Polygon. Polygon is a bit of a special case, it's what we call a layer 2 solution that works on top of Ethereum. Without Ethereum, it can't work because it's completely based on Ethereum. What it brings compared to other blockchains is more modernity, more modularity, more speed. Its interest is also ecological. Have you heard of "gas fees"?

- Raphaël : Yes, that's what we'll pay every time we make a transaction.

- Pierre Chapelle: Yes, that's it. Each time we want to make a transaction on a blockchain, we have to pay a fee in gas. So for a while, Polygon had the advantage of having much lower gas costs than Ethereum, but today it's the opposite. Anyway, gas prices change every day.

- Raphaël : OK, so this is really the basic Ethereum technology which is then reused by other blockchains which are all on Ethereum or which can be totally parallel using the same technology.

- Pierre Chapelle: That's exactly it. It's completely parallel. Well, except for Polygon. The others are fully parallel blocks that use the same technology. It's like Mercedes, for example, which uses Renault engines for its B class models.

- Raphaël: Perfect, very clear.

- Pierre Chapelle: And so to come back to my background, since 2019 I've been doing web development and since last year I decided to start my own business as a developer of DApps in the Ethereum ecosystem. And I'm more NTF oriented.

- Mathilde: How is your work organized ? Who contacted you to develop these DApps? What kind of DApps do you develop? Finally, can you tell us more about the process? How do all the players fit together?

- Pierre Chapelle: I have two types of requests: either Start-Ups or individuals, especially to develop NFTs. As the ecosystem is brand new, there are no big companies.

- Raphaël: And the demand will always come from a smart contract.

- Pierre Chapelle: Yes, so that's what they want first of all, because it's the basis of a DApp. Afterwards, sometimes they also ask me to develop the web interface, which is a web page that allows interaction with the smart contract.

- Raphaël: And how would you define a DApp? Finally, what, for example, makes an NFT not a DApp? How can we limit the definition?

- Pierre Chapelle: Well, NFT is always associated with the smart contract from which it was created. However, when you buy an NFT, it's really yours, it's in your address, you're the only one who has access to it. Today, NFTs are often associated with works of art, but the potential is enormous. There are video games, there is the metaverse, there are projects in the supply chain, in ticketing.

- Raphaël: and for example, developing NFTs as property rights, is that already something that is feasible?

- Pierre Chapelle: So it's not ready yet, there are projects working on that and it's possible to bring blockchain technology to this kind of thing. And in the future, I am convinced that this is what we will have.
- Raphaël: Yes, it's true that we are seeing more and more Play To Earn video games for example.
- Pierre Chapelle: Yes, exactly, these are video games which, thanks to NFTs, allow you to have unique items, to transform them, and to sell them on a marketplace. I don't know if you know the Ultra project. It's a very interesting video game blockchain project I think. It's a whole ecosystem for making video games in which there is a marketplace to resell your video game acts in the form of NFTs.
- Raphaël : Super clear, thank you very much. And to come back to my previous question, could you specify the difference between a DApp and an NFT? If I create an NFT and put it up for sale on a market place, is it not a Dapp or is it one because it is still based on a smart contract?
- Pierre Chapelle: So an NFT on its own is not a DApp. Technically, it is a token that is unique. Hence the acronym "Non fungible Token". You can't exchange an NFT for another NFT. However, we can say that the NFT is created from a DApp.
- Raphaël: So the Dapp is similar to the smart contract.
- Pierre Chapelle: Yes exactly, a Dapp is a smart contract, plus the web interface.
- Raphaël: And behind this, can we say that there is a notion of service or purchase?
- Pierre Chapelle: I would say that in general, it is not necessarily services for example. For example, for NFT in video games.
- Mathilde: We also have questions about the governance of Dapps: what are the different types of governance since from the moment the slide is released, it is totally decentralized, so there is no longer any real decision-making body and the Dapps are more or less modifiable. What are the limits? Are there governance systems that are more adapted to certain types of Dapps than others?
- Pierre Chapelle: You're talking about DAOs, right?
- Mathilde: Yes, that's right.

- Pierre Chapelle: So DAOs are a type of application that is a decentralized decision-making entity. I've already made a small DAO in which I integrated a voting system to make decisions. Each person in the vote has a different weight. The more Ethers we have, the more weight our vote has. Every time a decision has to be made, we put the decision down, and everyone votes. Do you know the subunits of Ether?

- Raphaël : No, it doesn't mean anything to me.

- Pierre Chapelle : It's like euros and cents. We're talking about WEI, and 1 ETH = 1×10^{18} WEI, which is the smallest subunit of Ether. I made sure that 1 WEI = 1 share. To summarize in 5 steps: The DAO collects the investors' money in Ether, this allows to define the weight of the votes. Then, we follow the contribution of the investors in relation to their shares (we visualize the weight of each investor). Then, we allow investors to create proposals. This can be any type of proposal: increase the total number of tokens, change the name of the Dapp. Then investors are given the opportunity to vote. Finally, the proposal that wins the vote is executed.

- Raphaël: And so when the proposal is created, we also create the program that will be updated? And who will be in charge of it?

- Pierre Chapelle: Yes, that's right, but the programme will be very short. Once you deploy a smart contract on a blockchain, it is immutable, you can't change it. There are two options: if you make a mistake, you have to deploy another smart contract, or before deploying it, you have to provide the necessary functions to change certain parameters. The changes to the smart contract are decentralized in the sense that it is on a Blockchain (so it is impossible to modify the smart contract once it is deployed), and then because there is always the possibility of choosing who will be able to activate the functions in the smart contract.

- Pierre Chapelle: Everything is automated in the smart contract, once it is deployed, the code is not changed. One of the particularities of the Blockchain is that everything is transparent, so everyone has access to the code of the smart contract and the transactions.

- Mathilde: And each time, the DAO is associated with a particular DApp?

- Pierre Chapelle: Not especially. The DAO's smart contract, combined with the web interface, together form the DApp.

- Raphaël: So a DAO is a DApp to which a governance system has been added?

- Pierre Chapelle: A DAO is a governance system.

- Raphaël: But it is still linked to a DApp?

- Pierre Chapelle: In fact, the smart contract of the DAO, plus the user interface, form the DApp. Most DApps are not DAOs because they don't have a particular governance system.

- Raphaël: So there are DApps that will never be able to change or be updated or it will be done autonomously, but it will not be the result of the users' vote?

- Pierre Chapelle: Each smart contract is unique, everyone puts what they want in it. It is clear that most contacts are not governance systems, so they are not DAOs. The DAO is a concept, which you can translate into code in a smart contract. For example, it is clear that a smart contract that allows you to create NFTs is not a DAO at all.

- Mathilde: OK, and are there other governance systems than the one you have set up?

- Pierre Chapelle: Yes, there are no limits. There are many others with many particularities.

- Raphaël : And do you have any idea if there is one that is more common than others where there is really everything?

- Pierre Chapelle: Oh, I couldn't answer you, but frankly everything is possible.

- Raphaël : Thanks, it's very clear. Are there other possibilities than EVM to code smart contracts? Can we say that DApps are only on Ethereum?

- Pierre Chapelle: So, a few years ago, I would have told you that this was the case. But today there are other very serious competitors to Ethereum. For example Avalanche, which is EVM compatible. There are other blockchains competing with EVM, such as Solana, which is

widely used but still lags behind Ethereum. They are still in the testing phase. Cardano is even further behind and has not yet been finalised. Algorand and Thesos (French project) are also serious competitors.

- Mathilde: What are the characteristics of these other blockchains and why can they compete with Ethereum?

- Pierre Chapelle : They are faster, they cost less in gas costs, they are also more scalable. You should also know that Ethereum is currently developing an update. If they succeed in this update, they will improve the speed, the gas costs... It will become even more competitive than the others. On these other blockchains, we are on other languages than Solidity even if it remains the same smart contract system.

- Mathilde : Ok great, thanks a lot. I'm changing the subject, but we were also interested in the different cost items involved in creating a DApp. For example, a company has to call on a developer like you, and after that, are there any other costs?

- Pierre Chapelle: Yes, it's just the gas costs to power the smart contract which is on the blockchain. You also need a web server to run the user platform. Some online services are free. But most companies have their own in-house servers, so they have to pay for the maintenance of the server and the electricity to power it. The gas costs are paid by the users. So in the end, for a client who asks me to create a DApp, if the users pay the gas costs and he uses a free online service for the interface, then there is nothing to pay but my work.

- Raphaël: And so these gas charges made by the users will then accumulate in the DApp?

- Pierre Chapelle: So actually, no, no, it doesn't work like that. On Ethereum now, there are two parts: one part will be burnt and therefore disappear, to avoid inflation and the gas fees increasing too much; and the other part of the gas fees will go to the miners who validate the transactions. So the money does not go directly into the DApp but is used within the blockchain on which the DApp is.

- Raphaël : about the steps to create a DApp. If I want to create one, I need an idea, a developer, and then is there a white paper published, an online prototype? How is the communication of the DApp done?

- Mathilde: in other words, how do you gather a community and gather users?

- Pierre Chapelle: So for the NFTs, each time a new collection of NFTs is released, we always call on someone who does WEB marketing and who will attract people on the internet to attract people on the day. For NFTs, this is done a lot on Twitter and Discord. But you can also find them on Facebook or Linkedin. They can also have a Wait List that allows people to get their NFT for less. I imagine afterwards that start-ups use marketing experts to advertise on the internet.

- Raphaël: What are the next uses of NFTs that will be coming soon?

- Pierre Chapelle: For me, the next NFT revolution will be dynamic NFT. They allow interaction with the outside world. For example, an NFT that will display the weather by being linked to an Oracle that allows the link between the blockchain and the real world. A well-known Oracle is Chainlink. It's a system that works on Ethereum and other blockchains, it's an ERC20 token. Otherwise, other future uses will be around gaming, metaverse. We can also think of voting systems, or proof of attendance, which allow us to prove that we are present. In a class for example, we can imagine that everyone has their own NFT, and that a Wifi or Bluetooth system would make it possible to detect whether all the NFTs are present.

- Raphaël : And when you said the dynamics with an Oracle, what exactly is it ? What makes this link between WEB2 and WEB3? What makes it so that when I make a purchase on the platform, it runs on the blockchain? Thanks to the Oracle?

- Pierre Chapelle: The Oracle will retrieve data that is external to the blockchain and that is on the Internet, such as the weather for example, and send it to the blockchain. It will therefore make the link between the blockchain and WEB2. Technically, all this is code in smart contracts.

- Mathilde: I don't really see the point of having an NFT in the context of the weather, for example.

- Pierre Chapelle: That's just one example among many. It was just to illustrate. But we can imagine, for example, a collection of NFTs

representing football players with the players' statistics updated in real time with an Oracle.

- Raphaël: About the user experience, we find that there is a big barrier to entry for a user who doesn't know much about the WEB3.0 environment. Indeed, it is necessary to create a wallet, to buy cryptocurrencies, to transfer them without mistake... Are these barriers going to change?

- Pierre Chapelle: You're right, there are still some significant barriers today. And even if there are more and more people interested in WEB 3, those who don't want to take a concrete interest still don't have access to it. The whole point in the years to come will be mass adoption. This will be achieved by simplifying the user interface as much as possible. This will allow people to gradually free themselves from certain steps such as creating a wallet. What makes the link between the user interface and the blockchain is from a code point of view, 2 Java Script libraries that allow to link the user interface to the blockchain (WEB3 JS and Ether JS). Thanks to this, you can integrate your smart contract from the web interface. Another way is to have a Node, which allows you to bridge the gap between the web page and the smart contract, it is mainly used by developers. There are online services that allow this, the best known is Ifura, it is a server that allows us to go from our web page, on the blockchain. Finally, the last way, which is easier to access is to use Metamask, which allows you to keep your cryptocurrencies, and to make the bridge between the web interface and the blockchain. Metamask uses a different Node to operate. This simplifies the interaction between the user and WEB3.

- Raphaël: Does this mean that if I want to go to the WEB2 site of a DApp, I can't make a transaction if I don't have Metamask?

- Pierre Chapelle: Yes exactly. You have to connect your Metamask to a DApp's web page to do a transaction. It is impossible to do something in crypto and wallet.

- Raphaël : Last question, do you have a crypto currency in which we absolutely have to invest ?

- Pierre Chapelle: I advise people to do their own analysis and research. Otherwise, I really like Bitcoin, Ether, Solana and Avalanche.

- Raphaël: Finally, wa have noticed that it seems that a lot of things are happening at the moment, that there are a lot of new things and that everything is evolving very quickly.

- Pierre Chapelle: It's true, everything is moving forward at an incredible speed.

- Mathilde: Yes, and I also think that we are witnessing a change in mentality, that more and more people are interested in this field, especially with the NFTs.

- Pierre Chapelle : It's true, now even the institutional investors are getting involved, it's incredible because 2 years ago, nobody believed in cryptos.

- Raphaël : And from a professional point of view, are there more and more blockchain developers or not?

- Pierre Chapelle: It's still a, it's still a rare resource, so much the better for us. But the more time passes, the more there will be. When a developer develops a smart contract, he doesn't first develop it on the Main Net, i.e. the main blockchain (like Ethereum). There are several Test Nets of Ethereum, about 4 or 5, which are real blockchains using fake cryptocurrencies. This allows developers to create smart contracts without having to spend real cryptocurrencies. This blockchain lives in parallel to the main net. This way, we can test the smart contracts and make sure they behave properly before deploying the smart contract on the main net.

- Raphaël: Does this correspond to the test blockchain that I can choose on Metamask?

- Pierre Chapelle: yes exactly, because MetaMask is compatible with all ERC20 tokens, that is to say all tokens that can work on Ethereum.

- Raphaël : Thank you very much for all your answers.

- Mathilde : Then we'd like to look at some DApps in particular, which we're going to study as case studies, do you have any names of Dapps to give us information?

- Pierre Chapelle : There is a very well known decentralised finance DApp called Uniswap, which allows you to exchange cryptos.
- Mathilde: And in France, do you have any names of start-ups that develop DApps?
- Pierre Chapelle : There is a Gaming Start Up called Dogami, they have created a Metaverse with animals.
- Raphaël : Great, we'll find out more.
- Mathilde : Great, thank you very much. We won't hesitate to contact you again if we have any other questions. You really helped us a lot and that's it. Now, we're going to try to make progress with our thesis.
- Raphaël: Thank you very much!
- Pierre Chapelle: It was a pleasure, good luck.
- Raphaël: Thank you and good luck for all your projects, see you soon and have a nice day.

Appendix 3 - Tanguy Lepage - 8/06/2022
- RR: Hi Tanguy, can you explain your background and the projects you are involved in?
- TL: Hello, well I first got in touch with a guy named N. Romero who first created a company called Satoshi Studio that made sneakers. He thought it was annoying to have a receipt to order sneakers, so he had the idea of associating an NFT with the physical pair of shoes. His idea worked well at first, and then he moved on to something else called Future Factory. The goal is to take designers on Instagram and give them a different way to interact with their community and make money. And on the other side, we offer the opportunity for people to interact differently with sneakers in a totally virtual way when the pair can't be built physically. It's also interesting for brands that want to be more eco-responsible, that will be able to sell a virtual product first, and then produce in a physical way what was sold in a virtual way, in order to avoid unsold products.
- MG: So there is no physical production?
- TL: There is a physical production only for the brands that have the means to do so, but today they are not yet on the platform. Today the

company is a DApp. To simplify in a few words the Dapp, I would say that a DApp is simply a website on which you can connect with Metamask, and pay in crypto if there is something to pay. So, Future Factory is a Dapp; on which is made a drop, that is to say a release of NFT per week with 3 levels of rarity because it works well, like Sorare, with different prices paid in Ether wrap among others on the Polygon blockchain. And why Polygon, because it is much faster and it requires much less gas fees than Ethereum.

- RR: What is the entry price of the sneakers?

- TL: It depends, but it's between 200 and 400 euros. Polygon has the same programming language as Ethereum, Solidity, so we can do a transfer once Solidity 2.0 is released.

- MG: If you don't want to buy sneakers, you have to connect to your Metamask?

- TL: It depends on the DApp, on a lot of sites you have to, but not on Future Factory. You have access to everything until you pay. Then, last year, I joined two other companies. At Futures Factory, I was project manager. I had to create a Notion of their tasks (productivity and project management tool), negotiate with suppliers, manage the 15 developers to create the MVP, define the project and the persona, make the technological choices, code a little bit the smart contract to better talk to the developers. Then, I was a freelancer for a blockchain company, which ended up hiring me as a project manager. I give them 15 hours a week now. The company is called Berty Technology which uses blockchain but not really cryptocurrencies. It's not a DApp, it's a protocol, it's a technology. They propose to encrypt messages from end to end without going through a server, in peer to peer thanks to distributed networks. Here my task is to make the application, so the user experience part. The second company is NXT POP, composed of 25 full time devs, they make an OS, a kind of WEB3 portal. When we arrive on it, we will have a lunch pad, a market place of NFT, crypto news of your wallet, the valuation of your wallet, ... In fact, the goal is to create a complete environment, user friendly and multi chain. They

created their blockchain thanks to the Cosmos environment, which allowed them to create quickly their own blockchain.

- MG: Why did you create your own blockchain?

- TL: First of all because it gives legitimacy. When you want to run a big DApp it can be good to have your own blockchain. It can also answer specific needs that we would not have on other blockchains. For example, the people at Axe Infinity have created their own, Rodin.

- RR: And from a Road Map point of view, how would you detail the creation of a DApp? In terms of launch, governance...

- TL: There is not much difference with a classic company, in the sense that it is just a website on which you connect with your Metamask, so your identifier is not in a database. There is no particular governance system. 95% of DApps are like that. Behind the strategy is to develop the UX and bring more value. What will change is if you create a DAO. You can create a DAO and tell users to go to Discord and vote on a private channel, and the reactions will be counted as votes. Then you can have more advanced systems with holographic consensus, which will succeed in compiling scalability, resilience of voting systems. The vast majority of WEB3 is WEB2 in disguise, where you connect with your MetaMask.

- RR: And so to come back to the creation stages, could you detail them for us?

- MG: and beyond the steps of creation, what are the ones that are different compared to the creation of a normal start up?

- TL: Think of it at first as a normal startup. You need a crazy person who has an idea, who then recruits a team. Compared to a basic start-up, here we need a blockchain developer, which is very complicated to find. Even if today we see more and more No Code tools developing that allow to easily incorporate WEB3 in an application. For example, Starton, which recently raised 4.5M. So there are the same issues: creating a need, finding customers. What will eventually be added is: the connect button to the MetaMask; the NFT and crypto to launch; the way we raise funds (ICO possible); the use of discord and twitter to gather a community and make the

communication. We can also make contests to win NFTs. If we go a little on the strategy side, the nerve of the war for a successful NFT or WEB3 project, unless you have a huge utility like Starton, is the community. How to create a community and engagement knowing that it is still a niche market and that there are a lot of projects that have been created lately, especially with the speculation that these projects can create. It's still a niche because there is a basic barrier to entry which is already important (using a metamask....), and after allowing users, they must be able to put a lot of money into NFT. In the end, my theory is that there is finally a rather small community of users who own a very large number of NFTs each. In the same idea, there are very few blockchain developers, only 18K in the world. An NFT project is composed of: (1) The artistic aspect, so you need to recruit a designer, (2) The smart contract which is Open Source (you can even copy and paste one), (3) The Community, which is very long to gather and more complicated. So, there are community managers and community builders specialized in WEB3 who are paid a fortune, and who will put you in relation with other communities. They manage the discord, they create engagement.

- RR: In terms of timing, is there a difference between WEB2 and WEB3 startups?
- TL: It's much faster for WEB3. But it depends on the projects. If they are basic NFT projects, you have to go very fast, and some projects are developed in 3 weeks. If they are other projects that have a much higher added value and are not in this type of market that evolves at high speed, and can lose value very quickly, then they have more time, and will gather their community in a less aggressive way, since it is their value proposition that will automatically bring customers.
- MG: So every time the community is gathered from people who are already on discord, so they are already part of the ecosystem. How easy is it to attract outsiders?
- TL: Well, it's not easy. For example, we address two types of people: NFT collectors, and people who are fans of sneakers, but who don't know NFT especially. To attract this type of person, we mainly use

instagram, via sneaker designers for example, by making collaborations with them.

- Another strategic problem that NFT projects face is the volatility of revenues. Revenues are extremely uncertain. For example, we sold out our first collection in 3 minutes. But since then, we sell out 20/100 in a week. A very good week means nothing. There is a big uncertainty on your income.

- MG: Is there a big loss in creating a lot of NFTs without selling them?

- TL: Depending on the blockchain you are on, it costs more or less to deploy a smart contract. On Polygon it doesn't cost much, so there is almost no loss in our case. The marginal cost is almost zero.

- MG: And does the collection lose value if it is not fully sold? Does it impact the price of the next NFT release?

- TL: We get the unsold ones back, we can make contests out of them... For the price, it's us who set it, it depends on each launch, if the NFTs are nicer for example. But on the secondary market of course the trust will erode because everyone has access to information on unsold items. So here the strategy for any company is to buy back its own NFT, sometimes with different addresses to disguise that it is the company that buys back its own products. So, another strategic issue is that everything is visible: it is impossible to hide if everything is not sold. Thus, the price of the products relies heavily on trust, since all the results of the DApp are transparent. This trust can disappear overnight if the results of the Dapp are not good. So there is a huge pressure on the need to make good results. These results are not easily camouflaged because everything is public. The technique sometimes used is to create hundreds of different wallet, which is particularly expensive, and to buy back one's own products. Other companies also make flash loans. The objective is therefore total transparency.

- RR: I feel like I see a lot of projects raising millions, is there a particular reason for this or not?

- TL: Yes, they are raising millions. The sector is starting to explode and everyone is talking about it, which is causing a lot of liquidity, while there are very few people who know about it, so there is a big

information asymmetry. So as soon as there is someone who knows a little bit about it, it is very easy to raise money. It's a bit of a downer because not all the projects are interesting and lack value added.

- MG: There are really interesting topics sometimes?

- TL: Yes, of course, but it's rare.

- RR: yes, and these are figures that are so disconnected from classic start-up projects, that one has the impression that they are solid projects, when in fact they are not.

- TL: No, there are very few solid subjects. But the market is going to tighten up because of the Fed cutting rates and the message from White Combinator, the most famous US incubator, that it's going to be much more complicated and risky to raise money this year. The problem now for these projects is that you have to deliver something at the end. People are selling a lot of stuff on paper, and have the pressure of their Discord community behind it. There are a lot of guys who run away with their money without keeping their promises... Then on the other hand, today, there is a more solid infrastructure that is starting to develop, with incubators and lunchpads for example. From the creator's point of view, you have to be more serious and convincing because there is more and more competition (lots of different projects). The Lunchpad is visibility and fundraising, but for all that, people need to see a White Paper.

- MG: Could you describe the other types of DApp projects that are developing, other than NFT?

- TL: It's clear that NFTs have stolen the scene, but there are lots of other interesting projects. For example, there are a lot of infrastructure projects, which will create the tools for others to use. There are also many interesting projects in the Metaverse. I had made a list of projects that I had spotted that I can share with you.

=> Gallery.so : Instagram of NFT

=> The Fabricants : wearing clothes in augmented reality and in the Metaverse. There are a lot of fashion related projects that are developing. Like we do at Future Factory.

=> The other very interesting area is anything that is large-scale, decentralized, frictionless collaboration. So DAOs typically. So what happens is that you get a lot of people to work on a subject, from all walks of life, without a contract or a registered status, it's a token payment. For example, we have the Crew3 project, which is in development. The goal is that a certain number of tokens will be released upon completion of the task. And we have peer review which allows us to inform the tool if the task is completed or not. We stop with everything that is fixed salary for example, and each employee works at the hourly level he wants, knowing that he will be paid so much for a task. The token is a way to quantify people's collaboration.

- MG: Can we imagine all companies using this type of tool?
- TL : Yes, of course. I've heard about an other project in which the user owns his data in the form of NFT, and decides to sell them on a case by case basis to such and such a third party for a fee. It can be any kind of data, Google or Facebook. The data is called NFMe.

=> Immortals Games: gamifying chess, we have skins, which are NFTs on chess pieces, that we can lose or win. And we also have rewards in crypto according to the level of the person against whom we win or lose. So we come to the 3rd pillar of WEB3 with the DAO and the collectibles: the play to earn. It is a game for which you are paid to play. So we go from pay to play, to free to play, and now to play to earn.

⇒ Finally, another very interesting project, Crunch DAO, is a DAO in which we have analysts who will provide predictions on prices, and who would be paid according to whether their prediction is true. There would be a token that will track these analyses, and if people predict well, the token will go up.

- RR: How complicated is it to create your blockchain or not?
- TL: If you really have a specific project, it is that the company has the resources to do it. For me it's very rare to need to make your own blockchain.
- MG: And on the environmental side, how much of an impact does it have?
- TL: Since the prof of stake, there is not so much.
- RR: And for you, will WEB3 necessarily be part of the future or not?

- TL: not necessarily. There are several possible scenarios, either people realize that the usefulness of WEB3 is marginal after all, or there is so much money and people involved that the majority will convince themselves that it can't fail because there is too much at stake, so we will create things that will work and last in the long run. For example, all gamers may come to believe that no item has value unless it is an NFT. Or, it becomes the standard for transactions due to lack of trust in the government, and it becomes the underlying technology for every payment terminal. Finally, it becomes the standard for all emerging countries because they do not have established banking systems. Finally, the last option between the two, we will be able to integrate small technological bricks underneath, where as the majority of people do not question the functioning of internet servers, the blockchain technology will be integrated. We will have a totally private and decentralized identity linked to our wallet, with all our data, adopted by everyone. So, there are people who are extremely convinced by the technology, or only people who are here to realize a quick gain. So to summarize, from a strategic point of view, the main issues are: transparency, community. What changes compared to a classic BtoC business is that there are only 100,000 target people, that there are a lot of projects, so the competition for attention is even more exacerbated. There is also a technological issue, especially with the choice of blockchain and its viability for the future, it must not crash because the business is totally dependent on it. The cash flow of the business is ultimately extremely volatile because it depends on the blockchain on which it is housed. Thus we can also mention interoperability as a crucial issue because a business must not be limited to a single blockchain. Another technical issue is the speed of technological development. The speed with which blockchain protocols develop can impact businesses very quickly. The question is therefore: how can we focus on a long-term project (about 5 years) when the underlying technology is only 2 years old? Finally, the last issue is the product itself, its added value and how it differentiates itself from others. Finally, there are several more or less complicated ways to create a

DApp. The simplest, without real technical complexity, is to make a learning page on Weeks/Wix. You have to put a button that connects directly to Open Sea where you can sell your NFT collection. There is almost no need to code. On the other hand, the most complicated thing is to create your own technology, your blockchain, etc.

- RR: Yes, that's exactly it. That's really our goal, if someone wants to set up a business on blockchain, to guide them on the possible choices and justify why they should make one choice more than another.

- TL: Well, first of all, you have to put yourself in the same position as in any other business problem, i.e. you have to know how to answer the question: who do I serve? And how? And why? And then what is my link with blockchain and how do I need it and why? And finally, do I really need it? This is a question that not enough people ask themselves. Because it's a big constraint to limit yourself to a niche market.

- MG: Do you think that in the long term, NFTs will last?

- TL: As a technology, yes. For example in the supply chain. But otherwise, many of the NFTs that exist today, with all the speculation that goes on around them, will disappear. There are a lot of projects that will never get off the ground.

- MG: And do you also know a little bit about DAO or not?

- TL: That's the area that interests me the most. I read an interesting white paper on holographic consensus a year ago, it's exciting. You can really see the usefulness and there is also an interesting technical aspect. For me, the next step in human collaboration, after companies today, is DAOs. You can see a country as a DAO. You see where your tax dollars are going, you know for every choice that has to be voted on, you have a different decision making power depending on your knowledge in the subject or the impact that the decision will have on you.

- MG: And you think that has a future?

- TL: Not necessarily on a national scale, or at least we're not ready yet. But I could see a DAO driven mission where there is a mission,

allocated funds, and lots of sub-projects inside, hierarchical and organized and anyone can get involved.

- RR: Very interesting! Thank you very much!

- TL: My pleasure, thank you. Please feel free to ask any other questions you may have.

- MG: Thank you very much!

Appendix 4 - Interview Antoine Chauvin - 23/04/2022

- MG: Hello Antoine, thank you for accepting our invitation. As a WEB3 expert for a few years, you're going to be a great help for our project. First of all, could you quickly introduce yourself, then we can move on to the questions.

- AC: With pleasure. I've known the industry for a few years now, I invest in it and I learn a lot about the various associated themes. My main objective is to invest in long-term projects, because they make sense, are interesting, I hope they will last, grow in the long term, become financially interesting, etc…

- RR: Great, and why did you get interested in WEB3: how did you hear about it? And how did you build your knowledge about it?

- AC: The interest in WEB3 came mainly from an interest in cryptocurrencies in general. Usually you get into binance to find interesting returns and then you end up being interested in the products you've invested in and their uses. My first contact with DeFi was on staking protocols, when I was looking for a way to monetize my ETNs. Once you discover this whole world, with a little bit of curiosity you have to dig.As far as knowledge on the subject is concerned, it's a lot of teaching on youtube and also learning by doing.

- MG: What projects interest you and why? What are your criteria for investing? When you are about to invest, what are the criteria you are most interested in?

- AC: First of all, the type of project. I'm mainly interested in gaming, cryptocurrencies (metaverse/P2E), new blockchains like Casper, utility NFTs, i.e. metaverse avatars, nft DeFi or more specific projects contributing to the ecosystem. For example, Atadia, which allows to try

to do scorings on portfolios in order to know who to assign a WL to and who to lend to. In general, I'm interested in any project that seems to addvalue but hasn't already appreciated by 2000%.

- RR: And in terms of technology used, do you have any preferences?

- AC: Blockchains are mainly ETH, Solana, Binance smart chain, elrond and polygon. I simply use them because they are the most widespread. As far as consensus is concerned, it seems obvious to me to blacklist everything that is proof of work, especially with the European regulations that are coming. As for the value of the token, don't buy a token that appreciates much more than the market, it just becomes a gamble.For the financing of the DApp, it is true that the launchpads are a guarantee.

- MG: What about the quality of the interface, the community, the type of people who talk about it, do you think that's important?

- AC: Yes, all of that is very important. The interface may not be the most central point because a lot of these projects are developing it as they go along (often in collaboration with the community), but the marketing that the team has put in place has to be huge otherwise it will be hard for them to make it in the crypto space. Also, the people who talk about it is crucial. This is true for NFTs, for cryptos, for everything. For example if you see coinbase venture on a project you can go with your eyes closed, if everyone is talking about an ICO on twitter it smells good, if some launchpads are incubating it it's a guarantee of value, the reactivity of the mods on telegram or discord is also a very important indicator, as well as the cleanliness of this channel. I find this information mainly on Twitter, Telegram and Discord.

- RR: And how do you hear about DApps and new stuff on WEB3?

- AC : So first I would say through word of mouth, then through social networks, on Discord channels or online media, then on particular sites, and finally through advertising.

- MG: What do you think about DAOs? Are you interested? Do you think it's a good investment?

- AC: It's not really an investment criterion for me, just a parameter, it's not a guarantee of quality, some DAOs really work and are sustainable, some are just controlled by a few big portfolios, some DAOs don't even have a voting mechanism for the holdersI don't know if DAOs are really that useful. I think the concept is nice but not revolutionary. Many projects already co-create on discord by asking for regular feedback from the commu on options without using the DAO label. Moreover, some problems often make these organizations unstable (also because the mass is not necessarily smart).
- RR: What do you think are the criteria for a successful WEB3 project in the long run?
- AC: For me, the projects that will make their mark at the next bullrun would be :

  Those that add essential elements to the crypto universe that are currently missing (consumer scoring, NFT pawnbroking, B2B projects especially on the metaverse in order to adapt VR technologies), or those that are already established but still don't seem to me to be sufficiently valued because they offer great value (VeChain, Casper, Illuvium, Solana...)

  In any case, I'm aiming exclusively at big blockchains and robust projects because right now many of them won't survive. As for the management of the company, it is often too opaque on young companies. After if I have the chance to invest in ICO I am more light on these principles in view of the preferential rate.
- MG: Great, thank you very much, it's very clear. Finally, last question, how do you see the future of WEB3?
- AC : With all the educational efforts made around these domains and the mass evangelization underway, I think mass adoption is inevitable (especially when FB, Microsoft etc. get involved). After that, the question will be what form it will take exactly and how institutions will get involved in it.

  The limits that exist today are that the exchanges between the traditional economy and the WEB3 are still too choppy, you have to declare the money that comes in and goes out, it's difficult to buy real

goods with cryptos, you have to go through an exchange to convert your euros...

- RR: Great, thanks a lot! We can stop the interview here then. Have a good day!
- MG: Goodbye, thank you very much!
- AC: Thanks to you, have a nice day!

Appendix 5 - Interview Jan Strøm - 28/03/2022

- RR : Hello Sir, nice to meet you and thank you very much for this meeting. We are looking forward to speaking with you. First we are gonna share our project with you.
- MG : So as you know we are two students from France and we are actually in double degree at BI. We are currently working on our master thesis and our subject is the development strategies of decentralized application on the blockchain.
- RR : We now want to focus on the strategies used by people creating business on the blockchain. For those reasons it was perfect to speak with you. We have some specific questions, but first maybe you want to introduce yourself and VojVoj.
- IS : So we are developing a centralized app. And we will move to the WEB3 through a wallet, that would be Metamask or something similar. I can show you something first. We still believe, even though the market of blockchain is moving fast, we still believe because we are targeting very young users that are not allowed to have wallets, we are building the app first in WEB2. And then we are giving options for WEB3. And then, we will move everything to WEB3 in the future.

Lets see our presentation : we have a centralized app, but you can buy or earn tokens from fiat currency. Then, you can change these tokens. Then we are setting up the WEB3 : there is an exit route that goes into the Metamask, and in that wallet we are setting up our WEB3 strategy. We have created the VojVoj coin that you can take to the WEB3 space, and exchange it with whatever you want. So our own currency has 2 parts : first the sub-token that goes one to one with the crypto, and the crypto. Also, in the Metamask wallet, we are looking

to develop an NFT marketplace that will enhance the content that will be on VojVoj. VojVoj will not take ownership in the content because we don't sell user data to a third party so the user has its own content. Users can sell content as an NFT, or they can buy NFT and put it in the media, so that everybody can see it. We are looking to become the Netflix of Social Media, but if you want to tread it, you MINT it and you put it in a smart contract and you can sell it or buy it. So what we are doing is a very different strategy from your decentralized app where the value creation is decentralized. Here the value creation is centralized, but we are connecting it to the decentralized web.

- RR : What is the reason for it ? Is it to build a bigger community first ? Because of the users?

- IS : Yes, first the scalability, the security were our 2 main issues. And when you have users from 12 to 16 years old, they don't have the right to have wallets. What we are also letting the users do, as they cannot be involved with the crypto, they can save the tokens they are earning in the app, keep it there, and then one day they will be able to take it into the crypto environment, and they also have the speculation.

- RR : So its almost the same but they can't use it as a proper crypto before they are 16. And is it when you like someone's content, you need to spend tokens, and you're rewarding the creator for its created content ?

- IS : So we are targeting the skateboard community. So, if you're watching a video of skateboarders, and the technique to differentiate good content from bad content is by giving appreciation. For 1$ you can buy 70 tokens, so it's not a lot of money. And also, for the creators of content, it's a way to earn money. You can either pay 1, 5 or 10 tokens for rewarding the content. But again, its optional, the app is free. But if you want to support and give appreciation, its also possible. So each user has a centralized wallet. How does VojVoj is earning money ? Well when a user is transferring money from its wallet to the app, VojVoj gets a transaction fee. You can also post « hidden » content, that will be only for the one that subscribed for my content. So some content can be free, others can be hidden by a subscription wall. We

will also add paid chat options and paid livestream options. You can build your own brand in VojVoj and you convert your existing social media traffic to VojVoj traffic. We believe that now social media is not a fair revenu model, it's only the big companies that are making money directly, even though it's the users that are making the content. So we wanted to change that, by providing a new kind of social media with no ads, data privacy.. We are actually just software that enables you to build your own brand with your existing social media traffic.

- MG : Ok, very clear. And for now you have a lot of users ?

- IS : Ya, now we have 500 downloads. We are now looking for fundings, we are very underfunded. We will then build our crypto and blockchain MVP in a couple of months. And then, we will start a more aggressive marketing campaign.

- MG : What will be your strategy for the marketing campaign ?

- IS : We have a very clear strategy. We have chosen to onboard the skateboard community so we are targeting only one community, and we are going very hard on this community. There are a lot of reasons : its a very highly skilled art, that are is very influential. For instance, its very influential in the fashion industry. And coming from that community, I though that it was important to onboard this community first. Also because its highly connected to other segments like music, danse… We feel that we have chosen the hardest segment to onboard because they are very cold you know, they don't touch anything. But we believe that if we crack this one, we will crack it all. There are 85 million skateboarders, so its a very big market globally.

- MG : And you have ideas on how concretely you're gonna reach this community ?

- IS : Yes, so there are two sides. First there is a hard side, is to reach the most difficult to get. Its difficult because skateboarders don't care about communicating with businesses. So its not vary easy to onboard them, also because of their trust issues. They know that everybody wants their credibility. So we have built a referral model on the app, so you can refer your users, by sending them a link or scan a code, and you get 5% of what they are making. Thus, its beneficial to get your friends in the

app. We intend to grow this hard side by reaching filters and creators. For that, we are implementing a collaboration mode. If I'm a filmmaker and I record famous skateboarders, before I post the content, I can choose the collaboration mode so I can search for the skateboarder I filmed, I can give him % of the tokens. The post will appear on both profile and all appreciation given if split by the % I choose. On the soft side, we will use media marketing, social media marketing. I think that one of our strengths is that we are very clear on strategies. We are not trying to get everybody, so we are doing wide campaigns into a very narrow target.

- RR : Is it something that other DApp usually do ? To start on WEB2, and then move to WEB3 ?

- IS : I don't know another platform that is doing this.

- MG : Do you think you have competitors within these two industries ? Do you think you are competing more with regular applications in the centralized industry ?

- IS : I think we are competing with the centralized app. But I also think we are a fresh air when it comes to being centralized because of our level of privacy. We are kind of taking the philosophy from WEB3 and implementing it to a WEB2 structure. Our strength is that we are not doing what everybody is doing. We are unique and trying to do our own thing. And despite the fact that we are doing a centralized app, we are trying to be the good guys. Our vision is very simple : « VojVoj is a socially responsible media». For instance, we want to manage the content of the media, no politics, no religion, we want it to be a space for the kids where they can have good entertainment, without being pushed on commercials, without being pushed on religion. Today, there is too much shit to consume for kids in regular social media. We want to keep a space where their parents can feel that they are ok to let them go into VojVoj, and don't need to monitor them. Another point is the algorithm. We will make an algorithm to give users a good experience but we will not show you content that we think you would like. We want to show you only the content of people you follow. And the user will have to give consent if he/she wants the AI to give a feed based on

its interests. Also, since we are not collecting data, we don't need users to spend hours on the app. So for instance, if you're spending too much time on the app, we will send you a push notification.

- RR : We have some questions about the team. How many people do you have and when you will move to WEB3, what will happen to the people.

- IS : We have a development team in India, marketing team in Norway and Slovenia. We are now setting up a WEB3 development team, that will be an extra asset. And also for now, we don't know when the government will change the law on which conditions you can have a wallet. And for the WEB3 team, there are 16 people, mainly developers and marketing people.

- RR : And regarding the WEB3, you didn't start yet. But do you already know which blockchain and protocol you're gonna choose ?

- IS : we are in dialogue with several providers, Polygon, Solana, and we are now in the process of building prototypes. We will see what prototypes come up with, which protocol will work best, which governance will work best. We basically are waiting to see which platform comes up with the best solution.

- MG : And what characteristics are you looking for in priority?

- IS : Because of volumes, we are looking at costs, speed, security, scalability. Because for social media you need to be good overall.

- RR : Also about the community. Even in the future, it will be build on WEB2. But for the WEB3 part, as we know that its sometimes difficult to access the WEB3, do you plan to build an easier access from WEB2 to WEB3 ?

- IS : That is also one of the reasons why we are not doing it on the WEB3. I strongly believe that we will be a converter, because they will see the benefit of getting the value of getting the value of their token in the blockchain. So I think that the collaboration we make with the wallet partner will also be beneficial for us and for the users. Because only 5% of the word population as a crypto wallet, that no enough for now. We know that its scaling fast, but its basically the same users jumping from trend to trend. Because WEB3 isn't for everybody at the

moment. And at the moment, a lot of people are just chasing the fast money, and everybody is doing the same thing. And this would eventually break, because it is not sustainable to continue like this. Some of these cryptos will stand out and that will be the most serious ones. And I have seen a lot of these people during a summit in Dubai, they don't really have any value to bring to the table, they just want to make money out of this trend, and not to build something for the future. This will eventually slow WEB3 a bit at the begging and then the real value will start to be created. Now its still a testing phase, everybody is thawing things in the mix, and some will work and some won't. But in 3 to 5 years, we will have learned what works, what was just a scam. But until then, I think that using a centralised system is more scalable. Its still very little % of the population that is in crypto. On the WEB2 plateforme, there are similar apps that are trying to do the same thing as we are. Like Wemm for instance. They also have this free speech thing, but first they are targeting much more people, and also it can become places for conspiracy theories and then its not that interesting for other people that want to see good content.

- RR : Do you plan to look at the other WEB3 social media to take advantage of what they did ?
- IS : I think our solution is a bit different. And I don't really like to make this comparution. We are like Only Fans for skateboarders. But we are literally creating the same thing, but no adult and with a different content.
- RR : Ok perfect, it's very clear.
- IS : Sorry I have another meeting, it was really nice to meet you !
- MG: Thank you for your time, have a good day !

Sources

➤ Chapelle P. (2022), Interview - Appendix 2

➤ Lepage T. (2022), Interview - Appendix 3

➤ Chauvin A. (2022), Interview - Appendix 4

➤ Strøm J. (2022), Interview - Appendix 5

❖ a16z (2022), State of Crypto 2022,
https://a16zcrypto.com/wp-content/uploads/2022/05/state-of-crypto-2022_a16z-crypto.pdf

❖ ABC de l'économie (2022), La blockchain,
https://abc-economie.banque-france.fr/sites/default/files/medias/documents/822165_blockchain.pdf

❖ Adkens S. (2020), USA : Facebook est un monopole de réseau social qui achète, copie ou élimine les concurrents, Developpez,
https://www.developpez.com/actu/309527/USA-Facebook-est-un-monopole-de-reseau-social-qui-achete-copie-ou-elimine-les-concurrents-selon-la-Commission-antitrust-de-la-Chambre-des-representants/#:~:text=Selon%20le%20comit%C3%A9%20antitrust%2C%20Facebook,entreprise%20en%20mati%C3%A8re%20de%20donn%C3%A9es

❖ Aymar (2022), Qu'est-ce que la Tokenomics ?, Coin Academy,
https://coinacademy.fr/altcoins/quest-ce-que-la-tokenomics/

❖ Barthelemi S. (2020), Qu'est-ce qu'un flash loan ? Un mal nécessaire, Cryptoast, https://cryptoast.fr/flash-loan/

❖ Bastien L. (2022), GAFAM : qu'est-ce que c'est, et comment dominent-ils le monde grâce au Big Data, LeBigData,
https://www.lebigdata.fr/gafam-tout-savoir

❖ Binance Academy (2022), Les DAOs expliquées,, Les organisations autonomes décentralisées (DAO) expliquées | Binance Academy

❖ Bitcoin (2022), Les grandes dates de Bitcoin, Bitcoin,

  https://bitcoin.fr/histoire/

❖ Bitpanda (2022), Quelle est la différence entre les utility tokens et les

  security tokens ?, Bitpanda,

  https://www.bitpanda.com/academy/fr/lecons/quelle-est-la-difference-e

  ntre-les-utility-tokens-et-les-security-tokens/

❖ Blockchain bridges (2022), Ethereum.org,

  https://ethereum.org/en/bridges/#:~:text=we%20need%20bridges.-,Wh

  at%20are%20bridges%3F,transfer%20of%20information%20and%20a

  ssets.

❖ Blockchain France (2016), Qu'est-ce qu'une DAO ?,

  https://blockchainfrance.net/2016/05/12/qu-est-ce-qu-une-dao/

❖ Blockchain France (2018), Qu'est-ce qu'une application décentralisée

  (DApp) ?,

  https://blockchainfrance.net/2018/09/14/quest-ce-quune-application-de

  centralisee-dapp/#:~:text=Une%20DApp%2C%20ou%20application%

  20d%C3%A9centralis%C3%A9e,informatique%20est%20enti%C3%A

  8rement%20open%20source

❖ Blockchain France (2021), Qu'est-ce qu'une blockchain ?, Blockchain

  France,

  https://blockchainfrance.net/decouvrir-la-blockchain/c-est-quoi-la-bloc

  kchain/

❖ Bobée F. (2022), DELEGATED PROOF OF STAKE (DPOS) –

  DÉFINITION ET EXPLICATION, Journal du Coin,

  https://journalducoin.com/lexique/delegated-proof-of-stake-dpos/

❖ Bobée F. (2022), Proof of Stake, définition et explication, Journal du

  Coin, Proof of Stake : Définition et Explication - Journal du Coin

❖ Bobée F. (2022), Proof of Stake, définition et explication, Journal du

  Coin, Proof of Stake : Définition et Explication - Journal du Coin

❖ Bobée F. (2022), Qu'est-ce qu'un smart contract ?, Journal du Coin,

  https://journalducoin.com/lexique/smart-contract/

❖ Boyer R. (2022), Crypto : Qu'est ce qu'un fork ?, Cryptonaute,
https://cryptonaute.fr/fork-definition/

❖ Brave (2022), Le meilleur de la confidentialité en ligne,
https://brave.com/fr/

❖ Breia R. (2022), What Is A Dapp: Decentralized Apps Explained,
Sensorium, https://sensoriumxr.com/articles/what-is-a-dapp-explained

❖ Buterin V. (2013), WHAT PROOF OF STAKE IS AND WHY IT
MATTERS, Bitcoin Magazine, What Proof of Stake Is And Why It
Matters - Bitcoin Magazine

❖ Cassidy (2019), Understanding Inflation in Crypto Networks, Medium,
https://medium.com/blockchannel/inflation-in-crypto-networks-b957df
30987e

❖ Challand R. (2022), Qu'est-ce que le Web3 et comment il pourrait
changer la face d'Internet, Les Numériques,
https://www.lesnumeriques.com/vie-du-net/qu-est-ce-que-le-web3-et-c
omment-il-pourrait-changer-la-face-d-internet-a172679.html

❖ Coin Market Cap (2022), https://coinmarketcap.com/currencies/maker/

❖ Coin Telegraph (2022), DAO governance models: A beginner's guide,
DAO governance models: A beginner's guide

❖ Coinbase (2022), What is proof of work or Proof of stake, What is
"proof of work" or "proof of stake"? | Coinbase

❖ Collins P. (2021), Smart Contracts: 4 Reasons Why We Desperately
Need Them, Medium,
https://medium.datadriveninvestor.com/smart-contracts-4-reasonswhy-
we-desperately-need-them-53a1774d94e3

❖ Couvat E. (2022), Medium,
https://blog.cryptostars.is/a-guide-on-web3-marketing-tactics-and-strate
gies-5d256b0e4154

❖ Cryptopedia (2022), Ethereum and the ICO Boom, Cryptopedia,
https://www.gemini.com/cryptopedia/initial-coin-offering-explained-et
hereum-ico

❖ Cryptopedia (2022), What Are Public and Private Keys?, Cryptopedia, https://www.gemini.com/cryptopedia/public-private-keys-cryptography

❖ Cryptus (2022), Qu'est-ce qu'un node ? Univers blockchain, Cryptosous, https://www.crypto-sous.fr/blockchain-fonctionnement/nodes/

❖ DApp Statistics (2022), State of the DApps, https://www.stateofthedapps.com/stats/platform/ethereum#new

❖ De Kerchove Dexaerde Y. (2021), Premier bilan de l'adoption du bitcoin au Salvador, EuroNews Premier bilan de l'adoption du bitcoin au Salvador | Euronews

❖ DECA DApp Official website, https://deca.eco/

❖ Edwards A. (2021), Why Web3 is a (R)evolution of Open Source, WEB3WP, https://web3wp.com/blog/why-web3-is-a-revolution-of-open-source/

❖ Estimbre T. (2021), Web 3.0 : qui es-tu, Web nouvelle génération ?, Fnac, https://leclaireur.fnac.com/article/56298-web-3-0-qui-es-tu-web-nouvelle-generation/

❖ Ethereum (2022), Introduction to Web3, https://ethereum.org/fr/web3/#:~:text=Core%20ideas%20of%20Web3&text=Web3%20is%20decentralized%3A%20instead%20of,amongst%20its%20builders%20and%20users.

❖ Ethereum (2022), Livre blanc Ethereum, https://ethereum.org/fr/whitepaper/

❖ Ethereum Development Documentation (2022), Consensus mechanism, Consensus mechanisms | ethereum.org

❖ Ethereum Development Documentation (2022), Consensus mechanism, Consensus mechanisms | ethereum.org

❖ Ethereum Development Documentation (2022), Proof of Stake, Proof-of-work (PoW) | ethereum.org

❖ Ethereum Development Documentation(2022), Proof of Stake, Proof-of-work (PoW) | ethereum.org

❖ Ethereum StockExchange (2016), What was the approximate cost of 1 ETH during pre-launch (Aug 2014), ethereum.stackexchange, https://ethereum.stackexchange.com/questions/4522/what-was-the-approximate-cost-of-1-eth-during-pre-launch-aug-2014

❖ Etherscan (2022), https://etherscan.io/

❖ Evans J. (2022), DAO Maker Guide: Participation in IDO, Tiers and Launchpad Requirements, Bitcoin Trading, https://bitcoin-trading.io/ido/launchpades/dao-maker

❖ Eyebe P. (2022), Launchpad Crypto – Tout Savoir sur les Levées de Fonds, Cryptonaute, https://cryptonaute.fr/guide-crypto/launchpad-crypto/

❖ Fabien (2021), Comment développer une application décentralisée : Guide dApp non technique, Advency, https://www.advency.fr/blog/tech-design/comment-developper-une-application-decentralisee-guide-dapp-non-technique

❖ Ferec A. (2022), Qu'est ce qu'une DAO ?, We Are Climb, Qu'est-ce qu'une Organisation Autonome Décentralisée (DAO)

❖ Florent C. (2021), DAO MAKER : la plateforme qui apporte à l'investissement crypto, une portée universelle, Journal du Coin, https://journalducoin.com/defi/dao-maker-plateforme-investissement-crypto/

❖ Frankenfield J. (2022), Proof-of-Stake (PoS), Investopedia, https://www.investopedia.com/terms/p/proof-stake-pos.asp

❖ Futura (2022), Non-fungible token : qu'est-ce que c'est ?, Futura Tech, https://www.futura-sciences.com/tech/definitions/tech-non-fungible-token-19205/

❖ Grings (2021), Proof of Work (PoW) vs Proof of Stake (PoS) en crypto, Coin Academy,

https://coinacademy.fr/blockchain/proof-of-work-pow-vs-proof-of-stake-pos/

❖ Grobys K. (2020), Did you fall for it? 13 ICO scams that fooled thousands, Cointelegraph, https://cointelegraph.com/news/did-you-fall-for-it-13-ico-scams-that-fooled-thousands

❖ Herbst T. (2022), Qu'est-ce qu'une ICO ou levée de fonds en crypto-monnaies ?, Cryptoast, https://cryptoast.fr/comment-participer-a-une-ico/

❖ Industry Overview (2022), DappRadar, Dapps Industry Overview | DappRadar

❖ Industry Report 2021 (2021), DApp Radar, https://dappradar.com/blog/2021-dapp-industry-report

❖ Iredale G. (2021), Public Vs Private Blockchain: How Do They Differ?, 101blockchains, https://101blockchains.com/public-vs-private-blockchain/

❖ Iredale G. (2021), Ultimate Guide To Pros And Cons Of Blockchain, 101blockchains, https://101blockchains.com/pros-and-cons-of-blockchain/

❖ Jeanneau C. (2018), "Qu'est-ce qu'un token ?", L'Age du web décentralisé - Fondation Digital New Deal, https://blockchainfrance.net/2018/05/22/comprendre-les-tokens/

❖ Jeanneau C. (2019), Comprendre l'Open Finance, Blockchain Partner, https://www.blockchainpartner.fr/wp-content/uploads/2019/06/Open-Finance-Etude.pdf

❖ Joshi R. (2021), Web 3.0: Marking an End to Monopolistic Tech Giants?, TimeNext, https://timesnext.com/web-3-0-marking-an-end-to-monopolistic-tech-giants/

❖ Lacan J. (2021), "A Blockchain-enabled Anonymous-yet- Traceable Distributed Key Generation," 2021 IEEE International Conference on

Blockchain (Blockchain),

https://ieeexplore.ieee.org/document/9680537

❖ Lefèvre R. (2022), Qu'est-ce qu'un token, cet élément indispensable à l'univers de la blockchain ?, Cryptoast,

https://cryptoast.fr/token-element-indispensable-univers-blockchain/#:~
:text=sur%20les%20tokens-,Un%20token%2C%20qu'est%2Dce%20qu
e%20c'est,bien%20qui%20poss%C3%A8de%20une%20valeur

❖ Lévêque F. (2019), Le monopole et le pouvoir de monopole, SES ENS-Lyon,

https://ses.ens-lyon.fr/articles/le-monopole-et-le-pouvoir-de-monopole

❖ Linternaute (2022), Monopoly,

https://www.linternaute.fr/dictionnaire/fr/definition/monopoly/

❖ Madasoglu P. (2022), Web 3.0 Marketing: The Marketing Revolution And Its Impact, Popup Smart, Web 3.0 Marketing: The Marketing Revolution And Its Impact

❖ Maker DAO (2022), Open Position, https://makerdao.recruitee.com/

❖ Marin M. (2022), COMETH : LA MÉTÉORITE DES JEUX BLOCKCHAINS ARRIVE GRÂCE À SA LEVÉE DE FONDS, Journal du Coin, Cometh : la météorite des jeux blockchains arrive grâce à sa levée de fonds - Journal du Coin

❖ Medipedia (2018), The Various types of Crypto Tokens, Medium, https://medium.com/@medipedia/the-various-types-of-crypto-tokens-2
6bab8f6622c

❖ Megha P. (2022), French blockchain game studio plays in $10 million, Tech.EU,

https://tech.eu/2022/05/06/french-blockchain-game-studio-plays-in-10-
million/

❖ Money Rada (2022), DAO - Tout comprendre sur cette opportunité crypto à saisir en 2022, 🚀 DAO - Tout comprendre sur cette opportunité crypto à saisir en 2022

❖ Muriuki P. (2021), Top reasons why startups fail, Startup.Info, [Top reasons why startups fail](#)

❖ Pignot L. (2022), Episode 12 : Le Web 3.0, un outil de la parfaite transparence des informations ?, Zonebourse, https://www.zonebourse.com/actualite-bourse/Episode-12-Le-Web-3-0-un-outil-de-la-parfaite-transparence-des-informations---40247475/

❖ Pignot L. (2022), Episode 4 : Le Web 3.0, une confiance sans faille ?, Zonebourse, https://www.zonebourse.com/actualite-bourse/Episode-4-Le-Web-3-0-une-confiance-sans-faille---37458658/

❖ Professor Gary Gensler, MIT 15.S12 Blockchain and Money, Fall 2018, Blockchain and Money | Sloan School of Management | MIT OpenCourseWare

❖ Professor Gensler G. (2018), MIT 15.S12 Blockchain and Money, Blockchain and Money | Sloan School of Management | MIT OpenCourseWare

❖ Samsukha A. (2022), Web2 vs. Web3: Complete Guide, emizentech, https://www.emizentech.com/blog/web2-vs-web3.html

❖ Services by Flexe.Io, https://flexe.io/?utm_source=google&utm_medium=search&utm_term=web%203.0%20marketing&gclid=Cj0KCQjw2MWVBhCQARIsAIjbwoOFiOTOzHSyLGTHwECPAFviU7iew6VQkpjpMN4iEjn_uUxH3_F2hqwaAiAAEALw_wcB

❖ Sexer N. (2021), Etat des Lieux des NTFs, Ethereum France, https://www.ethereum-france.com/etat-des-lieux-des-tokens-non-fongibles-nfts/

❖ Skalex (2018), the deflationary economics of the Bitcoin money supply, https://www.skalex.io/deflationary-economics-bitcoin/

❖ Solana Blockchain (2022), https://solana.com/fr

❖ Sverdlik Y. (2021), Web3 Builders Hope to Fix Open Source, 'Broken' by Web 2.0, Equinix,

https://metal.equinix.com/blog/web3-and-open-source/#:~:text=Web3%20is%20almost%20entirely%20open,broken%20open%20source%20funding%20model

❖ The Dapp List (2020), What is the Blockchain Scalability Trilemma?, https://thedapplist.com/learn/what-is-the-blockchain-scalability-trilemma/

❖ The Shrimpy Team (2021), What Is the Blockchain Trilemma?, Academy Shrimpy, https://academy.shrimpy.io/post/what-is-the-blockchain-trilemma

❖ Vasile I. (2022), Qu'est-ce qu'un flash loan crypto ?, Be in Crypto, https://fr.beincrypto.com/apprendre/quest-ce-quun-flash-loan-crypto/#:~:text=Un%20flash%20loan%20crypto%20est,(DeFi)%20bas%C3%A9s%20sur%20Ethereum.&text=Les%20flash%20loans%20sont%20%C3%A9galement%20appel%C3%A9s%20pr%C3%AAts%20atomiques%20(atomic%20loans)

❖ Vitalik BUTERIN (2013), WHAT PROOF OF STAKE IS AND WHY IT MATTERS, Bitcoin Magazine, What Proof of Stake Is And Why It Matters - Bitcoin Magazine

❖ Vitalik Buterin (2014), Ethereum White Paper, https://blockchainlab.com/pdf/Ethereum_white_paper-a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf

❖ Vitalik Buterin (2017), The Meaning of Decentralization, Medium, https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274#.57gocynsr

❖ Vittori J-M. (2019), Le vrai problème de Facebook : sa toute-puissance économique, Les Echos, https://www.lesechos.fr/idees-debats/editos-analyses/le-vrai-probleme-de-facebook-sa-toute-puissance-economique-1018652

❖ Wackerow (2022), WEB2 ET WEB3, Ethereum, https://ethereum.org/fr/developers/docs/web2-vs-web3/

❖ Wavestone (2021), Radar 2021 des startups blockchain & crypto en France,
https://www.wavestone.com/app/uploads/2021/10/2021_Radar-Blockchain-crypto-Wavestone-.pdf

❖ What is proof of work or Proof of stake (2022), Coinbase, What is "proof of work" or "proof of stake"? | Coinbase

❖ Whittemore N. (2020), JPMorgan Launches JPM Coin: Welcome to the Private Currency Era, Coin Desk, JPMorgan Launches JPM Coin: Welcome to the Private Currency Era

❖ Women in Blockchain and ValuesIndex (2022), Know Your Worth in Web3, Know Your Worth in Web3

❖ Zonebitcoin (2021), LaunchPad Crypto : La chasse au trésor des tokens, Zonebitcoin,
https://zonebitcoin.co/launchpad-crypto-la-chasse-au-tresor-des-tokens/