

Department of Marketing, Operations and General Management

How Blockchain and This New Digital Financial Services Can Accelerate Innovation

Joel Henrique Bonança Sadio

Master in Management of Services and Technology

Supervisor:

Mário Filipe Amorim Faria de Oliveira Lopes

Invited Assistant Professor, Department of Marketing, Operations and General Management
ISCTE Business School

October, 2022



BUSINESS
SCHOOL

Department of Marketing, Operations and General Management

How Blockchain and This New Digital Financial Services Can Accelerate Innovation

Joel Henrique Bonança Sadio

Master in Management of Services and Technology

Supervisor:

Mário Filipe Amorim Faria de Oliveira Lopes

Invited Assistant Professor, Department of Marketing, Operations and General Management

ISCTE Business School

October, 2022

Acknowledgements

I would like to have the opportunity to thank everyone who was part of this journey, especially family, friends, colleagues and all the teaching staff, with special dedication to Professor Mário Amorim Lopes with whom I had the opportunity to work, discuss and learn.

In a special way to thank also all my colleagues who passed by the two professional experiences that I had, at Closer and at Cofidis, this last one where I still work.

Abstract

Innovation is crucial for economic development and growth, whether in a macro context or in a micro context, for example, in day-to-day life in companies. There are many and different programs that have been developed to foster and create a culture of innovation and transformation. One of the biggest drivers of innovation, in what concerns the development of new products, services and business models, are the start-ups. Start-ups play an important role both in attracting talent and in involving investors who end up believing in this type of technological projects. Since 2008, with the launch of the White Paper written by Satoshi Nakamoto, a great change has been witnessed, essentially leveraged and sustained by the Blockchain technology. This research paper seeks to understand what impact this technology has on innovation, whether or not there is the potential to accelerate this whole process and understand how the innovation ecosystem itself has been able to adapt and reinvent itself with the number of new services available, as well as the implications and limitations that exist.

The analysis methodology is based on a qualitative study. After an extensive literature review, the reader will have access to a case study applied to the first start-up in Portugal (crypto-native) to use a decentralized funding method, an Initial Coin Offering.

Keywords: Innovation, Web3, Digital Innovation, Blockchain, Investment, Start-ups

JEL Classification Codes: G24, G23

Resumo

Sabemos hoje que a inovação é crucial para o desenvolvimento e crescimento económico, tanto num contexto mais macro, até um contexto mais micro, por exemplo, no dia a dia das empresas. São muitos e variados os programas que têm sido desenvolvidos para fomentar e criar uma cultura de inovação e transformação. Um dos maiores motores da inovação, no que se compreende ao desenvolvimento de novos produtos, serviços e modelos de negócio, são as start-ups. As start-ups têm um papel importante quer para a atração de talento, como para o envolvimento de investidores que acabam por acreditar neste tipo de projetos tecnológicos. Desde de 2008, com o lançamento do White Paper escrito por Satoshi Nakamoto, tem-se assistido a uma grande mudança, essencialmente alavancada e sustentada pela tecnologia Blockchain. O presente trabalho de investigação procura perceber qual o impacto que esta tecnologia tem na inovação, se existe ou não a capacidade de acelerar todo este processo e compreender como é que o próprio ecossistema de inovação tem sabido adaptar-se e reinventar-se com a quantidade de novos serviços disponíveis, assim como as implicações e limitações que existem.

A metodologia de análise baseia-se num estudo qualitativo. Depois de uma extensa revisão de literatura, o leitor vai poder ter acesso a um caso de estudo aplicado à primeira start-up em Portugal (crypto-native) a recorrer a um método descentralizado de financiamento, uma Inicial Coin Offering.

Palavras-Chave: Inovação, Web3, Inovação Digital, Blockchain, Investimento, Start-ups

JEL Classification Codes: G24, G23

Table of contents

<i>Chapter 1 - Introduction.....</i>	<i>1</i>
<i>Chapter 2 - Literature Review.....</i>	<i>3</i>
2.1 Innovation.....	3
2.2 Digital Assets.....	11
2.3 Distributed Ledger Technology – Blockchain overview	14
2.4 DeFi: new ways of funding start-ups with blockchain tokens.....	23
<i>Chapter 3 - Research Methodology.....</i>	<i>29</i>
<i>Chapter 4 - Case Study.....</i>	<i>31</i>
<i>Chapter 5 - Interview Analysis.....</i>	<i>34</i>
5.1 Familiarization.....	34
5.2 Coding, Searching, Reviewing, and Defining Themes	38
5.3 Writing the Report and conclusions.	41
<i>Chapter 6 - Limitations, and Contributions</i>	<i>45</i>
<i>References.....</i>	<i>46</i>
<i>Annexes</i>	<i>52</i>

Chapter 1 - Introduction

Innovation has been seen as one of the main drivers for economic growth. According to the Global Innovation Index (2021), Global investment in R&D has been experiencing steady growth, growing faster than the economic output (Global innovation Index, 2021), for instance, in 2019 Global R&D investment hit a high rate of 8.9 percent, while the global GDP grew only 2.4 percent that year.

Rewind to the basics of innovation, Schumpeter (1934) in his Theory on Economic Growth states that innovation is the engine for economic growth. In fact, Innovation influences the economy in multiple ways, as such, economic growth (**GDP**), competitiveness, job creation, attractiveness, quality of life, infrastructure development, and the financial system. In Schumpeter's idea, innovation is always associated with creative destruction, in which a new incomer outperforms the incumbent ones, and completely change the market, therefore in the light of what is being said, companies can be created and destroyed in the process of growth. According to Rosenberg (2006), innovation activities are the most important component of long-term economic growth. Daron Acemoglu and James A. Robinson, two well-known economists, suggested that sustained economic growth demands innovation, and that innovation cannot be decoupled from creative destruction, which replaces the old with the new in the economic sphere.

The idea that innovation would in such a way be connected to economic growth was first mentioned by Solow in 1959. He highlighted the existence of a long-term relationship between these two phenomena (Pace et al., 2015). Solow's theory is based on the idea that capital accumulation or population growth is the main driver of technological progress. However, between 1970-1990 many studies have explored the relationship between economic growth, competitiveness, innovation and IP (R. A. Atun, I. Harvey & J. Wild, 2007), concluding that human capital had little input when it comes to the sum of all pieces in the process of economic growth.

Without a doubt, today, innovation is crucial and has an important weight in how economies evolve and adapt in a world of constant change. Indeed, innovation is key when it comes to tackling global challenges, such as climate change and sustainable development which are transversal to all economies and countries around the world. However, despite all

the awareness created, there's still a long way to go, and for that, a new look at innovation is needed.

Also, politicians do care about innovation, how they can support and design a set of policies that can help to streamline all the innovation processes (policies are always a good driver of innovations), thus, acting as a facilitator. For instance, to accelerate the modernisation of the EU, the innovation across sectors, and the introduction of new business models, the European Commission developed a set of well-defined policies that intend to speed up the broad commercialisation of innovation and its monetization.

Thus, knowing how fast technology has been developing and, along with that, knowledge and capabilities, we have witnessed great breakthroughs, mainly in this tech world, which have been impacting other areas, such economy. Giving birth to hundreds of innovations that are meant to disrupt the incumbents. One of the most well-known technologies is the blockchain and what has been built upon it. Since it started, more and more products and services have been launched to the market, and the pace of this new brand products/services has been faster than expected. However, can this technology really accelerate the processes of innovation? The whole innovation process from ideation to go to market requires investment, investment that is not always available for this type of projects, what can this technology bring in a different way?

Therefore, the purpose of this work is to shed light on the following research problem: **How this new digital and decentralized reality can foster and accelerate innovation.** To better understand the problem, three research questions were defined to which answers will be given in order to serve as support to our thesis on how Blockchain can be used towards fostering innovation:

- How this new digital and decentralized reality can foster and accelerate innovation?
- Can the new digital era (DeFi, Blockchain, Digital Coins) accelerate the funding of startups?
- What are the conditions for resorting to these methods, and for which firms does it apply?

Chapter 2 - Literature Review

Innovation has been recognized as a subject of utmost interest in our society. In the book “Innovation Studies: Evolution and Future Challenges”, the authors introduce the topic of innovation by saying that it has been recognized as a vitally important and economic phenomenon worthy of a serious research study. To stress this view, Joseph Schumpeter affirms, in his Theory on Economic Development in 1934, that innovation is the “Leading engine for economic growth”. Xavier Vives (2009), professor of economics and finance, has also described innovation as the most important source of economic development and firm growth (Baudier et al., 2022).

The field of innovation studies is at least half a century old. However, innovation didn't have always the same importance as it has nowadays. In the early 1900s, Schumpeter, a pioneer in this field by that time, tried his best to spread the idea that innovation was the ultimate source of economic growth, and it was worthwhile to be studied (Fagerberg et al., 2007). In the mid-twentieth, few studies were approaching this subject. Scholarly publications were also few, as can be seen in Figure 1.

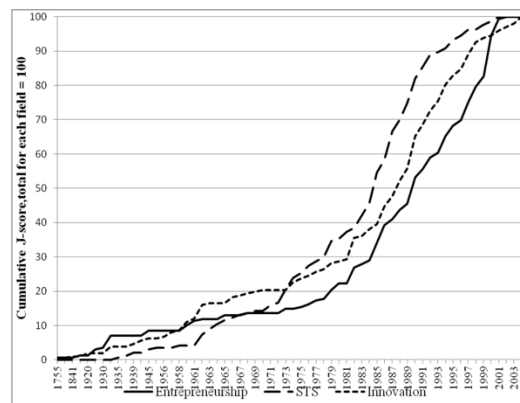


Figure 1 - Sources: Calculations based on Appendix 1 in Fagerberg et al., Landström et al., and Martin et al

Since the early 90s, the articles on the topic of innovation have grown sharply, which reveals how innovation has spurred interest among academic researchers. Fagerberg and Verpagen (2009) concluded in their survey that the population of researchers in innovation studies worldwide would be around 4000, which is aligned with the trend of increased publication on this topic already shown above.

2.1 Innovation

There is a multitude of definitions of innovation. Arguably, there are as many definitions as people that tried to define it. From the academic point of view, it gets difficult to

find just one definition that may fit innovation in all its dimension. Cohen (2010) in one of his most publications goes very straight to the point, admitting that the current shape of innovation is “problematic” due to the absence of robust empirical shreds of evidence (Fagerberg et al., 2013). Which in many ways ends up by not proving what has been written in the literature, the importance of experimentations helps scholars to conclude if the theory meets the practice or not. Tidd and Bessant (2018) said that the meaning of innovation is still a growing challenge for all academics interested in it, due to its fast-developing and inter-disciplinary field. They also underlined Cohen’s idea by stating that much of this work developed in this particular field, has not provided cumulative additions to their knowledge, nor necessary resulted in a more coherent and bounded field of enquiry (Tidd and Bessant, 2018). In that very same article, the authors also pointed out that one of the most difficult barriers for current management scholars is to not let themselves be influenced by contemporary fads and fashions that they may come across (Tidd and Bessant, 2018).

Meissner and Kotsemir (2016; 5:14), when trying to conceptualize the term Innovation, argued that it requires unorthodox thinking that must be successfully accepted by society. Hence, the definition of innovation must comprise new technological, economic, organizational, and social solutions that may not be marketable from an economic perspective but are applied and used daily. To conclude, the authors stressed that the definition of innovation cannot go without two other essential components, which are knowledge and ideas (Meissner and Kotsemir, 2016), with ideas stemming from human creativity.

It is curious and interesting the definition brought by David Teece (1996), stating that innovation is a seeking for the unknown. Involves searching, probing and disapproving of technology opportunities as well as new market opportunities. Summing up, what Teece is saying is that innovation comes out of the blue, and states that searching, probing and reprobing is part of the innovation process, and that one may spend a substantial amount of money and other resources to get it right. Selman (2012) writes that innovation means intentionally “bringing something into existence”, which is all about making new tools, products or processes, allowing human beings to accomplish something they were not able to accomplish before. Merritt and Merritt (1985:11) declare that innovation is the presentation of a new idea, method or device into a social unit, which means that a given innovation may already have been used elsewhere, for instance in another different context, but it can turn into innovation if introduced in another environment (Gow, 2014).

Schramm et al (2008, p. 11) have also defined innovation as the design, invention, development and/or implementation of new or altered products, services, processes, systems,

organisational structures or business models for the purpose of delivering new customer value and financial rewards to the business (Schramm et al., 2008, cited in Boer 2015). This view is pretty much aligned with Schumpeter's thoughts.

According to the Theory on Economic Development, which was already mentioned in this work, Schumpeter gives five points in order to help us to have a clear image of the concept of innovation, that are the following (Boer, 2015):

1. Introduction of something new, a new (sort or quality of a) good, that the consumers are not acquainted with;
2. Introduction of a better or improved method of production, stemmed from scientific or non-scientific findings;
3. Opening of a non-existing market or entering in an existing market of which the manufacturing branch in question has not already been there;
4. Obtainment of a new source of supply, this source may already exist or has first been created;
5. Improvement of industry organization, for instance, reaching a monopoly position or breaking up an already existent market with an incumbent leading the way;

Progress in conceptualizing Innovation

As previously seen, it's been hard to reach a consensus about the innovation concept over time. Its conceptualization has evolved a lot for the past decades, from linear and sequential models to increasingly complex models comprising of a wide range of actors and processes. Roy Rothwell (1994) wrote that the increasing complexity and speed of industrial and technological change are pushing businesses to both forge new vertical and horizontal alliances to seek greater flexibility and efficiency when facing the market change. As we move forward, our day-to-day lives become more turbulent and complex, which intensify the need, and the constant quest for innovation, coming from all sorts of natures. That's why those vertical and horizontal alliances mentioned by Rothwell are so important, they will lead us to get innovation more quickly and efficiently. To reinforce this idea, Malerb and McKelvey (2018) shared one thought that supports Rothwell's thesis, saying that the idea of innovation system approach has emphasized interoperability and the need to interact with a wide range of heterogeneous actors from suppliers, users, scientific organizations, governments agencies, and financial organizations. And now we start to see that innovation can't be seen as an island, to really get innovation a lot of other stakeholders must be embedded in the process to get it right.

With regards to what we have been discussing in this section, Rothwell (1994) developed the fifth generation (5G) innovation process. On top of that, Meissner and Kotsemir (2016) decided to extend the model with the “sixth-generation”, a model developed by Henry Chesbrough in 2003 called “Open Innovation”. According to Marinova and Phillimore (2003), the sixth generation would require interactions between networks and innovation systems, which goes in conformity with the open innovation model, described by Chesbrough as the use of input and output knowledge objectives to both accelerate in-house innovation, and to enlarge markets for the outward use of innovation. (Chesbrough, 2003). The idea is that innovation should be treated as anything else, like a marketplace where one can sell and buy ideas whose purpose meets the company's need, taking into consideration the area of action and the business model.

The idea “You can’t have the best people working for you” turned out to be a reality, and companies realize it also. However, as described previously, OI is not only about people, but ideas and how those ideas are approached and taken to the market. From this point, companies started to look at innovation from a different perspective, giving considerable attention to the way they manage and conduct the innovation process. To add greater relevance, although innovation hasn’t been something new, many authors argued how important is for companies to be innovative (Hamel and Prahalad 1998, Tidd and Bessant 2005, Mulgan and Albury 2003, cited in Eveleens, 2010). Companies realize that the creation of an ecosystem, where ideas could be shared and discussed, could benefit not one, but a wide range of actors that belonged to that ecosystem. In short, OI happens when a firm deliberately connects with new ideas that have their origin outside the firm, or vice versa, and here is where the concepts of inside-out and outside-in approaches show their potential, meaning that innovation must be treated as anything else, the winner is the one who know how to share and capture ideas (Harvard Business Press, 2003).

Open Innovation reached the mainstream after the launch of Chesbrough’s book. After that, it was popularized, becoming a management “cool” word. However, Chesbrough hasn’t created the wheel, in fact, companies, by necessity were already applying some of the OI concepts in their way of work and interacting with outsiders.

Table A summarizes the six-generation models, their characteristics, strengths, and weaknesses.

Model	Generation	Characteristics	Strengths	Weaknesses
Technology Push (1950s – 1960s)	1	Simple linear sequential process, focus on science and R&D	Simple; Based on Science and Technology.	No market attention; No technology research; No interaction among stakeholders.
Market Pull (1960s – 1970s)	2	Simple linear sequential process, the market was the source of ideas.	Simple; Based on customers' needs.	No technology research; Lack of feedback; No interaction among stakeholders.
Coupling (1970s – 1980s)	3	Sequential process, focus on technological capabilities and market needs, and the existence of feedback loops	Simple; Understanding and meeting market needs; Feedback loops	No interaction among stakeholders
Interactive (1980s – 1990s)	4	Integration within-firm activities and the parallel development of new products and services focus on external linkages	High production efficiency; Integration of stakeholders into the new product development; Existence of a clear network; Intensive information exchange.	Complex; Hard to master and keep going.
Network (1990s – 2000s)	5	System integration and extensive networking, continuous innovation, focus on knowledge	Use of networking to get innovation; Pervasive innovation; Increase of Flexibility and responsiveness.	Small firms are highly dependent on large companies; Highly complex and difficult to master.

		accumulation and external linkages		
Open Innovation (2000s)	6	Combines internal and external ideas into architectures and systems whose requirements are defined by a business model.	Use of internal and external sources of knowledge; Extended network of highly qualified people; Focus on the business model; Treating innovation as anything else that can be traded.	Highly complex Increase the complexity of controlling innovation; The revelation of Intellectual property.

Table A - source: Barbieri, J. Álvares, A. (2016), "Sixth Generation Innovation Model: Description of a Success Model", *Revista de Administração e Inovação*, 1809-2039.

However, there has been some criticism about OI (Tidd, J. John, B. 2018). Some of these criticisms are based on the following ideas:

- How and when should a firm source external knowledge and share internal knowledge? (Tidd, J. John, B. 2018)
- The empirical evidence on the utility of OI is limited and practical guidelines are too general. (Tidd, J. John, B. 2018)
- OI has constrained innovation research to turn its focus on narrowing the in-bound and out-bound strategies to better appropriate the gains from innovation, forgetting all other stages of the innovation process. (Tidd, J. John, B. 2018)
- One of the main inhibitors of innovation is the natural competition that exists between individuals, OI *per se* doesn't provide any clue on how to avoid this issue. (Eric Seulliet, 2016)
- The idea that ideas are everywhere and belong to nobody hampers innovation, due to its difficulty in tracking and capitalising ideas and knowledge. (Eric Seulliet, 2016)

Digital Innovation

Over time innovation has come in many forms, however, as has been explained, some recent phenomena have had a massive impact on the world as innovation has accelerated. A lot is due to the rise of the internet and computational powers, of course it all stems from the human capacity to have ideas, and the know-how to execute them.

World Wide Web evolution

To comprehend in which direction the Web is heading, it is important to describe the evolution of the Web from its very beginning. It's not an easy task to distinguish these stages, albeit it's possible to identify some differences. The Web evolution is characterized by three stages in the internet era, these being Web 1, Web 2 and Web 3 (O'Reilly, 2007 cited in Bruwer and Rudman, 2015).

Web 1

Berners-Lee, a British computer scientist at CERN, his remarkable work will never be forgotten. According to the World Wide Web Foundation, by October 1990 Berners-Lee developed the three fundamental technologies that became the backbone of the web, HTML, URL and HTTP, also including the web page editor/browser **worldwideweb.app**. Web 1.0 is the “Australopithecus” of the modern world, it was a platform conceived to post and share information in a static form designed with text and images (DCruz, 2009 cited in, Bruwer and Rudman, 2015). As the Global Director of Deloitte Research, Ajit Kambil said, “It was fundamentally a publishing medium for hypertext documents, which eventually included multi-media objects”. In this period, companies like Google and Yahoo launched web search engines, and others, such as Amazon and eBay, enabled the marketing of products and services on the Internet. By that time catching on with Web 1.0 was a sea change in the way they were operating and ultimately it would change their business models forever. Something that distinguishes Web 1 from the next stages is the fact that the users had to pay to access the WWW.

Web 2

Web 2 is the current state of the web with which we are all familiar. It makes it possible for consumers to create, share and interact with content on the Web to be viewed by millions of people around the world, as long as they are all connected. Web 2 is all about networks and social media, where the product is the user. Web 2 came to enhance and streamline collaboration among consumers, services providers, and organizations, enabling them to generate content. As Ajit (1999) said, Web 2 “was characterized by a fundamental shift in how content and value was socially and collaboratively co-created by users”. Albeit everything above sounds promising, the Web evolution was followed by key innovations that allowed its exponential growth, such as mobile internet access and social networks, all easily accessible through our smart devices (e.g., iPhone, Android). All these conditions were exploited and

explored by the well-known Web 2 applications, such as Meta, Instagram, YouTube, LinkedIn, Airbnb, Uber, to name but a few.

Web 3

By and large, Web 3 is all about data ownership. Who owns our data, and the way it is stored. Considering the previous examples, what happens today is that large companies, running huge monopolies, are as powerful as the data about us they have. Wolfram (2010) brings artificial intelligence to the surface to define Web 3 saying that in this era, computers will behave like humans, and, in the limit, their capacities will outperform human cognition, resorting to AI algorithms, more specifically machine learning. To this extent, Ajit (2008) argues that the new era will combine human and increasingly available machine power to make information more open, accessible, reliable, and private. Web 3 relies upon the core concepts of decentralization, openness, and greater usability. Following the same pattern from the previous examples, we see that every era is somehow jeopardized by the next one, therefore Web 3 could potentially be as disruptive as Web 2. Web 3 is all about owning, the users owning their data in a digital realm, and this is only possible due to the blockchain technology. Anything in the Web 3 relies on blockchain, that's the only way for the users to own our data without trusting anyone, because the information will be stored in multiple locations, consequently decentralized, and that will knock down current databases and business models that rely on data, such as Google, Instagram, YouTube that will lose control over their users.

“Has anyone seen web3? I can't find it” asked Elon Musk on Twitter, to which Jack Dorsey replied, “It's somewhere between a and z”. Elon Musk and Jack Dorsey, two of the most vocal big business owners, showed, in a sarcastic tone their disappointment about web3 on Twitter, considering that no matter how decentralized a system is, it will always end up with a regulator. Web 3 is a reality, and it has been leveraged by technologies like Blockchain, AI, ML, IoT. The question is how we can drive the change and be part of the 3 revolutions, instead of being future-ready, let's think the other way around and drive the future, rather than letting other decide how the future will look like. Rebecca King (2022) listed a couple of questions to draw attention to the following themes, such as: can Web 3 scale sustainably? will Web 3 genuinely provide online sovereignty? is it possible to educate and shift the culture of the masses to understand Web 3?

2.2 Digital Assets

In a digital era, along with the rise of the internet and its applications, we could not fail to mention digital assets. What does it mean? A digital asset is the ownership of virtual property in a form of a binary data, stored in a computer, or over the internet somewhere in a cloud (A. Toygar, C. E. T. Rohm & J. Zhu, 2014). In a digital realm, any kind of data in a binary form can be considered an “asset”, for instance, digital photos, documents, audios, and video files, due to the value associated with them, which can be either monetary or personal. Digital assets are already part of our society, mainly leveraged by social media networks. These digital assets are similar to the tangible ones, and have grown in importance in other areas, notably in the financial services (A. Toygar, C. E. T. Rohm & J. Zhu, 2014), which will be covered next.

Digital Coins

Worldwide interest in Blockchain was ignited by Bitcoin, which was the first cryptocurrency being traded on the web without a central authority. Bitcoin comes to life in the first Nakamoto’s seminal white paper (2008). Since then, it has grown strongly, and this growth is also reflected in its market cap. After that, many other digital currencies have been born, with special attention to ETH, backed by the Ethereum platform, the former platform supporting smart contracts (Lipton. A, et al., 2018). Blockchain, due to its characteristics is well-suited for empowering financial transactions between peer-to-peer networks, eliminating the need for a trusted central entity that usually charges a fee to execute the transaction (Chen, Y. 2018). Transactions are publicly broadcast and stored in the blockchain that can be afterwards seen by other participants. Once this process is concluded, it’s time for the “miners” to play their role, which consists in verifying the reliability of that transactions and ensuring that there is no double-spending problem by competitively providing a proof of work (PoW). In the end, miners are rewarded with a digital coin, for instance, BTC or ETH (Lipton. A, et al., 2018).

GovCoins

Recently, a lot of discussions have been ongoing on the possibility of Central Banks issuing a central bank digital currency (Lipton, A. 2018). Being aware of that reality, governments, in special central banks, which take control of monetary policy, have been working on their own digital coins in order to not be left behind, and not lost their sovereignty. For instance, the European Central Bank started in October 2021 an investigation on how the digital Euro might look like that will end by October 2023, once the investigation is completed, the decision to move further will be taken. According to the report (ECB, 2021), a digital euro would provide

a quick, easy and secure tool for everyday payments, supporting the digitization of the European economy, while actively promoting innovation in retail payments. It's well perceptible that this digital euro would not replace cash but complement it. By issuing a digital currency, banks can also get rid of physical cash by replacing it with its electronic equivalent (Lipton, A. 2018).

Tokenization

In one of the attached exploratory interviews, the interviewee referred to blockchain as “nothing more than a sophisticated database”, a slow and expensive data base (Myalo, 2019), that gave us the appropriate tools to transact primitive digital tokens of value on the top of a public peer-to-peer network without trusted intermediaries.

“Token” is another word used to refer to crypto assets. So, tokens come into existence because of their usefulness in digitally representing something (Oliveira. L, et al., 2018). In the digital realm, cryptocurrencies, relying on the blockchain technology have “tokenized and decentralized” money, putting the entire financial system at stake (Larios-Hernández, 2017, cited in Y. Chen, 2018). According to Tapscott (2016), Blockchain technology has reached a point in which it is capable of tokenizing and decentralizing not only money, but other scarce assets, opening up the scope of its usage to several sectors (Y. Chen, 2018). Blockchain Tokens can be created on top of a blockchain and can be used to represent an endless variety of scarce assets that go beyond the ones already discussed. To make it clear, Butterin (2014) provided some examples of those endless varieties of scarce assets, for instance, “securities” (financial instruments), “properties” (something unique), “loyal points”, and “gift certificates” among other (Y. Chen, 2018). There seems to be a convergence when typifying them (Oliveira, Luis. et al., 2018 and Y. Chen, 2018), being portrayed as coin/currency or token. However, this is the starting point, then some authors add more classifications depending on their purpose. Oliveira. L, et al (2018), in their meta-analysis, defined eleven parameters when classifying tokens, class, purpose, role, representation, supply incentive system, transactions, ownership, fungibility, layer, and chain (table S attached in the annexes). The analysis also specifies the attributes of each parameter. To conclude, there are two major types of Tokens, currency/coin and tokens, the later could be for instance ETH that is built on top of the Ethereum platform and is used to transfer Ethers in a peer-to-peer network, thus a native currency born out of the Ethereum platform that was launched at its very beginning (Y. Chen, 2018), and the later, on the contrary, isn't native to a given blockchain but is created on the top of it, and its governance is done through smart contracts (Y. Chen, 2018). In the last case, tokens are representing a

wide range of digitalized assets, as seen before, and their value is dependent on the value of the related assets and services that these tokens represent (Y. Chen, 2018).

Token Archetypes

Oliveira. L, et al (2018) detected patterns through the direct relations between the parameters already defined and their role in their respective business model. Thus, in their research, they named these findings “token archetypes”. Basically, the token archetype will vary according to its main purpose and abilities, as the authors highlight, the extended analysis made it possible to ensure that tokens exhibit multiple functionalities and are equipped with specific capabilities for differentiated purposes. With this being said, the authors agreed that one token could have more than one purpose. All the archetypes are represented and defined below.

Archetypes	Main Purposes	Description
Cryptocurrency	Currency	Token whose goal is to become a widespread form of currency
Equity	Earning, store of wealth	A token that confers to its holder a right to equity-related earnings, for instance, profit sharing, applications rents or platform fees.
Funding	Store of Wealth and funding	A token that can be used as a way to finance projects in their early stages (through ICOs and IEOs), can be also used as a long-term investment.
Consensus	Validation reward, store of wealth	A token that has the goal to reward the miners, those governing the blockchain, ensures the validation and consensus each time a transaction is done.
Work	Work reward	Token means to reward users for their actions and behaviors on the chain.
Voting	Voting right	A token that confers a voting right to its holders
Asset	Voting rights, asset ownership	A token that represents assets ownership, proving who owns a given asset.
Payment	Payment	A token that is used as a payment method in a given application/platform.

Table B - Source: Oliveira. L, et al (2018), “To Token or not to Token: Tools for Understanding Blockchain Tokens”

2.3 Distributed Ledger Technology – Blockchain overview

Blockchain is a form of distributed ledger technologies (DTLs) (Gans, J. S., 2019), a dataset that is spread across multiple locations, and organised as a list of ordered blocks (F. Casino et al., 2018), where several participants are working on it (Papadonikolaki et al., 2021). Blockchain technology can be then defined as a distributed data store, from A to B, following a consensus mechanism, and an encryption algorithm (hash), by and large, is a decentralised distributed ledger database (Chen W et al., 2020).

Why distributed and not centralized?

Centralized solutions are like the ones we have been using over the last years (i.e., banks, governs, apps), this is a system where one or more clients are connected to a central server. This is the most common one, as an example, hence, the client sends a request to a given server, and then receives the answer. In this case, every single user can be seen as a node that is linked to the master node, which is the company, and this organism has the right to proceed with your request forward, or not.

Distributed system, here, every node makes its own decision, meaning that if a given user requests something, all nodes will be notified and, in its turn, will assess the integrity of the request, if a consensus is reached, then the request is accepted. So, the decision process is distributed and not centralized. In this case, trust is not placed in a central institution, but rather distributed across the system, following the same rationale, central authorities are replaced by a “community of peer-to-peer network”, being impossible for anyone else in the system to decide on behalf of any other participant (De la Rosa, 2017).

Looking back on Arrow’s learning curve (1962), which is the equivalent to the technology cost curve, it’s perceptible a rapid fall, meaning that distributed systems/solutions have in fact shown to be more cost-effective and, therefore, more competitive than the incumbent system.

Blockchain has earned its place in the microeconomic theory with a rise of a new discipline, cryptoeconomics, which would fall on the economics for cryptography (Zamfir, 2015 cited in Davidson et al., 2016). This would make cryptoeconomics a branch of the mechanism design developed by Leonid Hurwicz, Eric Maskin, and Roger Mayerson that “uses economics incentives to ensure that it keeps going and doesn’t go back in time or incur any other glitch” (Davidson et al., 2016). Here, distributed technologies are seen as a transparent

and trusted book of records kept on a decentralized public ledger, and that is why cryptoeconomics can be part of the mechanism design.

Blockchain

This technology become widely spread mainly due to the rise of Bitcoin. In fact, Bitcoin is the earliest application of the blockchain technology, due to its necessary involvement to make any kind of interaction happen. According to Marc Kenigsberg's Tweet, "Blockchain is the tech. Bitcoin is merely the first mainstream manifestation of its potential". It's worth noticing that Bitcoin (BTC) is an application of blockchain technology, in which every block added to the chain will generate Bitcoins under the Bitcoin protocol (Davidson et al., 2016).

The use of blockchain has been evolving rapidly, and it's been widely used in both, the public and private sector. The same happens with the industries where it has been deployed (Chen W et al., 2020). The increasing adoption of this technology has brought changes across sectors, and due to its adoption it became attractive to industrialists, practitioners, policymakers and academics (Papadonikolaki et al., 2021).

There's still a huge mystery behind the creator of this technology, however, researchers give its authorship to Satoshi Nakamoto in 2008. According to the experts, Blockchain came to solve the problem of maintaining the order of transaction, and to avoid the double-spending problem (Nakamoto, 2008 cited in F. Casino et al., 2018). To better understand this problem, an economic insight is needed. In digital-cash systems, making sure that the money is not being used twice is a matter of utmost concern. Double spending is then possible because the receptor has no idea if that money was already used or not, due to the absence of a third party who would, along the way, validate the integrity of that transaction (Nakamoto, 2008).

In Nakamoto's solution, blockchain solves the problem at hand by using a "decentralized database with network-enforced processes that are based on a proof of work (PoW) consensus mechanism for updating the database" (Papadonikolaki et al., 2021). Cryptocurrency is a practical way to overcome those problems mentioned above, since it relies on blockchain (Nakamoto, 2008). Data and encrypted information ensure that all the information flow and interactions are safe and protected from any suspicious action (Chen W et al., 2020). Any block that is added to the chain needs to be verified, and must contain the previous, and its own hash, which is used as a form of encryption. Hashing is the process of transforming an input item of whatever length into an output item of a fixed length, a good example is Bitcoin's Secure Hashing Algorithm 256, which for a given input item converts it

into an output result of a 256-bits sized hash. Indeed, blockchain transactions are recorded using public and private keys, allowing them to keep themselves anonymously, thus protecting their privacy while enabling participants to verify their integrity and identity (“Economist”, 2016 cited in de la Rosa, 2017). Data-encrypting private and public keys make data transfer safer (De la Rosa et al., 2017).

Summing all, blockchain is a way of establishing a robust, secure, transparent, and distributed ledger (Papadonikolaki et al., 2021), a distributed ledger technology that records and updates data, based on a decentralised system. Records are interlinked by a digital authentication or a hash of the prior blocks. As each user has a copy of the blockchain, data can be audited, verified and recorded transparently. Since each user can validate the entire chain and add a block, there must be a consensus among the different users with its copy. The blockchain cannot be tampered with by a minority or unstable majority, since the blocks are chained, and in order to modify older blocks, changes in subsequent blocks must be approved. So each user has a copy of the block, ensuring the integrity of the blockchain.

Blockchains can be divided into three basic concepts: transactions, blocks, and chains. By a transaction, we mean all the operations concluded that will end in a change in the status of the ledger (W. Chen et al., 2020). Blocks are used to record the information arising from transactions and the chain is where the information, in the form of a block, is stored. As information technology, blockchain uses a random hash as a way of encryption and timestamps all transactions (W. Chen et al., 2020). Figure 3 provides an overview of blockchain’s general architecture.

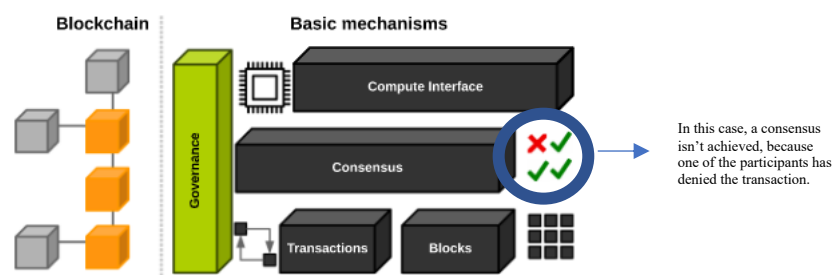


Figure 2 - An overview of blockchain architecture (F. Casino et al., 2019)

Blockchain challenges prevailing views on innovation, which is predominantly considered as the introduction of innovative products or processes in the market (Abernathy and Clark, 1985 cited in Papadonikolaki et al., 2021). New thoughts in digital innovation are arising as its implications spread across industries, and its interactions become more distributed and less predefined (Lyytinen et al., 2016, Papadonikolaki et al., 2021). Research by the

Polytechnic University of Milan aiming to understand how blockchain-based projects brought by SMEs has taken place over 2016 and 2019 shows a sharp increase at the global level since the first year of the study. The growth of blockchain-based project is notorious, and when considering the announced and implemented projects, we see that the number increased by four levels between 2016 and 2019 as shown in the chart below.

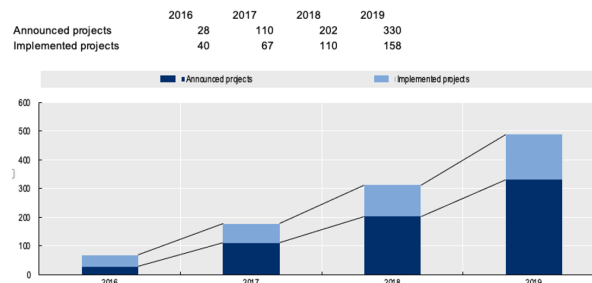


Figure 3 - Source: Polytechnic University of Milan (2020) "Blockchain & Distributed Ledger: unlocking the potential of the Internet of Value"

Bringing back the economic theory, blockchains are likely to become increasingly cost-effective, when compared with traditional systems (based on centralised solutions), as they follow three exponential cost curves: Moore's law (the number of users doubles about two every years); Kryder's law (the cost of storing information will fall every 13 months); Nielsen's law (the cost of shipping information drops every two years). Indeed, when observing the learning curve (Arrow 1962), it's possible to realise that blockchain is starting to gain room against the mature technology of centralized ledger (Davidson S et al., 2016).

Types of Blockchains

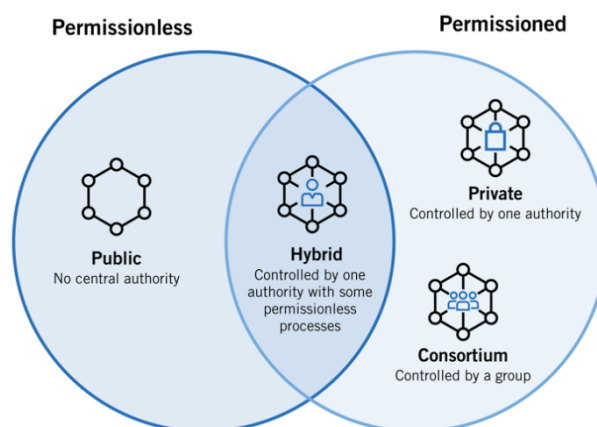


Figure 4 – Types of Blockchains (source: Wegrzyn and Wang, 2021)

As shown in 4 above there are four types of blockchains structures:

- **Public Blockchains:** this is a permissionless type of blockchain, everyone with access to the internet can join, and it's completely decentralized (ex: Bitcoin, Ethereum).

- **Private Blockchains:** this is a permissioned type of blockchain controlled by one organization. This authority has the right to determine who's illegible, or not to be part of the chain.

According to Wegrzyn and Wang (2021), both private and public have their own disadvantages. Public are characterized by having longer validation times for new data than private blockchain, whilst, on the other hand, the private ones, are more likely to suffer from some illicit action. To overcome those issues, **consortium** and **hybrid** blockchains were developed.

- **Consortium Blockchains:** this is a permissioned type of blockchain managed by a group or organization, in contrast to what happens with private blockchains. This kind of governance makes consortium blockchains more secure and safe.
- **Hybrid Blockchains:** This type of blockchain is managed by a single organization. However, a public blockchain is needed to perform certain validations.

Determining which is the best blockchain also requires evaluating a couple of tradeoffs, despite the ones introduced above, and, for instance, throughput, transaction costs, degree of decentralization, and the existing ecosystem where the blockchain is based (Editor, T. 2016)

It's worth saying that the crypto (R)evolution is still going on. In the future, we may have more blockchains with different features that will allow us to perform more things and disrupt new markets. Let me recall the S-curve of technology performance (relation between performance and investment) when technology's performance starts at a low pace, and then over time, it has an exponential growth. This could also be a good point for further research, defining in which stage of the curve blockchain is.

Lin Cong (2018) from the University of Chicago argues that "the Blockchain technology has the potential to disrupt business and financial services in the way the internet disrupted off-line commerce." Going even further by stating that blockchain can completely change market competitiveness. This is not novel, incumbent firms have started to realize it, and the truth is that they are now looking at blockchain and its application with much closer attention. Change is imminent and it doesn't seem to wait for anyone, just as so many other changes have been happening and forcing industries to reinvent themselves. (De la Rosa., 2017). Indeed, in the Deloitte's Global Blockchain 21' report states that the business imperative to adopt Blockchain

and digital assets is growing as never seen before, emphasizing that organizations must catch up on it, and accept that their business models are at stake.

Blockchain applications

Marco Lansiti and Karim R. Lakhani (2017) shared some thoughts on what they think blockchain can achieve over the next year in an article at HBR entitled, “The Truth about Blockchain”. They wrote the following, “we can imagine a world in which contracts are embedded in digital code and stored in transparent, shared databases, where they are protected from deletion, tampering, and revision”. They went even further saying that everything we do will have a digital record and signature that could be validated, identified and stored through machines and algorithms, stating that jobs like lawyers, brokers, bankers will be rendered obsolete. All this had the intention to give an outlook on the immense potential of blockchain.

According to Swan (2015), Blockchain applications can be broken into three stages, blockchain 1.0, 2.0, 3.0. More recently, another stage was added, the 4.0 (Baudier et al., 2022). The former one is linked to the financial aspects, the deployment of cryptocurrencies and payments systems in our day-to-day life; the second stands for the decentralization of the market more generally, and comprises all types of assets beyond currencies, it's a whole new space created that can include bitcoin 2.0 protocols, smart contracts, smart property, decentralized apps, decentralized autonomous organizations, and decentralized autonomous organizations. Blockchain 3.0 is the application of blockchain to other areas of our society, such as education, government, healthcare, science, and so forth. Finally, the latter includes artificial intelligence solutions.

In the academy, researchers found their way to protect their IPRs through the combination of blockchain technology and publishing. They have developed a digital protection model based on blockchain (Chen et al., 2020) in order to keep track of their citation and avoid plagiarism. China has also developed an “officially supported copyright service and settlement system” (Chen et al., 2020). Certilogo is a good example of blockchain-based product authentication company that resorts to AI and other authentication solutions to track the authenticity of luxury products (OECD, 2021). Recently, a joint venture between IBM and Maersk developed an open and neutral industry platform leveraged by blockchain technology called TradeLens that offers a consistent and holistic view of the entire supply chain, enabling information sharing and collaboration across supply chains (Gardner et al., 2011).

Ethereum Blockchain

It was in 2015 when Vitalik Buterin presented a new blockchain platform called Ethereum and its token, “Ether”, which is based on the concept of decentralized smart contracts (Myalo, 2019). Ethereum is the community-managed tech that fuels the cryptocurrency ether (ETH) and tens of thousands of decentralised apps (Bawany, 2021). Since the beginning (2015), Ethereum platform and its currency ETH made it possible to build blockchain-based applications for almost any kind of use and sector (De la Rosa et al., 2017). All transactions are made resorting to ETH, every time one uses ETH or an Ethereum application a small fee is charged to use the network. This fee is seen as an incentive for miners to process and verify all the movements, ending with a new block added on the blockchain.

Ethereum is an open sourced-based platform open to everyone, its extensive use exploited a couple of benefits, and gave place to some network effects. To name a few, marketplaces, interaction networks, and platforms. This decentralized system, in which Ethereum is established, allows other apps to be created and deployed (Bawany, 2021).

Although Ethereum isn't the best blockchain platform, remains the most widely used, largely due to its network effects, and for being the first to appear in the crypto world using smart contracts. But what's new with smart contracts? Smart contracts allowed any participant in the network to define their ownership, transaction formats, and state transition methods, which by then was something completely new, and seen as a huge breakthrough (Bawany, 2021). In short, smart contracts are digital contracts that self-execute automatically when certain conditions are satisfied (Bawany, 2021), which must be agreed upon by both parties. Ethereum is also known as an “implementation layer”, which means that it comprises a system associated with the base or main architecture of a blockchain on top of which projects/applications are created (Singh, 2021). A particularity, in this kind of decentralized system, is that they provide a set of rules and parameters that must be accepted by all participants, such as its consensus algorithms, block time, transaction throughput, and so on (Vermaak, 2021).

Blockchains such as Ethereum use a consensus mechanism, whereby all transactions will have to go through. For that, all participants, nodes in the network must agree on if the block is legible to be added or not. This agreement is achieved by a consensus mechanism, most of the time resorting to mathematical models that are perfectly parameterized. Each member of the blockchain is rewarded in tokens (Myalo, 2019), a major part of blockchains uses a type of mechanism called proof-of-work, however, advancement in this field has been

done, and more mechanisms can be found, such as, proof-of-stake, proof of authenticity or Nakamoto consensus.

Smart Contracts

Smart contract was first used by Nick Szabo in 1994 (Vigliotti, 2021), long before Bitcoin was created by Nakamoto in 2008. Szabo wanted to digitalize contracts to store contracts by doing that he would attain a collection of properties that a real contract couldn't have, as such, traceability, transparency, immutability, and the unnecessary use of human intervention. Smart contracts have evolved since the introduction of the concept by Szabo, they can acquire different shapes and forms, depending on the given purpose (Vigliotti, 2021).

Using smart contracts not only gets rid of the middleman in the transactions, who would charge a fee for its services, but also ensures transaction security and reliability (Chen et al., 2018).

A smart contract running on blockchain, like Ethereum is, in its essence, a computer protocol that materializes in a real contract (Vigliotti, 2021), which has been used for decades (Chen et al., 2018). The difference between real and smart contracts is that they are completely digital, and are accompanied by a set of properties that make them more attractive. Now in a digital context, smart contracts are “automated software agents” (J. Goldenfein, A. Leiter, 2018) hosted on blockchains that can allow transactions autonomously, according to a set of rules, conditions, and parameters previously established by the owner of the contract. Smart contracts have acquired a couple of characteristics that make them way more attractive to business nowadays, such as their speed of execution, accuracy, integrity in payments and performance (Monisha Coelho, 2021). In contrast to the traditional ones, smart contracts proved to be fairer (Chen et al., 2018). Indeed, they boost confidence in the transactions, thus enabling all participants to check the terms of the contract, clearly and honestly (Vigliotti, 2021). Smart contracts are not “smart” in the AI sense, they are pieces of code that are deployed on the blockchain and that can be executed, thus they determine a set of rules to be performed if a consensus is found among all nodes.

Smart contracts are widely used in our day to day lives, for instance, in contactless bank card payments, they have to go through a validation process that is conducted and possible resorting to a smart contract that is deployed in the terminal system (Vigliotti, 2021), if your bank account complies with all the requirements, then the payment is done and registered. The Internet has accelerated the deployment of this kind of “internet agreement”. According to the EU, Article 9 of the European Union's Electronic Commerce Directive (Directive on electronic

commerce, 2000 cited in Vigliotti, 2021) established that all state members should support and facilitate the deployment of smart contracts. Nowadays, there are plenty of frameworks that help implement smart contracts, for instance, OpenZeppelin, Solidity, Enterprise Smart Contract Framework, Embark or Populus (De la Rosa et al., 2017).

The most common use for raising capital is the ERC-20 (represents a fungible token, and mostly run on Ethereum), a smart contract that generates a new token and makes it possible to transfer cryptocurrency from one peer to another (Myalo, 2019). ERC-20 is used for all smart contracts on the Ethereum blockchain and provides a common list of rules that all Ethereum tokens must adhere to. To conclude, Momtaz (2021) pinpointed two important competitive advantages when describing how smart contracts are transforming the financial markets, namely over financial technologies: (i) Interoperability, meaning that one can now transfer value from one platform to another, that's one of the hurdles of the incumbent firms using old technologies; (ii) Settlement speed, blockchain with its features can now accelerate trades on exchanges platforms, what now takes two business day, may only take a few minutes using this technology.

Startup market and financing services

“Money is the seed of money, and the first guinea is sometimes more difficult to acquire than the second million” – Jean-Jacques Rousseau

In this section, the goal is to present the ways in which startups finance their projects in the early stage of their projects, most known as the “Startup stage”. Therefore, a quick overview of banks, financial institutions, and their role in financing innovation will be given. Banks and financial institutions play an important role in the startup ecosystem, providing capital and thus, financing the kickoff of the early-stage projects, whose aim is to grow fast (Wonglimpiyarat, 2015). However, banks are most of the time reluctant to support those aspiring unicorns due to the risk of the early-stage ventures in terms of sufficient assets, one of the reasons for such reluctance is the lack of proven track record and low capitalization (Berger and Udell, 1998, 2006; Black and Gilson, 1998; Wonglimpiyarat, 2007; Menkhoff et al., 2012; Fredriksson and Moro, 2014, cited in Wonglimpiyarat, 2015). To some extent, major financial institutions do not see here a profitable business, making entrepreneurs find another way to fund their ideas and therefore turning them to other financial sources available on the market. According to Smith et al (2011), it takes skills and creativity to raise funds for a venture that has no track of previous success, but rather a huge bubble of uncertainty. Therefore,

entrepreneurs fund their ideas/inventions through a wide variety of financial services. In Table C is possible to understand who are the main agents that are willing to finance a start-up in their early stage, the start-up phase.

	Start-up	
Entrepreneur		
Friends and family		
Angel investors		
Corporate strategic partner		
Venture capital		
Asset-based lender		
Venture Leasing		
Government Programs		

 Primary focus of investor type
 Secondary focus of investor type

Table C - Source: adapted from ("Entrepreneurial Finance: Strategy, Valuation, and Deal Structure ed.1ª, pag.64)"

As outlined above, the capital market risk ends up becoming a strong means of financing for these startups, and this idea goes in hand with what Sohl (1999) said when he identified private investors as the major source of capital in the startup stage. The Risk Market can be divided into two segments, the formal and informal, the former is related to the VCs market, which is a form of private equity and type of financing that investors provide to start-up companies, whose aim is to make a profit in a long-term period. The latter is related to the well-known Business Angels (private investors), in this case, the investor is provided by high-net-worth individuals.

2.4 DeFi: new ways of funding start-ups with blockchain tokens

When finance meets the internet something mind-blowing happens. Over the years, as the era of the digital economy approaches, financial technology has started to become more influential, taking up some traditional roles played by large financial institutions (Chen and Bellavitis, 2020). Although Fintech has done a great job in reducing the need for financial institutions, it has not taken the intermediaries out of the way (Chen and Bellavitis, 2020). The rise of tokens and decentralized financial systems has been possible due to the Blockchain technology and it promises to reshape the future of finance and by coincidence the democratization of entrepreneurship.

Funding is one of the biggest concerns for founders and entrepreneurs. One can have a brilliant idea but without execution it won't go past that. Therefore, the funding process in the early

stage of the projects can determine the growth viability and the potential success of the startup. Blockchain and its functionalities created a whole new paradigm when it comes to seeking investment and promises to turn the risk capital market upside-down. This new paradigm has led to the emergence of decentralized finance in this domain, which created an alternative financial system that can be more decentralized, innovative, interoperable, borderless, and transparent. (Y. Chen, 2020).

Initial Coin Offering (ICO), concept and market overview

According to the Cambridge Dictionary an Initial Coin Offering (ICO) “is the currency space’s rough equivalent to an IPO in the mainstream investment world.” As might be expected, all other definitions came down to the one presented above, for instance, Myalo (2018) describe it as a process of creating and distributing tokens to users in return for a network’s primitive cryptocurrency. He highlights that, whenever a new token, other than Bitcoin, is issued and listed on trading platforms, it can be considered an ICO, thus being the starting point for many “young” cryptocurrencies. Interestingly, Andrieu and Sannajust (2021) put it in a simple and easy way, saying that “ICOs enable ventures to raise capital by selling digital assets to a crowd of investors”. In this case, what ICOs brought different to the venture capital market was the potential democratization of entrepreneurship, making the access to capital more efficient, fairer, and above all, with greater equality of opportunity (Y. Chen, 2018). For the first time, entrepreneurs have at their disposal an endless number of potential investors, this time not restricted to a physical space, but rather across the globe (Y. Chen, 2018). By and large, ICO can be seen as a Token sale, where a project team sells its token to the public for the first time, aiming to raise money to fund their project, allowing thus wide participation from the public (Y. Chen, 2018). Today, it is now possible for public ICO to target VCs and BA, since they begin to vary the risk of their investments and be more attentive to the cryptocurrency market. An ICO may involve one of the following types of tokens: (i) Utility Token, a token that gives access to a product or service within a platform, they are thus benefits or credits stored on the blockchain; (ii) Security Token, a token that can be used as a financial instrument, such as stocks and bonds; (iii) Cryptocurrency or Payment Token, a token that is used as a payment method. Briefly, and to make it clearer, with an ICO the investors become dependent on the success of the project, and this success will then appreciate the coin, making a profit for investors. In the chart below are described all the steps required to create an ICO.

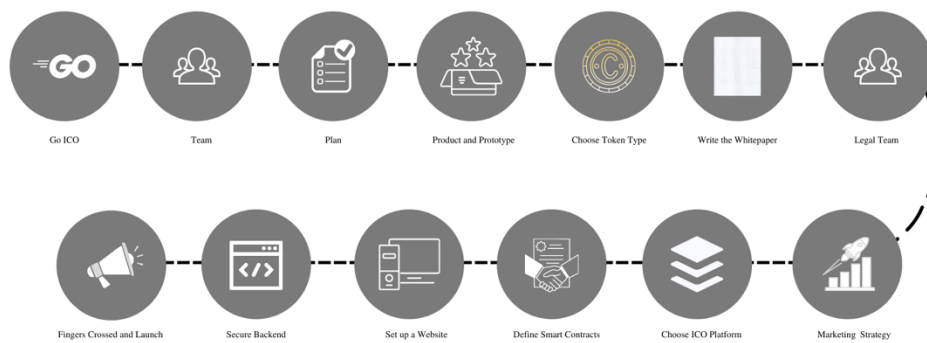


Figure 5 - source: https://miro.medium.com/max/700/1*Y0QUHAcvYmwNzY2RBTUgzg.png

Market overview

The first Token sale happened in July 2013 and was carried out by Mastercoin. In 2014, Ethereum was the first example of an ICO raising 3,700 BTC, which would later, in 2015, be launched (Myalo, 2018). According to the ICO Market report 2019/2020, from the Technical University of Munich, in 2019 more than 3 billion USD were collected via ICOs, being the largest raised amount of \$ 1.000.000.000, in Taiwan, China. Ethereum keeps its status of leader across platforms to launch ICO, having 88% market share. Also, most of the tokens issued in 2019 weren't traded on a secondary market, which reveals the speculative value of these new investments. 30 days after their ICO, 30% of tokens traded on a crypto exchange platform were traded above their ICO price, and 180 days after, 17% of tokens traded were still in the profit zone. By July 2020, 87% were under the red line, and only 13% were in the profit zone, that happened because more than 65% have lost all their value. Finally, shares issued via IPOs during 2017 and 2018 performed better on secondary markets than the tokens issued during this period. A press release from The Express Wire, January 16, 2022, said that the "Global Initial Coin Offering (ICO) Service Market is expected to grow at a steady growth during the forecast period 2021-2027." Although the forecasts are quite positive, from 2018 onwards, ICOs began to fall, much due to the discovery of various schemes. Shobhit (2018) wrote an article where he claims that 80% of the ICO conducted during 2018 were scams, and that was confirmed by publicly available information and sources. After these findings, investors start to look at other alternatives.

Decentralized Autonomous Organization Initial Coin Offering, concept

Decentralized Autonomous Organization Initial Coin Offering, also known as DAICO, came to existence by Vitalik Buterin, founder of the Ethereum Blockchain platform. His goal was to overcome the problems associated with ICO by combining the advantages of decentralized autonomous organizations with the classic ICO model (Myalo, 2018). In this case, all the steps

to be covered are the same, the project team has to go through all the ICO steps already mentioned above, but things change from the moment the initial token is sold onwards. A DAO can be thought of as a crypto-native business model that is collectively owned and managed by its members, who are willing to invest in innovative projects. With DAOs the investors don't need to trust anyone but the code, which is 100% transparent and verifiable by anyone. As in a democracy, decisions are taken by consensus, governed by proposal and voting. DAOs are based on smart contracts that set the rules and keep the organization running without human intervention. Also, with this model, token holders take control of how much money is available to the team (Myalo, 2018), through this way the holders of tokens can have a holistic view of the project and protect themselves from possible frauds, as well as restricting the access to investments by stages (Myalo, 2018).

Initial Exchange Offering (IEO), concept and market overview

After the rise of ICOs, a new variant showed up (Myalo, 2018). According to the website, Bybit Learn, an initial exchange offering (IEO) “is a way for start-up companies to raise capital by selling utility tokens which confer preferred status with the company through a cryptocurrency exchange platform.” IEOs work pretty much like a stock market and take place on a “cryptocurrency exchange” (Furnari, 2021). An IEO can be defined as an ICO held in the marketplace, through this platform, investors can buy tokens using fiat currency or do trading activities using tokens (Furnari, 2021). Hence, in contrast to the ICOs, IEOs rely on cryptocurrencies exchange platforms, and their offering is intermediated. All projects are the object of rigorous screening, including, for instance, the performance of AML/KYC verifications (Andrieu and Sannajust, 2021), ensuring the reliability of potential projects, and thus, connecting high-quality projects to potential investors (Chen and Bellavitis, 2020). In this case, there is no need for smart contracts because the exchangers do that work. IEOs enable startups to be part of large-scale fundraising through a trusted intermediary, who will verify all the transactions and manage the funds raised during all the capital generation process. To make it easier for investors, these platforms ensure the proper description of the projects, and endorse the high-quality ones, according to their own reputation and parameters (Chen and Bellavitis, 2020). The U.S Securities and Exchange Commission wrote the following alert in January 2020, “the online trading platform involved in an IEO may also be acting as a broker or dealer”, and thus must be subject to the legislation of the SEC. Cryptocurrencies exchange platforms facilitate the trading of cryptocurrencies for other assets and act as an intermediary between the buyer and the seller making money from commissions and transaction fees. Myalo (2018)

listed the most well-known and reliable platforms providing its users with the opportunity to take part in IEO, among which are Binance, Huobi, and Coinbase.

Market overview

Due to legal restrictions, there are a set of restrictions in different countries for exchanges, some even banning IEOs, such as Albania, New Zealand, and Canada, among others (Myalo 2018), with most countries lacking regulation and legislation. According to Bae, Kim & Lee LLC (2022), South Korea was the first country to release concrete guidelines on IEOs, covering the protection of investors, projects' development planning, technical materials, compliance, and security issues. According to the IEO Market analysis, conducted by ICObench in 2018, Singapore is the leader in the IEO market having conducted 11 IEOs projects accounting for 58.8 million, followed by Estonia in second and the USA in third. Hong Kong, albeit with only 4 projects has managed to collect 65.7 million being on the top by the number of funds raised.

Security Token Offering (STO), concept and market overview

Security Token Offering is a trend growing very rapidly, STOs are an upgraded and highly regulated digital version of traditional securities. Unlike ICOs, STOs have to be listed on the financial market and follow the legislation in force in the country where they are established. Although the lack of information and academic research on the topic, a consensus tends to be found on the future of this emergent resource, STOs are likely to replace, in the long term, traditional methods of registration and commercial ownership in various asset classes (Momtaz, 2021). For a more accurate definition, "Security tokens are blockchain-based investment contracts that are subject to existing securities law" (Momtaz, 2021). Security tokens represent real capital in the enterprise, although it is not necessarily tied to a share in the company, they can be also used to split rights of ownership, in the form of "ownership of shares", "periodic dividends", "cashflows", "payment of debts", "the right to vote", etc, being all of these supported by a smart contract (Myalo, 2018). When it comes to entrepreneurs, STOs are an easy way to get funding, although expensive (Momtaz, 2021), when compared ICOs to raise capital. For investors STOs provide a secure and transparent direct investment in a company, for instance, in the US, STOs projects must obey all SEC regulations, meaning also that the investor's money is protected by law.

As already mentioned, security tokens are financial instruments and they can have a form of a share of a company or an asset, such as a property, art or investment funds. Due to blockchain technology, the ownership information is stored on the chain, protecting the token and the

investor against fraud and misuses. According to Zaki (2019), there are three types of security tokens, Equity, Debt, and Real Assets Tokens.

- Equity Token: are similar to traditional shares, they represent the value of shares issued by a company on the blockchain. The difference between an equity token and a traditional stock is in the way in which its record of ownership is done.
- Debts Token: are debt instruments, such as real estate mortgages and corporate bonds. Debt tokens can work as a way to raise money and can be compared to a loan, debt owners are entitled to the repayment of principal and periodic interest.
- Real Assets Tokens: represents ownership of certain assets, for instance, real state or commodities.

As Momtaz (2021) said, the STO process is quite similar to ICOs, but in this case, with a different legal context and timeframes.

Market overview

Since 2018 STOs reputation has been growing (Momtaz, 2021). In March (2019), 122 STOs were completed, raising 512M US dollars, which accounts for almost the same amount raised by ICOs between January and February 2019 (Myalo, 2018). KMPG projections of the rate of growth are 8 trillion US dollars by 2025, according to the Blockstate website in a study conducted where more than 120 projects were analyzed. In the same study Blockstate's top findings were the following, total funding raised accounted for 953 million US dollars, the US, Switzerland and the UK ranked top three, and 6 out of the top 10 countries are European, although the US dominates globally, the Finance and Banking segments are by far the dominating industries, followed by blockchain and real estate, Ethereum is the clear technological leader with 94% market share, and the majority of security tokens are companies' equity, accounting for 75%, then real assets with 15%, and lastly debt with 10%.

Chapter 3 - Research Methodology

Due to the novelty of the topic being studied, an exploratory research design was pursued, since the goal was never to produce final and conclusive evidence about the topic under research (Dudovsky, J., 2022). And, for that, an inductive reasoning was applied. This ended up being the most suitable approach, there was a need to move back and forth throughout the development of this research study, trying whenever possible to support all the conclusions in the theory already written, while, on the other hand, observing and understanding the events that are happening today around this topic, and that has not yet been studied. Thus, the author started with the already known research questions. To shed light on that matter, initially, the author of this research resorted to a set of secondary data sources, comprising surveys, documents and multiple sources.

Everything on the topic of crypto assets are still very new. Throughout this research process, when discussing with many of the experts and pioneers in this field in Portugal, it became clear that we are still in a learning and development stage, and that we are all just starting to understand the real value and potential that blockchain technology can bring to the financial world and, more specifically, to innovation (Interviews in the annexes A, B, C).

Then having chosen the methodology pursued, the methodological choice taken was the qualitative research design, followed by the research strategy known as a case study where non-standardized, in-depth (unstructured) interviews were conducted (Saunders et al., 2019). Creswell (2013) describes qualitative research as an approach to a given case study where the author of the study focuses is work on understanding the context and the phenomenon of one or more cases, communicating directly with the participants, through detailed observation, and in-depth data collection.

In order to bring greater academic grounding on the ideas shared and conclusions derived from the interview, a method of analysis was chosen for the interview, thematic content analysis (TA). The chosen technique was conducted due to its unique features that can be used in a wide variety of approaches to qualitative research (Clarke V, et al., 2015). Through this approach, addressed in the book "Qualitative Psychology: A Practical Guide to Research Methods" from Jonathan A. Simith, Virginia Braun and Victoria Clarke (2006) defined a six-phase approach which allows the researcher to begin in a broader scope and with little objectivity towards a set

of conclusions in forms of themes that were decoded and identified during the interview analysis. Many of the themes would end up being removed as there was no strong evidence, assuming that a qualitative analysis is based on subjectivity and opinions, in order to avoid mistakes and misperceptions, it is necessary to find patterns of convergence that point to a more reliable conclusion.

As mentioned before, the goal of this research study is to find answers to the following research questions:

- How this new digital and decentralized reality can foster and accelerate innovation?
- Can the new digital era (DeFi, Blockchain, Digital Coins) accelerate the funding of startups?
- What are the conditions for resorting to these methods, and for which firms does it apply?

Chapter 4 - Case Study

Research Strategy

The research strategy adopted was the case study, using non-standardized, in-depth (unstructured) interviews to answer the research questions through the analysis of one company, Bityond, which was the first startup in Portugal to raise money through an ICO in 2017. However, before reaching out Bityond, two interviews were done in a form of unstructured and generally open-ended questions, whose goal was to make it a shorter conversation while, at the same time truly insightful, to get the views, and opinions of the participants. The first two interviews targeted company leaders that are doing a great job and contributing a lot to the development of blockchain and DeFi in Portugal. They are Hugo Volz Oliveira, Secretary-General and Founding member at Instituto New Economy, and Mário Alves, CEO at TAIKAI and Bepro. After these two exploratory interviews, the author decided to follow then a case study with Bityond, thus developing part of this research with Pedro Febrero, Bityond and Realfever's CEO.

As introduced in the previous chapter, the research strategy was based on an analysis method often used for qualitative research, the thematic analysis. A thematic analysis provides thus, an accessible, systematic and structured approach to coding and theme development (Howitt, 2010 cited in Clarke V, et al., 2015). TA can be used to explore almost any type of research question due to its flexibility, i.e., it can be applied and adjusted to the almost any type of qualitative data guided by a different theoretical framework (Smith J, 2015). Apart from its flexibility, take a range of different forms, inductive, deductive, semantic, latent, descriptive, and Interpretative. For this research the inductive form was chosen, this allowed, from the very beginning, to look at the scripts in a critical way and understand where we could find some bias that could influence the conclusions drawn by the themes. The main goal was then to understand if we found different patterns across the data collected from the interview. In order to be rigorous in obtaining the best results, the six-phases proposed by the authors of this methodology were followed, as described below.

1) Familiarization	Read the transcripts and making notes of the first impressions (Braun and Clarke, 2006).
2) Coding	Identifying and labelling relevant features of data (Braun and Clarke, 2006).
3) Searching for Themes	Clustering together codes in order to create, find patterns across the data that can be then transformed into themes (Braun and Clarke, 2006).
4) Reviewing Themes	Check whether the themes exhibit a good “fit” with the coded data and with the data set (Braun and Clarke, 2006).
5) Defining and naming themes	Writing theme definition (Braun and Clarke, 2006).
6) Writing the reports	Findings transition into the interview analysis, making the bridge with the theory already studied (Braun and Clarke, 2006).

Table D – six-phases of the thematic analysis

Description of the company

Before starting any kind of analysis, it is important to give some details about the company under study. Bityond is a skills-matching talent management and recruitment platform. Bityond differs from other skills-matching and recruitment platforms for being the first to incorporate an economic incentive for users in 3 different ways: (I) Free tokens, by using Bityond, users always get an economic incentive translated into tokens; (II) Voting, users have the right to vote on new developments and features; (III) Utility, users can spend tokens to sponsor new developments or purchase subscriptions and reporting.

Bityond can be seen as a multi-sided platform to serve candidates, and employers in the IT sector, using an automatic matching tool that connects candidates' skills, with open job opportunities looking for those skills. While, on the other side, employers can either recruit across Bityond, or manage people in their organization. Bityond was founded in 2016 and raised 20 ETH through an ICO from family and friends.

In order not to lose focus on the research questions, they were remembered from the beginning and taken into account from the first phase suggested by the authors of the methodology and defined with colors for further analysis and framing, as it's possible to see below.

Q1. How this new digital and decentralized reality can foster and accelerate innovation? – Red

Q2. How the new digital era (Defi, Blockchain, Digital Coins) can accelerate the funding of startups, and in this way reshape the future of the Capital Market Risk. – Green

Q3. What are the conditions for resorting to these methods, and for whom this reality applies?

- Purple

Chapter 5 - Interview Analysis

In order to avoid taking too much space to analyze the interview, it was decided to not transcribe the thirteen questions asked to the interviewee, these will be in the annexes section together with the interview in its entirety

5.1 Familiarization

First Question
Nowadays even crypto native companies, they are generally, at least partially, venture backed startup, meaning that they use venture capital to fund their businesses in the early stage of the project
There has been a change in the investment paradigm, in the beginning, this kind of investment in startups in the web3 area, used to come mostly from private investors that started to invest in crypto. Today, with the advancement of technology and the creation of communities dedicated to investment, such as launchpad, there is a greater connection and participation of VCs. They are also starting to see here an opportunity to diversify investment and ensure their future sustainability.
Is funding getting more decentralized than it was in the past? The fundraise now has been much lower than in the past.

Table E – Question 1

Second Question
Bitcoin or cryptocurrencies they don't compete with traditional money, nor financial services, the problems are a level underneath, and it's linked to how much money is distributed and not the financial services that are where the money exists.
There is a real problem in the way the money is managed and distributed. It doesn't necessarily have to do with the financial services, these are there to serve the user, but rather with the way money is created and distributed and this is very much linked to the evolution that has existed and how money has been backed.
Bitcoin does not compete directly with banks, or the services most banks provide, it does compete with central banks, for sure, in the sense that Bitcoin works as a protocol to create currency.

Bitcoin works as a protocol to create currency, therefore, it's exactly what the central bank does.
DeFi brought us autonomy, I can have access to many financial services without the need of any intermediary, meaning, financial institution.
Through a protocol, a smart contract you swap currencies and exchange money.
Crypto offers an alternative system to what we have nowadays. It won't substitute the fiduciary system.

Table F – question 2

Third Question
Yes, innovation can be democratized and due to the technological capabilities brought by blockchain, accelerated. This is because, anyone can create their own project without the need to open a company, it is much cheaper and faster. It is only necessary to know how to work with the technology and use it.
It's easier the go-to-market approach because you're selling directly to the consumer, and they can use their wallets to proceed with the purchase and interact with the smart contract.
There is way less barriers to enter, because it's easier for anyone to set up a web3 business than a traditional web2 business.

Table G – question 3

Fourth Question
There is still the need to involve people with know-how and expertise. BA, and VCs are important because they connect the startup to the business world, driving the path to the customer, and revenue generation.
It's important to make yourself and project known, so then people can trust you, invest in what you are building and buy your product.
If you are innovating, people need to know, but it's also important to know where these people are. In this regard, there is no much difference between web2 and web3 startups.
But you know, as in a web2 approach, you still need to know the right people, they need to like you etc. So, it's very political if I can say that way.

Table H – question 4

Fifth Question
It is not entirely clear this change, we continue to have and understand that there are always many interests in the market for investment for startups.

In the big showcases for these projects, example Polkstarters and Binance launchpads, it is not completely impartial which projects are chosen to be there.

At the end of the day, it doesn't matter if you have a great product, what matters the most is that you can find easy access to people who can buy your token.

Table I – question 5

Sixth Question
Using these decentralized methods and exposition through the right channels, it's possible to go faster when it comes to go to market and fundraising, and that means that we can try out new ideas and launch them to the market quickly.
The best advice is to use as many ways to fundraise as possible, can either be through a IEO, STO, or also a VC, or Business Angel.
It's not that easy to raise considerable amounts of money in a decentralized way, the new way that projects are finding, in an attempt to attract the market is by doing, for example, airdrops.

Table J – question 6

Seventh Question
The means one choose to invest will depend on the market, if it's a bear or a bull, if it's something technical or market driven.
What really matters is having people buying your product, your token, and that means that those people see value in what you are building, but it's also necessary to give some utility to that token.
When taking about finding ways to get exposure and financed, it's necessary to find these people, and partners, that's because they have influence in their companies and communities.
It's important to find people who can add value to your business besides their money - network and know-how.

Table K – question 7

Eighth Question
It is possible for web2 startups to resort to this kind of approaches, but it makes no sense, as there is no value in the token, and no need to create a community. Namely, when we talk about physical products, there are other types of more traditional approaches that make sense. Ways like crowdfunding, still VCs.
In these cases (web2), it's necessary to have a middleman to take the risk of the investment.

It'll also depend on the jurisprudence of the country where the startup is being created, how foreign investors exercise their rights when investing in Portuguese startups.

In web3 everything is directly managed through a contract, it's much easier for anyone else to check the contract and assess how the contract works, then the risk is in the hand of the investor. The investor is capable of actually looking at the stuff and realizing what is doing, what the function is doing.

Different types of risk require different types of players and experts.

Table L – question 8

Nineth Question

An ICO made sense by that time because it would make sense for people to have some utility, that might be interesting for them.

Table M – question 9

Tenth Question

By the time Realfiver launched an ICO, and it was considering an innovation, because he (Pedro) was the first to do so, then a novel thing.

Since he was a crypto native startup, it would make sense pursue this approach.

Table N – question 10

Eleventh Question

The connection with CMVM was only done, because an ICO was a completely new thing. They have the mission that the rule wasn't be broken, like revenue share, and all kind of revenue option available.

CMVM was very eager and open to learn and to build this with RealFever, interested to understand the advantages of having a token and its potentialities.

Table O – question 11

Twelfth Question

Regulation won't make everything safe. Protocols are already regulated, there is regulation embedded in the protocol. Regulation should exist to standardize all financial services available to the consumer, all them should play by the same rules. Doesn't matter if it's a fiat, or a crypto company, if they provide the same services, they should have the same regulation/rules.

Although, if someone is offering a smart contract, and one accept it, it implies that one agrees with the rules written in it and that one is willing to play by those rules. So, there is no need to have regulations over something that is already regulated.

Protocols are not regulated. For example, you regulate IPv6, IPv4, no, of course, it's a protocol, it's regulated already, it's just technology, is literally code, software, there is no need for them to be regulated as the rules are already embedded in them.
Digital euro already exists what does not exist is a digital currency created by the central bank that is distributed in a decentralized manner, meaning a currency that is backed by the Central Bank and goes directly to the Europeans wallet.
CBDC is a bad idea, will skew the whole logic of DeFi, with CBDCs you give permission to a central part to look into every transaction that exists. Then you still have an intermediary controlling the money.

Table P – question 12

Thirteenth Question
Yes, these approaches have the ability to accelerate innovation. The technological advancement and the capability we are gaining will also be a good generator of new ideas that will undoubtedly impact financial services as we know them today.
The choice of the currency with which I want to be paid is a great advance, it can be in ETH or in Euros. Or using these kinds of currencies for other financial services, for instance, saving accounts, investments, etc.

Table Q – question 13

5.2 Coding, Searching, Reviewing, and Defining Themes

After the familiarization phase, it was necessary to start searching for codes, words and expressions that could somehow lead to themes that were linked to the research questions. Once the codes had been created and identified, we moved on to the theme generation and review phase. Some of these themes are not identified with any specific color, this is because there were no relevant references across the interview. We then proceeded to the next-to-last phase, themes definition. With all the research done up to this point and the breakdown done code by code, theme by theme, it is time to identify the hidden themes behind each code, even further, of what the interviewee was thinking at the moment he answered each question and frame it in the theory already identified in the previous phases of the interview analysis.

Below you can see the codes/labels identified, to facilitate the work, the codes were written question by question. In order to facilitate the creation of the themes, as soon as the codes were written, they were identified with the color of the associated research question; these colors have been previously indicated. The same is applicable to the following columns.

Coding	Searching for Themes	Reviewing and Defining Themes
First Question	It's hard to fundraise in the early-stage phase of the project; VCs and BAs investing in crypto/web3; Democratization of fundraising; Cryptocurrencies doesn't compete with traditional money; Bitcoin competes with central bank; Digital currencies brought autonomy; Innovation can be accelerated and democratized; There are less barriers to enter; BAs and VCs play an important role, not only with	VCs and BAs still have an important role in the innovation ecosystem; These new models have accelerated and democratized innovation; Going for an ICO, IEO, or STOs depends on the nature of the startup, the token should always have some utility; P2P financial system is now available to everyone, bottom up permissionless capital market; On the part of those who invest in web3 projects, everything is about risk management; Despite the money, community, know-how
Crypto-native companies VCs Early-stage startup Investment paradigm Startups Web3 Diversify investment Funding Decentralized		
Second Question		
Financial services Bitcoin Central Banks Protocol DeFi Smart Contracts Crypto Fiduciary System		
Third Question		
Democratization of Innovation Blockchain Cheaper and faster Go2Market Smart Contract Less Barriers to Enter		
Fourth Question		
BAs and VCs are important Investment doesn't differ from web2 to web3 know the right people Interest in the market Easy access to people		
Fifth Question		
Interest in the market Easy access to people		
Sixth Question		
Go2Market Fundraising IEOs STOs VCs BAs		
Seventh Question		

Buyers Token Utility Token Right People Network Know- How	capital, but know-how and network; It's faster to go to market and fundraising;	and market knowledge are still very important;
Eight Question		
Community Crowdfunding VCs Middleman Legal Context Risk Management Risk	To get money is important to diversify the funding sources;	It doesn't make sense for a startup that is not connected to web3 to resort to this kind of methods;
Nineth Question	Right people with know-how;	
Utility Token		There are fewer barriers to entry and this, speeds up the whole process;
Tenth Question	Does not make sense for web2 companies use this kind of approaches to fundraise;	
Innovation Crypto-native startup		
Eleventh Question		
Rules Tokens	Risk Management; Legal and jurisprudence context;	
Twelfth Question		
Protocols Regulation Rules Standardization of financial services Smart Contracts Digital Currency CBDC	Protocols are already regulated;	
Thirteenth Question		
Accelerate Innovation Technological Breakthrough	standardize all financial services; These new approaches have the ability to accelerate innovation;	

Table R – phases 2, 3, 4, 5 of the thematic analysis

5.3 Writing the Report and conclusions.

1st Research Question

How this new digital and decentralized reality can foster and accelerate innovation?

Through TA performed, we can emphasize three themes that were highlighted and serve as the motto for the answer to the first research question: (I) **These new models have accelerated and democratized innovation;** (II) **Despite the money, community, know-how and market knowledge are still very important;** (III) **There are fewer barriers to entry and this, speeds up the whole process;**

As previous shared, innovation is mostly likely to come from individuals. As we saw innovation is nothing more than bringing an idea into existence (Selman, 2012). And most of these ideas came from entrepreneurs that end up by pursuing its desire to make it happen. In this case, if considering the web3 realm, it is possible to observe a set of factors that make this a perfect moment to discover and create new processes, ideas, services and innovative business models, using technologies such as those described in the chapter on the world wide web, where Blockchain, AI, ML, IoT are part of it. When approaching the concept of decentralization, we have noticed that many ideas and businesses are coming from there and putting incumbent businesses at stake, largely due to the added value associated with these models, which bring the power of data and privacy back to the users, fostering an open and free market in a more decentralized and dynamic way. However, until now it has been difficult for these ideas to come out of the PowerPoint presentations made to VCs and BAs, as seen in one of the tables previously presented, where, still in an embryonic phase, the friends and family are the ones who are willing to support the idea. Blockchain and its functionalities created a whole new paradigm when it comes to seeking investment and promises to turn the risk market upside-down. This new paradigm has led to the emergence of decentralized finance in this domain, which created an alternative financial system that can be more decentralized, innovative, interoperable, borderless, and transparent. (Y. Chen, 2020). Pedro mentioned this fact, today it is much easier to get access to this kind of investments to bring innovation to the surface. In his worlds *"You don't need permission to do anything, in terms that I don't need to open a company, I just need to put a couple of codes together, deploy the contract, build the front-end, and you know, that's it, the product is released. So, it's much easier, in the go-to-market approach, because people can interact together with their wallets with my contract, so I'm selling directly to the end consumer, there is no Amazon, there is no middleman, it is just me and the end user."* It boils down, that yes, this new era is effectively giving space to more ideas,

and not only giving space, but also giving the conditions to nurture and launch new innovations in a more democratized and faster way. This happens because anyone, as long as he has access to the internet and a digital wallet, invest in these projects. For the first time, entrepreneurs have at their disposal an endless number of potential investors, this time not restricted to a physical space, but rather across the globe (Y. Chen, 2018). Despite decentralization and the fast way innovation can go to market, there are still constraints and success factors for innovation to have any impact, such as a good relationship with the ecosystem (BAs, VCs and Users), networking and access to knowledge - this is tougher to happen in a decentralized relationship, where the main focus is on ROI.

2nd Research Question

Can the new digital era (DeFi, Blockchain, Digital Coins) accelerate the funding of startups?

In the same way and following the approach taken in the first research question, two themes were derived through the AT: (I) **VCs and BAs still have an important role in the innovation ecosystem;** (II) **P2P financial system is now available to everyone, bottom up permissionless capital market.**

Blockchain seems to be made for driving the future of finance, a distributed technology, according to Waldo (2019), blockchain “will change the way we work, the way the economy runs, and the way we live in general”. There are several models and emerging forms of funding available, from 2017 with the ICO boom to the more recent DAICO for these startups to use and be able to somewhat try their luck. Platforms such as Binance and Polkstarters are good showcases for bringing investors to projects. However, and that’s what we learn from the interviewer, the rational doesn’t change much. At the end of the day, what matters is how much exposure you can get, and that in part is earned by connecting with the right people who are willing to kick-start the project. He also mentioned that there begins to exist some interest in these same platforms that due to their network (quantity of users) and exposure are seen as the perfect showcase to reach the largest number of people and thus ensure greater investments. Turns out that the vast majority of projects are there for the connections and not so much for the project itself. Many of these investors invest in a logic of long-term earnings, speculating that this project may be worth, in the medium/long term, five to ten times more. One of the downsides, and that is something one needs to bear in mind when taking the decision to pursue these ways, is the due diligence that, for an early stage, can be costly. This new digital era where traditional financial services coexist with these new P2P financial services will bring

variety and diversification into the capital market risk, the latter promising a genuine alternative to the former, being that built bottom-up, open to everyone, permissionless and low-fee. Then, yes, the future of market risk is changing, with VCs and BAs starting to enter this space and to be aware that they have to adapt, otherwise they will lose. Mário Alves, TAIHAI's CEO shared that, when talking about the company's investors, which are still mainly based outside Portugal.

3rd Research Question

What are the conditions for resorting to these methods, and for which firms does it apply?

Finally, and in response to the last research question, three themes were identified with AT: (I) **It doesn't make sense for a startup that is not connected to web3 to resort to this kind of methods;** (II) **Going for an ICO, IEO, or STOs depends on the nature of the startup, the token should always have some utility.**

One of the questions that raised the most interest was whether all ideas could be brought into existence through these new forms of funding, or whether it would only be something restricted to crypto-native companies. What would therefore be the advantages and disadvantages and to what kind of businesses, business models this would be applied. As previously shared, web3, and all services, and products born out of it, are characterized by being decentralized and that implies having a set of characteristics, such as being peer-to-peer, interoperable, borderless, and transparent. And one thing they all have in common is the fact that there is an incentive for people to join that community, that is a token, something that we can assign value and pay a price for it. For instance, Bityond provided a token that gave the right of voting to all its user, investors and employers, letting all them having a say when it comes to the governance of the platform. So, all these stakeholders would have influence in every decision taken and that's a big plus. Tokens may come in many forms and purposes, as currencies that allow the exchange, equity, funding, consensus, work reward, voting, asset, and payment (Oliveira. L., et al., 2018). When asked about if a web2 project could also resort to these methods, Pedro promptly said "yes", but that it wouldn't make any sense, for the reasons previously mentioned. If fact, to the best of our knowledge there is no project of this nature using these channels. Much because the very nature of the project, service or product is different, and it may require other types of support that in a web3 reality is not possible to find. Then, because all tokens need to have some utility, he himself said that the CMVM wouldn't let the idea move forward, it wouldn't make sense, it seems that someone is somehow extorting money from his investors without a counterpart, basically the rules don't change, what happens in a conventional way of raising money is the same in the decentralized, doesn't matter the approach chosen, every jurisdiction

has its own laws and all participants must obey by the common rules. So, at least for now, in Portugal it isn't possible to find these cases, being then these decentralized models limited to web3 companies.

Chapter 6 - Limitations, and Contributions

As it was presented, three research questions were formulated with the objective of clarifying and providing insights into the objectives of this research, which aimed to answer the research questions, being the main research goal to understand how this new digital and decentralized era could accelerate innovation, using those new decentralized methods already discussed throughout all this research. To support this research, a case study was conducted, being Bityond chosen for being the first startup in Portugal raising money through an ICO.

Below, the conclusion of each research question is presented.

There are some limitations in this research, due to the study being limited to one case and because of that, we are limiting our answers to one person's opinion. Nonetheless, it is an ethnographic description of a participant who has raised money through these means to execute an innovative project, so the testimonial is still relevant. Thus, the results might not be taken as a conclusive and final answer, more details and research need to be done to shed lights on this new, but very promising topic.

This work opens research avenues to more detailed research that considers a more comprehensive number of examples of companies in analysis, including web2 and web3, since we are still untapping all the potential brought by blockchain and its impact in finance.

References

- Acemoglu, D., Akcigit, U., Alp, H., Bloom, N. & Kerr, W. (2018). Innovation, Reallocation, and Growth. *American Economic Review*, 108(11), 3450–3491. <https://doi.org/10.1257/aer.20130470>
- Austerberry, D. (2012). Digital Asset Management. <https://doi.org/10.4324/9780080491158>
- Andrieu, G. & Sannajust, A. (2021). ICOs: A new Eldorado for investors and a revolution in startup financing? A survey. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3878055>
- Bae, Kim & Lee LLC (2022, March 10) Korea's New President Yoon Suk-Yeol: A Regulatory Primer. Lexology. <https://www.lexology.com/contributors/bae-kim-and-lee-llc>
- Barbieri, J. Álvares, A. (2016), “Sixth Generation Innovation Model: Description of a Success Model”, *Revista de Administração e Inovação*, 1809-2039.
- Baudier, P., Chang, V. & Arami, M. (2022). The Impacts of Blockchain on Innovation Management: Sectoral Experiments. *Journal of Innovation Economics & Management*, N° 37(1), 1–8. <https://doi.org/10.3917/jie.037.0001>
- Boer, J. (2015). Market Structure and Innovation: Determinants and Conditionality in a Schumpeterian Framework. Erasmus School of Economics.
- Bruwer, R. Rudman, R. (2015). Web 3.0: Governance Risks and Safeguards. *The Journal of Applied Business Research*, 31(3).
- Bae, Kim & Lee LLC (2022, March 10) Korea's New President Yoon Suk-Yeol: A Regulatory Primer. Lexology. <https://www.lexology.com/contributors/bae-kim-and-lee-llc>
- Casino, F., Dasaklis, T. K. & Patsakis, C. (2018). A systematic literature review of blockchain-based applications: current status, classification and open issues. *Telematics and Informatics*, 36, 55–81. <https://doi.org/10.1016/j.tele.2018.11.006>
- Catalini, C. & Gans, J. S. (2019). Some Simple Economics of the Blockchain. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2874598>
- Chen, Y. (2018). Blockchain tokens and the potential democratization of entrepreneurship and innovation. *Business Horizons*, 61(4), 567–575. <https://doi.org/10.1016/j.bushor.2018.03.006>
- Chen, Y. & Bellavitis, C. (2020). Blockchain disruption and decentralized finance: The rise of decentralized business models. *Journal of Business Venturing Insights*, 13, e00151. <https://doi.org/10.1016/j.jbvi.2019.e00151>
- Chen, W., Zhou, K., Fang, W., Wang, K., Bi, F. & Assefa, B. (2020). Review on blockchain technology and its application to the simple analysis of intellectual property protection.

International Journal of Computational Science and Engineering, 22(4), 437–444.
<https://doi.org/10.1504/ijcse.2020.109403>

Croitoru, Alin. (2012). Schumpeter, J.A., 1934 (2008), The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle, New Brunswick (U.S.A) and London (U.K.): Transaction Publishers. Journal Of Comparative Research In Anthropology And Sociology. 3. 137-148.

Coelho, Monisha. (2021, April 1). Blockchain Smart Contracts: Changing the Way Business is Done Today. Alvaradosmith. <https://www.alvaradosmith.com/your-vendor-wants-you-to-use-a-blockchain-smart-contract-for-the-transaction-now-what/>

Cohen, W. M. (2010). Fifty Years of Empirical Studies of Innovative Activity and Performance. Handbook of the Economics of Innovation, 1, 129-213.
[https://doi.org/10.1016/S0169-7218\(10\)01004-X](https://doi.org/10.1016/S0169-7218(10)01004-X)

Creswell, J. W. (2013). Qualitative Inquiry & Research Design: Choosing among Five Approaches (3rd ed.). Thousand Oaks, CA: SAGE.

Davidson, S., Filippi, P. D. & Potts, J. (2016). Economics of Blockchain. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.2744751>

Deloitte (2021). Deloitte's 2021 Global Blockchain: A new age of digital assets.
<https://theblockchaintest.com/uploads/resources/Deloitte%20-%20Deloitte%E2%80%99s%202021%20Global%20Blockchain%20Survey%20-%202021.pdf>

Dorsey, J. (@jack). (2021, Dec 21). It's somewhere between a and z. Twitter.
<https://twitter.com/jack/status/1473165759224463360>

Dudovsky, J (2018). The Ultimate Guide to Writing a Dissertation in Business Studies: a Step-by-Atep Assistance

Editor, T. (2016). Fan engagement. Transformative Works and Cultures, 22.
<https://doi.org/10.3983/twc.2016.01056>

European Central Bank. (2020, Oct). Report on Digital Euro.
https://www.ecb.europa.eu/paym/digital_euro/report/html/index.en.html

Eveleens, Chris. (2010). Innovation management; a literature review of innovation process models and their implications.

Fagerberg, Jan & Verspagen, Bart. (2007). Innovation, growth and economic development: Have the conditions for catch-up changed?. International Journal of Technological Learning, Innovation and Development. 1. 13-33. 10.1504/IJTLID.2007.015017

Fagerberg, J., & Verspagen, B. (2009). Innovation studies—The emerging structure of a new scientific field. *Research Policy*, 38(2), 218-233. <https://doi.org/10.1016/j.respol.2008.12.006>

Furnari S.L. Trough Equity Crowdfunding Evolution and Involution: Initial Coin Offering and Initial Exchange Offering. *Lex Russica*. 2021;74(1):101-117. <https://doi.org/10.17803/1729-5920.2021.170.1.101-117>

Gardner, S. & Birley, S. (2011). *Blogging for Dummies®*. 1–6. <https://doi.org/10.1002/9781118257531.ch0>

Goldenfein, Jake & Leiter, Andrea (2018). Legal Engineering on the Blockchain: ‘Smart Contracts’ as Legal Conduct. *Law and Critique* 29 (2):141-149.

Gow, J. (2014). Public Sector Innovation Theory Revisited. *The Innovation Journal: The Public Sector Innovation Journal*, Volume 19(2), 2014, article 1.

Haffke, L. & Fromberger, M. (2020). ICO Market Report 2019/2020 – Performance Analysis of 2019’s Initial Coin Offerings. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3770793>

Henry W. Chesbrough. (2003) *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press 2003.

ICObench (2018). IEO Market Analysis. (n.d).

Lin William Cong, Zhiguo He, Blockchain Disruption and Smart Contracts, *The Review of Financial Studies*, Volume 32, Issue 5, May 2019, Pages 1754–1797, <https://doi.org/10.1093/rfs/hhz007>

Jean-Jacques Rousseau Quotes. (n.d.). *BrainyQuote.com*. Retrieved October 25, 2022, from *BrainyQuote.com* Web site: https://www.brainyquote.com/quotes/jeanjacques_rousseau_147576

Kambil, A. (2008). What is your Web 5.0 strategy? *Journal of Business Strategy*, 29(6), 56–58. <https://doi.org/10.1108/02756660810917255>

Kathleen E. Wegrzyn Eugenia Wang. (2021, Aug 19). Types of Blockchain: Public, Private, or Something in Between. *Foley & Lardner LLP*. <https://www.foley.com/en/insights/publications/2021/08/types-of-blockchain-public-private-between>

Kenigsber, M. (@marckenigsber). (2016, Aug 26). Blockchain is the tech. Bitcoin is merely the first mainstream application of its potential. *Twitter*. <https://twitter.com/marckenigsberg/status/768976469951406081>

Kobie, N. (2010, March). Conrad Wolfram on communicating with apps in web 3.0. <https://www.itpro.co.uk/621535/qa-conrad-wolfram-on-communicating-with-apps-in-web-30>

Lansiti, Marco & Lakhani, Karim. (2017). The Truth About Blockchain:. Harvard business review. 95. 118-127.

Lipton, A., Hardjono, T. & Pentland, A. (2018). Digital trade coin: towards a more stable digital currency. Royal Society Open Science, 5(7), 180155. <https://doi.org/10.1098/rsos.180155>

Malerba, F. & McKelvey, M. (2020). Knowledge-intensive innovative entrepreneurship integrating Schumpeter, evolutionary economics, and innovation systems. Small Business Economics, 54(2), 503–522. <https://doi.org/10.1007/s11187-018-0060-2>

Marinova, Dora & Phillimore, John. (2003). Models of Innovation. [10.1016/B978-008044198-6/50005-X](https://doi.org/10.1016/B978-008044198-6/50005-X)

Meissner, D. & Kotsemir, M. (2016). Conceptualizing the innovation process towards the ‘active innovation paradigm’—trends and outlook. Journal of Innovation and Entrepreneurship, 5(1), 14. <https://doi.org/10.1186/s13731-016-0042-z>

Merritt and Merritt (1999). Some thoughts on Definitions of Innovation. The Innovation Journal: The Public Sector Innovation Journal, Volume 4(3), 1999, article 2.

Momtaz, P. P. (2021). Security Tokens. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.3865233>

Musk, E. (@elonmusk). (2021, Dec 21). Has anyone seen web3? I can’t find it. Twitter. <https://twitter.com/elonmusk/status/1473165434518224896>

Myalo, Alina and Glukhov, Nikita, (2019) Comparison Analysis of ICO, DAOICO, IEO and STO. Case Study. <http://dx.doi.org/10.2139/ssrn.3447974>

OECD, Weiermair, K. & Rosenberg, N. (2006). Innovation and Economic Growth. 43–52. <https://doi.org/10.1787/9789264025028-4-en>

Oliveira, L, et al., (2018, Dec 16). To Token or not to Token: Tools for Understanding Blockchain Tokens. San Francisco, USA. International Conference of Information Systems. <https://doi.org/10.5167/uzh-157908>

Papadonikolaki, E., Tezel, A., Yitmen, I., & Hilletoft, P. (Accepted/In press). Blockchain Ecosystem in Construction: Open or Closed Innovation? In Proceedings of the 37th Conference and Annual General Meeting, ARCOM Conference 2021: Recover, Rebuild and Renew. <https://discovery.ucl.ac.uk/id/eprint/10132934/>

Polytechnic University of Milan (2020[8]), Blockchain & Distributed Ledger: Unlocking the potential of the Internet of Value, www.osservatori.net/it/eventi/on-

[demand/convegni/convegno-risultati-ricerca-osservatorio-blockchain-distributed-ledger-2020](#)

Rehman, W., Zainab, H. e, Imran, J. & Bawany, N. Z. (2021). NFTs: Applications and Challenges. 2021 22nd International Arab Conference on Information Technology (ACIT), 00, 1–7. <https://doi.org/10.1109/acit53391.2021.9677260>

Rosenberg, Nathan. (2006). Innovation and Economic Growth. 10.1787/9789264025028-4-en.

Rothwell, R. (1994). Towards the Fifth-generation Innovation Process. International Marketing Review, 11(1), 7–31. <https://doi.org/10.1108/02651339410057491>

Rosa, Josep & Torres-Padrosa, Víctor & El-Fakdi, Andres & Gibovic, Denisa & Hornyak, Oliver & Maicher, Lutz & Miralles, Francesc. (2017). A Survey of Blockchain Technologies for Open Innovation.

Saunders, M., & Lewis, P., Thornhill, A. (2019). Research Methods for Business Students. (8 Edition). Pearson Education Limited.

Selman, J. (2012). Leadership and Innovation: Relating to Circumstances and Change. Innovation Journal: The Public Sector Innovation Journal, Volume 7(3), 2002, article 5.

Seulliet, Eric. (2016, August 23). Open innovation, co-creation: why blockchain is a small revolution. <https://www.linkedin.com/pulse/open-innovation-co-creation-why-blockchain-small-eric-seulliet/>

Seth, S. (2018, April 2). 80% of ICOs Are Scams: Report. Investopedia. <https://www.investopedia.com/news/80-icos-are-scams-report/>

Singh, S. (2021, Nov 22). Crypto & NFTs: Network Effects in Web3. Medium. <https://breadcrumb.vc/crypto-nfts-network-effects-in-web3-7689cf8f0439>

Smith J. K. Smith R. L. & Bliss R. T. (2011). Entrepreneurial finance : strategy valuation and deal structure. Stanford Economics and Finance. Retrieved October 25 2022 from <http://site.ebrary.com/id/10493935>.

Sohl, J. E. (1999). The early-stage equity market in the USA. Venture Capital, 1(2), 101–120. <https://doi.org/10.1080/136910699295929>

Swan M. (2015). Blockchain : blueprint for a new economy (First). O'Reilly. Retrieved October 25 2022 from <http://site.ebrary.com/id/11011567>.

Tapscott, D. and Tapscott, A. (2016) Blockchain Revolution: How the Technology behind Bitcoin Is Changing Money, Business, and the World. Portfolio

Teece, D. J. (2010). Business Models, Business Strategy and Innovation. Long Range Planning, 43(2–3), 172–194. <https://doi.org/10.1016/j.lrp.2009.07.003>

- Tidd, J. & Bessant, J. (2018). Innovation Management Challenges: From Fads To Fundamentals. *International Journal of Innovation Management*, 22(05), 1840007. <https://doi.org/10.1142/s1363919618400078>
- U.S. Securities and Exchange Commission (2020, Jan 14). Initial Exchange Offerings (IEOs) - Investors Alert. Investors Alerts and Bulletins. https://www.sec.gov/oiea/investor-alerts-and-bulletins/ia_initialexchangeofferings
- Vermaak, W. (n.d). What are application layer protocols?. Alexandria. <https://coinmarketcap.com/alexandria/article/what-are-application-layer-protocols>
- Victoria Clarke, Virginia Braun & Nikki Hayfield, (2015). Thematic Analysis. Jonathan A. Smith (Eds.), *Qualitative Psychology: A Practical Guide to Research Methods* (3rd ed., pp. 220-244). Sage.
- Vigliotti, M. G. (2021). What Do We Mean by Smart Contracts? Open Challenges in Smart Contracts. *Frontiers in Blockchain*, 3, 553671. <https://doi.org/10.3389/fbloc.2020.553671>
- Word Intellectual Property Organization (2021). Global Innovation Index 2021, Tracking Innovation through the COVID-19 Crisis. https://www.wipo.int/global_innovation_index/en/2021/
- Wright, Craig S. (August 21, 2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Available at <http://dx.doi.org/10.2139/ssrn.3440802>
- Wonglimpiyarat, J. (2015). Challenges of SMEs innovation and entrepreneurial financing. *World Journal of Entrepreneurship, Management and Sustainable Development*, 11(4), 295–311. <https://doi.org/10.1108/wjemsd-04-2015-0019>
- World Economic Forum. (2022, Feb). Web3: The hype and how it can transform the internet. <https://www.weforum.org/agenda/2022/02/web3-transform-the-internet/>
- World Wide Web.(2012). History of the Web. <https://webfoundation.org/about/vision/history-of-the-web/>
- Zaki, I. (2019, March 9). Security Tokens – Three Types You Should Know Of. Hackernoon. <https://hackernoon.com/security-tokens-three-types-you-should-know-of-d8146e648be9>

Annexes

Annex A

Pedro Febrero's Interview

Q: Banks and financial institutions play an important role in financing innovation, providing capital, and sometimes knowledge when financing the kickoff of early-stage startups, whose goal is to grow fast. It happens that banks are most of the time reluctant to support these projects due to the risk and the lack of proven viability, and low capitalization. How do you see the involvement of Defi in this attempt to speed up the funding process, discarding the need to resort to these financial institutions?

A: That's a great question if you look at a significant number of projects in the Defi space, in the crypto space, you'll notice that most of them have institutions like venture capitalist companies and other types of financial institutions that commonly allocate money into these types of projects. So generally, I would say, perhaps, in the early days, between 2015-17, I would say that funding, indeed came from common people, at least, well from people investing in crypto. But I think, throughout the years, especially now, most projects they've launched through connection with VCs and launchpads. There's a connection to these types of institutions, and not perhaps to the traditional banks for example. But you see now traditional VCs already operating in this space. I'm not sure if the funding nowadays is as decentralized as it was in the past. There is for example a good metric to compare, which is comparing the total funding of an ICO in 2017 and the total funding raised through an IEO, which are the common way of launching a project through a launchpad for instance, and you will notice that the amount of money raised is spectacularly lower than in the past. For instance, Utrust raised around 40 or 50 million or something like that, and today, Realfever, last year raised 200 thousand, 400 thousand something like that. So, the sums that are being raised today are lower than it was in past.

Q: *“When asked what is wrong with capitalism today, many people point to financial markets. One particularly widespread concern is that the financial system does a bad job of serving the needs of the real economy, in particular, of providing businesses with the financing they require to invest.”* (Haskel, J., & Westlake, S. (2018). *Capitalism Without Capital*, Princeton University Press.)

Putting into perspective the thought shared above, Bitcoin's White Paper introduced us to the purpose of a decentralized financial system that would in its essence, eliminate the need for intermediaries. And, looking backwards, Nakamoto (2008) clearly states the advantage of this new approach over traditional systems, with the belief of fixing what was wrong with capitalism. So, how can this decentralized, and peer-to-peer mechanisms be used for fostering innovation?

A: That's a great question but I think that you in the question already made an implication, which I think is wrong. The implication most people does is that Bitcoin or cryptocurrencies they compete with traditional money. But let me focus on Bitcoin because it was the token that you identified. So, Bitcoin doesn't compete with banks directly, it does compete with central banks though, I mean, the questions you asked imply that the problem lies in financial services, but at least in my opinion, the problem is in a level underneath, so the problem perhaps is in how much money is created and how much money is distributed, and not really with the financial services that are where the money exists. Because, if we kind of fix how the money works, those services won't be able to work the way they do today, right? Because the access to easy currency won't be as easy. Therefore, the way the business works will shift a little bit I would say. But my point is that, at least Bitcoin does not compete directly with banks, or the services most banks provide, it does compete with central banks, for sure, in the sense that Bitcoin works as a protocol to create currency. While, on the other hand, you find the Central banks who are the protocols today to create fiat currency. But if we extend the thought a little bit further, we can say that if Defi competes with banks, and the services banks provide, we can say that Defi winning massively, right? I'm gonna pick a few services, for example, just the fact that I can swap currencies, I can swap tokens, and I can buy and sell without resorting to a financial institution. When I say a bank, I'm also saying Binance, and Coinbase, those are also banks. So, what I'm saying is that I can acquire a cryptocurrency without an intermediary. Through a protocol, a smart contract you swap currencies and exchange money, I can earn yield without a central party involved. As you see there are different processes that are tackling different services banks provide, services of swapping money, and services of savings, those are the two services I mentioned, right? But there are more, of course, there are plenty of others. So crypto doesn't compete with banks, but rather with central banks, but in my opinion, cryptocurrencies offer an alternative system, I may not substitute the fiduciary system that we live in today, but at least it gives an alternative for anybody who wants to participate.

Q: Given your experience, do you think Innovation can be accelerated and, in a broader sense, democratized, meaning, everyone can have access to it with the same ease? If yes, how?

A: I would say that the biggest difference is that you don't need permission to do anything, in terms that I don't need to open a company, I just need to put a couple of codes together, deploy the contract, build the front-end, and you know, that it, the product is released. So, it's much easier, in the go-to-market approach, because people can interact together with their wallets with my contract, so I'm selling directly to the end consumer, there is no Amazon, there is no middleman, it is just me and the end user. I mean, that might be an advantage, and sometimes it's not an advantage, but in terms of barriers to enter, there's way less, because it is far easier for me to set up a web3 business than a traditional web2 business. In the sense that, you know, I can just deploy the stuff written, the token, the contract, the NFT, is already there, and people can buy directly, so interactions are a bit different. Then the question is, "what's your business?", right? Because, as soon as you have a token you stop to be a traditional business, because you have a token, right? it means you have a monetary policy, all that stuff, those things that countries need to worry about, you need to worry about also. Because, you're managing the value of the project, and the value of your project is attached to the value of your token. Therefore, the price, I would say it's the ultimate thing that any project needs to, at the end of the day, worry about.

How do you see the future of the Capital Market Risk, with the rise of these new opportunities?

A: I try to be pragmatical, sure I can try to launch a contract but with no help, it will just screw up. Generally, I need to know people, and people need to know me, so it's more or less the same. People need to know you, so they can trust you and they promote your work. I don't think that there is much difference between web2 and web3 startups. The difference is the approach of people around you, right? Because you are building something completely innovative, and it's just different in that sense, you need to know who are the ones you need to reach out to. But you know, as in a web2 approach, you still need to know the right people, they need to like you etc. So, it's very political if I can say that way.

Q: How the Capital Market Risk is changing?

I mean, I'm not entirely sure, because I see some stuff that is different like Bitcoin grant for example, where anyone can just contribute to any project. However, at the same time, I still see the Polkstarters and the Binance launchpads, the projects that are launched there are because of connections, right? So, you need to know the right people, etc. At the end of the day, it doesn't matter if you have a great product, what matters the most is that you can find easy access to people who can buy your token, ok? It's not the product, but the bridge, how you connect with people who value what you do. That's why in launchpads, for instance, they can easily centralize the project around them, because they already have the people, the buyers, they already know the right people, and that's what matters to the project, so it's not building the project like in the most decentralized manner "bla bla bla", that's pretty cool, but in the end, you need to play by the rules.

Q: Innovation is the commercialization of novel ideas, the more you bring those ideas to life, the more innovation you get. How would it be the impact and the change in the market if these decentralized methods were used to increase the time to market? When it comes to your experience, with Bityond, Realfever, do you think you have accelerated the time to market?

A: Yes, probably resorting to these methods lets us go faster. I mean, Realfever is a better example, but we used both, private funding, VCs and launchpad. We used the three methods, and, I mean, it is difficult to answer that question because it's always harder if you go through the VC because there's due diligence and different sums of money. But in a decentralized way, it's not that easy to get that much money. Look, we know about the winners, but there are way more losers. My point is that, it's not that easy to raise considerable amounts of money in a decentralized way, probably I would say that the new way that projects are finding, in an attempt to attract the market is by doing, for example, airdrops. It's a kind of funding, well it's not traditional, because you are giving stuff away but because you're keeping some of it, and if there is like liquidity pools you can actually sell the stuff, right? So, it's finding a way of also, finding money or liquidity.

Q: What are the constraints of using an ICO in Portugal and what implications this may have on the way the business is run? (You've talked about utility tokens, but there are also other types of tokens out there, such as security and governance tokens, which have

the mission give control back to the community) – would you follow the same approach nowadays?

A: Probably, you want to have more of a mix, but it depends on the type of the projects. And again, it's not an easy question because it really depends on the moment of the market, if it's bear, if it's bull, on the type of project, if it's something technical, if it's something market-driven, right? If it's something easy to sell, it really varies. Yes, probably I would have done some stuff differently, like just an ICO without launchpads etc, right? without support let's say. Because, at the end of the day, what you want is people to buy your token, it has to have some purpose, utility, whatever it might be, at the end of the day, what you want is to find these people. So, in the end, what you want is to find these partners, because they also have access to their companies, communities, etc. Then, at the end of the day, again, I think, a mix of probably both is the best way to go. Sure, you can do decentralized through an ICO, but you should also try to find private investors, people who can add value to your business, besides their money, value and knowledge.

Q: Regarding the current funding landscape, does it suit all start-ups? What are the hurdles and the benefits for a startup to use this approach rather than the ordinary ones? Companies out of the web3 realm, is there any way to overcome this issue (imagine I have a physical store, I can use an ICO?

A: Yes, sure, it's possible. But I think there's a reason why that doesn't happen because. I think is very straightforward the hurdle is that you actually want sometimes the middleman to actually take on the risk. You want to give the money and they manage the risk of where to invest. Because, physical business, well you need a completely different approach to assess the risk, it's not something as you have a token and I can access and check the token distribution, try to understand if they're gonna sell, if they not, etc, the product, bla bla bla. I think it's different, right? You talked about the physical product, like people go to your store buying your physical stuff. I mean, sure you can find money in any way that you want, but commonly, those businesses have liabilities, different liabilities. Generally, investors want an institution to take that risk. Of course, you can find forms, like crowdsourcing platforms, crowdfunding etc. All the ways to find money, so that the money reaches the final customer but, you need an intermediary because people don't know how to take on the risk, right? Because if a company is established in the US, how do I enforce my rights as an investor in Portugal, you don't do that. In web3 everything is direct, right? Through a contract, it's much easier for me to check

the contract, assess how the contract works, the privileges of the contract, bla bla bla. So, it's a different type of risk, right? And I don't mind having that risk on my hand, because I'm capable of actually looking at the stuff and realizing what is doing, what the function is doing. Again, you might have people choosing to have web3 intermediaries like Coinbase, Binance, etc. But, if you don't, you don't really need to, right? And it's much easier to just assess the risk and be protected. I think, in the end, it's just about risk management. So different types of risk require different types of players and experts.

Could you please share your experience as the first startup in Portugal to get funds through an ICO, what hurdles did you find and what advantages?

A: I did go to multiple startup programs while was doing the raise even. I didn't choose one, I choose all the available ones. And ICO was just another one because at the time I wanted to implement a governance token anyway, I was like, "ok people might be interested in buying this". Because, this is what's in it for them, right? Otherwise, why would someone be willing to buy a token, right?

Q: Do you consider the governance system brought by this new decentralized means an innovation at that time?

A: Yeah, sure. I do, there wasn't any platform doing the same, at least in our jurisdiction. At least we were the former ones, so in that regard, it's an innovation. If it's a good innovation or not, that's a discussion for another topic. But my point is, I did try to use all the available means, ICO was just another one. Well, I thought, I'm in the crypto space, so I thought it was cool why not try to do the same with this platform.

Q: How was your relationship with CMVM, what were the hurdles and benefits?

A: First, you get immediate access to an institution and to people that you never have access to. If I wasn't doing an ICO at that time, why would they speak to me, right? There would have been no reason. So, by doing that, I've got immediate access to the top people in CMVM, and that was pretty cool. The second one is that they made it pretty clear what were the rules that couldn't be broken, like for example revenue share, all that kind of stuff that you couldn't definitely do. But they were very open to understanding why would I want other people to have a say in some decisions on the platform, and why would they think that the token would be an incentive for them, right? And why would people actually participate? So, for them was a

learning curve as well, because they didn't understand the value of it. So, it was good because, I mean at least in my opinion, there is no relationship between the value and price of things. So, something that I find completely useless some guy pays ten thousand dollars for it, that's why value is something personal, but the price is dictated by a market. So, and that's different, that's why I'm trying to explain because you can build an app and set up a voting tool where people can vote, but it's fun to actually do a token, because people directly participate, they have the tokens and everything is on the chain, everything is traceable, auditable, I mean that's the fun part I mean, that's the biggest difference, it's not in a database somewhere public and is verifiable, auditable, and you know who are the participants. I think this is the cool thing about doing this kind of open system.

Defi is still subject to the regulatory framework, in Europe we have seen some moves towards getting digital assets regulated. I assume that the regulatory objective will be to protect users from volatility, and there are already initiatives to create a digital euro, for example. What's your opinion on that?

A: First, regarding the security part, I'm not sure if regulation makes everything safe. I think protocols are already regulated, Bitcoin is regulated by its own protocol by some consensus, so there is regulation embedded in the protocol. Bitcoin actually only works because it's regulated, it has its own internal rules that make it work, the same applies to Ethereum and any Defi protocols. So, the types of regulations that they want to implement, or perhaps should implement is around the services that offer crypto services to which I completely subscribe I mean, you should have the same playfield for any type of company, right? It doesn't matter if it's a Bitcoin company, or a fiat, dollar company, it doesn't matter. Everything should obey the same laws, and rules. So, my point is that, if I have a service for example where you send me your coin, and I manage the coins for you, I probably should be regulated as a traditional custody service because that's exactly what I am doing, right? If I'm offering you, buying and selling services, the same logic, but if I'm offering you a smart contract that you do your own work and you need to be the owner of the tokens to play with that protocol with that token, then there is no regulation needed because is the person interacting with the software, right? And the protocol already has the rules embedded. So, there is nothing to regulate here, right?! You don't regulate the person; you don't regulate the protocol. For example, you regulate IPv6, IPv4, no, of course, it's a protocol, it's regulated already, it's just technology, is literally code, software, you don't regulate that, because it has rules embedded, ok? That's my point. So, yeah,

I mean, in terms of regulation I think is pretty straightforward, I don't think there are many questions around it, eventually, regulators will understand it. And, regarding the second part of the question, about the digital euro. Euro is already digital, right? The difference is if the euro is CBDC or if it's just a digital euro. Digital euro already exists today, most euros and dollars are digital. What we don't have is a digital currency created by a central bank. Let's imagine that we have a currency that is printed by the central bank and goes directly to your digital wallet, so there is no bank in the middle to distribute, it goes from the central bank to your wallet. So that's the difference between the digital euro which is a currency that central banks created, and banks distribute between CBDC. I think CBDC is a huge mistake, because like, they don't replace currency, they don't replace cash, in a sense that cash is private, I can do whatever I want with my notes, with my coins, that's private. The transaction is between me and the person who receives the money, and they can verify if the cash is valid, etc. But with CBDCs you give permission to a central part to look into every transaction that exists, it's not really a great idea because then they can limit the access to your own money, which is terrible. I'm not really in favor of CBDCs because it's very easy to block people to have access to their money and I think that's the basis for freedom and for capitalism, which is you having access to your own money without any type of restriction. So, I'm in favor of regulation around the services, but not in the protocols themselves, right? Regarding the CBDCs, I don't think it's a good idea because it moves privacy from the currency itself, and I don't think that's good for our society.

Q: From your experience, do you think that people can start using this kind of approach to accelerate innovation?

A: Yes, I think these technologies will improve the ways people interact with one another, so yes. I think that will be spills of positivity towards, like you know, every kind of business, and market etc. At least in the sense that people can receive in a currency outside of the current system. I can receive Bitcoin, and Ethereum in my business. If I want to access savings accounts, I can do it, I can accept that type of currency then I can use that currency to leverage deposits and savings, to get stablecoins, whatever I want, it doesn't matter, participating in Defi with tokens. So, businesses have an option to convert fiat into crypto, right? But they can also receive in crypto. I mean, the advantage of that is that they have the door to any protocol, Defi protocol, Bitcoin whatever, they already have access to that because they already get the payment in a cryptocurrency, right? So, it's much easier for them to enter the Defi space for example. And that's, I think the largest innovation that crypto will bring to the world, is the

building for people and businesses, especially businesses to directly interact with people and directly interact with their consumers. I'm gonna give you a straightforward example, in Realfever we sell the packs directly to the end consumer, right? The person directly interacts, it's not even us who sell the contract because we create the contract, and the people mint the NFTs, they buy the packs so they mint the NFTs. So, they are actually doing the work of minting the asset that they bought. So, we just prepare the contract so that the people can do that, the consumers are buying directly from us, there is no store selling our stuff, there is no any type of intermediary, and if we receive in crypto, we can already use that crypto to already access Defi stuff, right? We don't need the extra hops. I mean for businesses, even if they are not crypto-related, crypto enables them to access everything beautiful about crypto, right? Like the Defi stuff. So, yeah, I think that's where the opportunity lies for most businesses.

Annex B

Mário Alves' exploratory conversation

Q1. Coloquei a questão sobre o que é a Web 3, o seu estado atual e perspectivas futuras. Para introduzir a questão, elenquei alguns factos que são hoje bem conhecidos acerca da web 3, assim como o papel dos incumbentes (Bancos de investimento, VCs, etc) nesta nova era digital.

A1. “Eu acho que a Web 3 é um resumo de todos os factos que acabaste de apontar, porque na verdade são mesmo isso. Por um lado, nós, estando no início deste movimento web 3 sabemos que grande parte das coisas que são feitas ainda estão muito rudimentares e há muitas delas que também são bullshit, ou seja, são uma forma de as pessoas também se tentarem aproveitar deste movimento para também ganharem algum dinheiro. Isto é indiscutível, mas eu diria que há, portanto, um movimento que se está a criar, e eu acredito mesmo que isso vai ter um impacto e vai realmente disromper, não só o setor financeiro, mas também outros setores. Acho que o setor financeiro acaba por ser o primeiro use case. Tens o caso da Bitcoin como a primeira criptomoeda, a existir, tem cerca de uns quatorze anos, talvez, tendo sido a sua primeira transação feita em 2009 e, portanto, nós no fundo temos aqui o primeiro use case. Por acaso, esta primeira experiência aconteceu numa altura pós crise bancária, mostrando que havia, efetivamente, aqui, uma alternativa. Depois houve toda uma série de serviços/produtos construídos em cima disso, especificamente falando, sobre DeFi. Quer dizer, tu ficas aqui com uma panóplia de serviços em que realmente pensas, será que realmente preciso de um banco?

Eu acho que estamos a caminhar nesse sentido, mas ainda assim, acho que ainda temos que caminhar bastante para chegar até esse ponto, por um motivo muito simples, porque a adoção e a experiência de utilizador ainda não está tão refinada ao ponto de comparares as experiências, bancária e web 3, ou DeFi, ou outro serviço qualquer. Isto porque lá está, porque quem não percebe nada do tema tem que primeiro, perceber do tema, investigar saber o que é uma wallet, saber o que são as chaves privadas. Depois, acontece que há pessoas que não querem ter essa responsabilidade, portanto, existe aqui todo um conjunto de conceitos que precisam de ser trabalhados e desmistificados. Com tudo aquilo que eu vejo, e respondendo à tua pergunta diretamente, vejo exatamente o mesmo movimento que aconteceu quando a Internet surgiu, muita gente usa esta referência mas essa é a realidade, ou seja, se nós pensarmos, para criar uma conta no Google, ou Facebook, ou o que quer que fosse, tínhamos que criar um utilizador, uma password, depois caso perdêssemos a password sabíamos que íamos ter que a recuperar, depois tínhamos os e-mails de confirmação para confirmar aquela conta, portanto, tendo isto em mente, quando alguém me diz, “Oh pah, é muito complicado usar uma wallet no mundo web 3”, não é complicado, na verdade as pessoas não estão habituadas, não é? Porque tens todo este processo que utilizas já na Internet de forma mecanizada, que dá muito trabalho, atenção, ou seja, basicamente tens que passar por 3 ou 4 passos para criar uma conta. Portanto, eu acho que estamos a caminhar nesse sentido, que é, as pessoas começarem a perceber que isto realmente existe e que isto realmente é o futuro, mas daí até haver uma adoção em massa ainda vai demorar algum tempo, mas acredito que esse é o caminho.”

Q2. Foi colocada a questão sobre qual o significado da inovação aberta e o que a TAIKAI está a fazer neste domínio, tentando perceber assim, qual o papel da blockchain neste tipo de modelo de negócio e de que forma, pode a blockchain criar incentivos para a colaboração entre diferentes players. Na segunda parte da questão, abordei o tema das network effects e da sua importância para atrair participantes, procurando perceber qual a estratégia da TAIKAI para atrair novos membros para a comunidade e mantê-los.

A2. “Sobre a inovação aberta e eu acho isto já não é um tema propriamente novo, e acho também que as empresas começam a perceber que a inovação aberta é um caminho interessante da inovação, não é? Ou seja, no fundo aqui a questão é, em vez de teres, sei lá, 50 pessoas dentro da tua empresa, ou 50 pessoas de uma consultora que contratas que já se sabe que nunca vão ser esses números, tu tens aqui 1000 pessoas de várias geografias, várias perspetivas, várias

culturas que te dão resposta àquilo que são os teus problemas e portanto abres os teus problemas e os teus desafios a uma comunidade, esperando que essa diversidade de soluções realmente te traga essas perspectivas novas e inovadoras que tu queres. Não é? E, portanto, estamos a falar aqui muito mais de inovação disruptiva do que inovação incremental. Não digo que é o único caminho que as empresas devem tomar, existem claramente aqui empresas que fazem inovação de forma fechada e portanto, com recurso às suas equipas de investigação e desenvolvimento, e tudo mais. Isto acontece muito até na área da saúde e na área farmacêutica por motivos óbvios, não é? Porque abrindo, também podes correr o risco de trazer aqui alguma inovação, ou algum player que não tenha a melhor das atenções, mas de qualquer das formas claramente que este é o caminho e portanto, nessa premissa, nós acabámos por construir aqui a TAIKAI, uma plataforma de inovação aberta que faz isso mesmo, ou seja, tenta ligar os desafios das empresas e outras organizações a uma comunidade de talento, que dá resposta a esses desafios. Portanto, esta foi a forma que nós encontrámos e também porque começámos a especializar dentro de desafios tecnológicos, adotámos a metodologia dos hackathons, ou seja os hackathons são maratonas tecnológicas que podem durar 24 horas, 48 horas, um mês, um ano, na verdade esta questão de ser uma maratona inicialmente acontecia por ser um evento, num espaço físico, mas agora com a transformação digital e como todos os processos a acontecer de forma remota, estes desafios podem acontecer no formato de um mês por exemplo, como já aconteceu várias vezes, e portanto, é esse o tipo de coisas e iniciativas que nós fazemos dentro da plataforma. E, portanto, respondendo à tua segunda questão sobre o blockchain, nós para realmente conseguirmos ter uma maior diversidade de soluções e de respostas a estes desafios das empresas, temos que ser community center, ou seja, nós temos que estar no fundo, no meio da comunidade, claro que a plataforma é uma ferramenta brutal para a empresa porque escusa de usar outras ferramentas, como Excel, ou outras ferramentas que não são adequadas para inovação aberta, mas no final do dia o que elas querem ver é a quantidade de soluções que são apresentadas e a qualidade dessas mesmas soluções. Portanto, grande parte do nosso trabalho, passa cada vez mais por construir uma boa comunidade e uma comunidade que consiga dar resposta a esses mesmos desafios. A blockchain entra exatamente para acelerar esse processo, por um lado todo o processo de seleção dentro de um desafio de inovação aberta fica dentro da nossa plataforma, utilizando a tecnologia blockchain, ou seja, todo este processo de seleção e votação é transparente para a comunidade. Isto para desmistificar um bocadinho aqueles tipos de concursos de inovação e de coisas que acontecem em que tu não sabes muito bem porque é que uma pessoa é vencedora em detrimento de outro e, portanto, esse é a primeira digamos, use case para utilizarmos a blockchain. O segundo, acaba por passar por dar mais incentivos à

própria comunidade e portanto nós introduzimos aqui o conceito de ter um token dentro da plataforma que introduz uma nova camada de gamificação dentro da plataforma, ou seja quem tem mais tokens sobe mais no ranking, e portanto as pessoas acabam por estar destacadas com base no seu envolvimento na plataforma, e ao mesmo tempo isso serve também como um incentivo financeiro, ou seja, em que as pessoas conseguem tirar aqui algum partido e algum reward daquele trabalho que fizeram, mesmo que não sejam o vencedor, ou seja, mediante o ranking, nós fazemos uma distribuição justa e com base na contribuição individual de cada pessoa, e portanto nessa premissa, nós olhamos para o mercado e sabemos, ok, a inovação aberta não é algo novo, algo inovador digamos assim, existem já alguns players com algumas plataformas no mercado de idea management, de hackathons, etc, mas nenhuma utiliza e se alavanca na tecnologia blockchain para tornar isto possível e para acelerar esse processo. Portanto, é isso que nós tentamos fazer e é isso que nos diferencia também.”

Q3. Com o objetivo de obter maior detalhe técnico/operacional, interpolei o Mário sobre o tipo de blockchain utilizada, se pública, ou privada.

A3. “Nós usamos uma blockchain pública na sua versão mainnet, ou seja, na sua versão live e tudo isto acaba por, mais uma vez, ser traceable e consultável. Nós não damos é essa essa visibilidade técnica a quem participa nos nossos desafios, porque achamos que não existe essa necessidade, mas havendo essa curiosidade é sempre possível, imagina, carregar num botãozinho em que consegues ver as transações a acontecer dentro da blockchain, e consegues ver exatamente que isso acontece, isto para os mais curiosos, não é? Sendo que esses curiosos acabam por ser 1%, se tanto, dessa comunidade. Portanto, simplificamos a user experience, mas está tudo numa blockchain pública.”

Q4. Foi abordada questão de como é que a TAIKAI faz a gestão de ideias na plataforma, o que faz com o seu repositório e de que forma as ideias não vencedoras, podem, eventualmente, vir a servir para outros challenges.

A4. “Sobre esse tema, nós efetivamente ainda não temos uma solução para ele. Nós sabemos que, ok, as soluções vencedoras eventualmente hão de ser utilizadas pela própria empresa, mas as outras que me disseste e bem, são igualmente válidas e podem não ter a solução 100% perfeita para aquela organização, contudo, podem ter para outra, e para outra, e portanto, nós temos essa missão também, de poder apoiar esses projetos e essas soluções, ou seja, vamos supor que existem soluções que realmente até poderiam transformar-se numa empresa, não é,

numa start-up, por exemplo. Nós queremos cada vez mais ter essa capacidade, para nós próprios, TAIKAI, ou através de parceiros, como investidores, etc, poder levar essas ideias para a frente e transformá-los em projetos de sucesso. Portanto, essa também é uma das nossas missões, mas ainda não conseguimos, ou seja, ainda precisamos também de algum tempo para poder operacionalizar isto, mas faz todo o sentido, não é? Ou seja, se tens 100 ideias, ok, mas as 100 ideias não vão ser todas boas, mas imagina que tens 50 que são boas e só uma, ou duas é que são selecionadas pela empresa, as outras eventualmente acabam por morrer, não é? E acabam por não ver sequer a luz do dia. Esta é efetivamente uma das nossas preocupações sem dúvida nenhuma.”

Q5. Questionei o Mário sobre a importância das comunidades, como é que se pode chegar ao maior número de pessoas e que tipos de incentivos podem ser dados a essa mesma comunidade. Para tornar mais clara a ideia, foi dado um exemplo de um desafio estendido a uma comunidade que vive numa cidade e que tem como desafio melhorar algo na cidade onde vive.

A5. “Já aconteceu em parte, não dessa forma tão simples não é, de ter um QR code espalhado pela cidade para as pessoas poderem contribuir, isso era brutal. Nós fizemos um desafio com a Câmara de Lisboa, que era muito focado em resolver os problemas da cidade de Lisboa, e temos outros relacionados aqui com um impacto social, que eu acho que fazem todo sentido, não é, ou seja, tivemos vários da fundação Calouste Gulbenkian, como resolver o problema da água, que é um problema mundial, não é? E que realmente poderá haver alguma solução e que era neste caso um desafio tecnológico, ou seja, poderá sempre haver alguma solução tecnológica que nos permita reduzir o consumo excessivo de água como nós estamos a fazer atualmente, e portanto, todos esses problemas que acabam por ser relevantes, eu acho que faz todo sentido realmente chegar ao máximo de pessoas, e ao máximo de comunidade e nós tentamos fazer com que isto seja simples o suficiente, se calhar não para pessoas como as nossas avós poderem usar, infelizmente ainda não estamos nesse nível, porque depois era preciso saber o que é um login, o que é criar uma conta, o que é criar um perfil, etc, ou seja, isso infelizmente não está ao alcance de toda a gente, mas tentamos fazer o mais simples possível para que seja relativamente simples qualquer pessoa, em teoria, poder fazer isto. Eu dou sempre um exemplo muito concreto, é um exemplo brutal sobre como a inovação pode estar em qualquer lugar e pode acontecer em qualquer circunstância, ou pessoa. Nós tínhamos um desafio específico que foi lançado por uma empresa que se chama Kanda Weather, que era para a construir um dashboard para prever de forma mais precisa as condições meteorológicas

em África, ou seja, isto ajudava os agricultores em África a poderem Tomar decisões sobre o seu trabalho e sobre as suas colheitas, e houve uma resposta de um miúdo de 12 anos dos Estados Unidos que construiu uma dashboard utilizando linguagens de programação como Java Script, como React, etc, etc, e esse miúdo construiu uma solução brutal. E depois penso em como a inovação pode estar em qualquer lugar, e que qualquer pessoa pode ter a solução para um determinado problema. Portanto, é sempre nessa premissa que nós tentamos sempre melhorar a nossa experiência de utilizador, pois achamos que esse deve ser o foco.”

Q6. Foi colocada uma questão relativamente ao Token da TAIKAI, como surgiu, se sempre o tiveram e qual a plataforma que usam.

A6. “Nós construímos isto desde a génese TAIKAI, ou seja, construímos isto também porque achávamos que esse era o caminho. Portanto, em vez de estarmos a construir a plataforma e depois tentar integrar com uma blockchain, com o token, etc, como muitos projetos fizeram, nós achámos que já havíamos de fazer isso desde a base. Na verdade, não utilizamos uma rede Ethereum, porque na altura também concluímos que era demasiado cara e não havia outro tipo de soluções como existem hoje em dia, como as IBMs e tudo mais, e portanto, nós acabamos por optar por uma solução que é outra blockchain dentro do software do IOTWS. Portanto não existe custos de transação e isso abstrai também os nossos utilizadores de utilizar este token. O Token chama-se skye e, portanto, neste momento, no fundo, nós conseguimos através desse token fazer todos estes processos que te falei, ou seja, de traceability, de votação, de atribuição de rewards. Aquilo que nós estamos a fazer agora, e que no fundo acabou por ser algo que nós também já tínhamos pensado era, ok, nós precisamos de colocar este token listado numa plataforma que permita realmente haver aqui uma conversão para euros, ou para dólares, ou outra moeda qualquer, e portanto, no meio desse processo, nós acabamos por encontrar uma empresa que estava a fazer algo que era complementar àquilo que estávamos a fazer, dedicada mais à componente de Bounties. Enquanto oferta, também era um produto totalmente descentralizado, também corria em smart contracts, neste caso noutra rede e que tinham um token, que é a bepro. Portanto, esse token sim, já está listado e já existe no mercado, em vários mercados e, portanto, aqui o nosso processo foi adquirir essa empresa, e agora essa empresa faz parte TAIKAI. Portanto é assim que nós também damos valor ao KAI, ao token, ou seja, nós no fundo atribuímos um valor face ao bepro e as pessoas podem no fundo fazer claime de bepro tokens, e podem depois converter em euros, em dólares, no fundo aquilo que acharem melhor. E, portanto, esta foi a melhor forma que nós arranjámos para acelerar este processo.”

Q7. Relativamente ao fundraising e aos novos modelos de acesso ao mercado de capitais que estão a surgir, foi pedida a opinião sobre qual o futuro do mercado tradicional de acesso ao capital de risco, o que está a ser feito por estas empresas e indivíduos, quais são os benefícios de modelos como ICOs e IEOs e como estes podem acelerar o financiamento de projetos inovadores.

A7. “Eu acho que a melhor métrica é ver com os investidores, os VCs tradicionais estão assustados e estão a tentar perceber como é que eles podem também entrar dentro deste movimento. E quando tu tens alguém, cujo negócio é isso, é investimento, e que está a tentar entrar dentro deste novo movimento web 3, quer saber como é que pode investir também, e querem também eles próprios entrarem dentro deste mundo dos tokens, isso mostra que existe mercado, não é? E que já não é só uma brincadeira, e que já não sou só eu a investir uns trocos no projeto do meu amigo. Portanto, eu vejo isso como o modelo de investimento do futuro, aliás nós já vimos bastantes ICOs a acontecer, especialmente em 2017, a levantar muito dinheiro, de muitos investidores isso provou o conceito. E depois, entretanto, obviamente que a regulação também tenta acompanhar essas coisas e tenta prevenir também que haja esquemas, mas ao mesmo tempo isso provou que esse conceito é válido, e que é uma alternativa a tu pensares num numa lógica de investimento tradicional, não é? Em que tens a serie seed, depois tem série A, depois tens a série B, e andas a levantar dinheiro até um IPO, quando podes acelerar esse esse processo. E eu acho que é um bocadinho isso, é acelerar esse processo, e acho curioso porque agora também com este novo movimento das DAOs em que elas próprias são financiadas através de token, pagam às pessoas por tarefa com base em token, tu comesças a ver que nesse tipo de movimento não só é mais simples de montar um negócio, como também é mais barato, ou seja, para montares de uma LLC em Delaware, é um processo relativamente simples, ou seja comparado com o mercado, com a forma de tu criares uma empresa, eles têm um processo de fast track em que tu consegues criar uma empresa quase na hora e custa cerca de 400 e tal dólares. Por outro lado, para montares um Gnosis safe, que no fundo é um cofre para tu poderes guardar a treasury da tua DAO, custa-te de 7, ou 8 Dólares. E, portanto, mesmo nesse ponto, do ponto de vista financeiro é muito mais fácil teres uma ideia e comesçares a fazer isto de forma descentralizada, do que passares por todo o processo de ok, eu tenho uma ideia, vou criar uma empresa, criei uma empresa ok, agora preciso de um contabilista, mas se calhar agora também preciso de um advogado porque agora estou a fazer alguma coisa que se calhar não sei se posso ir nesta direção, ou não. No fundo a complexidade, burocracia e custos vão

sempre aumentando nesse sentido e na descentralização tu já não tens tanto isso, também por ser um caminho novo e um novo mundo. Eu acho que existem novos projetos, novas ideias sempre a acontecer, move-se muito mais rapidamente e isso também te permite ter essa flexibilidade, e teres essa alternativa de investimento.”

Annex C

Hugo Oliveira’s exploratory conversation

Início:

Após uma breve apresentação de ambos, fiz um rápido enquadramento da minha tese e partilhei com o Hugo quais seriam os objetivos desta entrevista. A entrevista iria decorrer sem nenhum guião, ou qualquer tipo de opinião pré-estabelecida em relação ao problema em estudo, por forma a não influenciar o rumo da conversa e permitir ao Hugo explorar o assunto de acordo com o seu conhecimento e experiências, quer na área da inovação, como com a tecnologia Blockchain. Durante esta conversa que durou cerca de 40min, abordámos diversos pontos, sem nunca desviar do foco principal, “Como é que podemos usar a Blockchain para fomentar a inovação.”

Primeira interação:

De forma a lançar o mote e iniciar a nossa conversa, comecei por perguntar ao Hugo como é que a Blockchain podia ajudar/melhorar a co-criação e co-inovação.

Numa primeira abordagem o Hugo não viu como a blockchain conseguiria melhorar este processo de gerir a inovação, chamando à atenção para alguns pontos que devemos considerar quando pensamos na blockchain:

“Isto (tecnologia blockchain) também tem a ver com algumas reticências que uma pessoa tem em relação à tecnologia, ou seja, a blockchain é um conceito muito abstrato para falar de uma tecnologia muito básica.” – **no fundo, trata-se de uma evolução natural da web, uma tecnologia que permite descentralizar o processo da tomada de decisão e o ownership dos dados.**

“Seria importante pensar, não como a blockchain, ou a blockchain pode resolver, ou contribuir para a inovação, mas tentar pensar em soluções mais específicas.”

Segunda interação

À prior, não concordei com o pensamento do Hugo, pois parecia que a minha hipótese começava a não fazer sentido. Contudo, concordei que devíamos partir para um problema específico e sair do panorama abstrato. Partilhei algumas ideias que tinha sobre a utilidade da

blockchain, por exemplo, como é que esta tecnologia podia reduzir a fricção da inovação, dando o exemplo de um ecossistema de inovação na área da saúde, contemplando apenas 3 atores, startup, VC e uma instituição pública (hospital). Com esta Framework pensámos no processo e focámos, por exemplo, na questão do funding e em como este processo poderia ser agilizado recorrendo à tecnologia por forma a fazer o bypass a questões burocráticas e de governance – reduce delays and costs (operational)

Depois de exposto o exemplo, o Hugo partilhou algumas ideias que passo a citar:

“Pensando nesse tema, no afunilar e tentar procurar soluções mais específicas e particulares que possam ser relevantes para o problema em causa, o que é que eu estava a pensar? Em primeiro lugar à uma empresa portuguesa na área da web3, é criptonative, não tem um token mais hão de ter e trabalham em blockchain. É uma empresa de open innovation que é a “TAIKAI” – fazem hackathons e projetos de inovação com empresas, e usam blockchain para gerir parte da interação entre os vários participantes no projeto, numa perspetiva de incentivos e reconhecimento – aplicação de blockchain na área da inovação e co-criação, sobretudo em ambientes com diferentes players. Aqui, podemos observar outro ponto onde a blockchain pode atuar, nomeadamente num contexto de OI, atribuindo benefícios aos inventores.

“No processo de inovação o que precisamos é de pessoas e facilitadores para resolverem um problema. Se as pessoas forem da mesma empresa, podemos assumir que há confiança e que, portanto, não precisas de uma blockchain, ou de um Use Case tradicional da blockchain, mas podemos precisar para os outros temas, incentivos por exemplo. No fundo para a transformação digital.” – bom insight, ou seja, a blockchain poderá ter papeis diferentes, quando aplicada num ambiente conhecido (mesmo ecossistema), ou desconhecido (ecossistema diferente com diferentes players)

“No fundo a Blockchain, não é nada mais, nada menos, do que uma base de dados sofisticada que nos permite dar mais um passo no paradigma da transformação digital e contabilizar as coisas de uma forma diferente.”

Depois de uma breve reflexão, o Hugo voltou a focar no mesmo ponto já anteriormente mencionado, dizendo:

“Num contexto tradicional dos programas de inovação que existem pelo mundo fora, não acho que haja muito que a blockchain possa fazer, para além do que o que a TaiKai está a fazer.”

Na opinião do Hugo “sem confiança a malta nunca vai conseguir inovar e não irá ser a blockchain que irá resolver o problema da confiança por si próprio”. Após esta afirmação, interrompi o pensamento do Hugo e afirmei que a blockchain veio para resolver o problema da confiança, ao que o Hugo respondeu, “ A blockchain veio para ser uma ferramenta que te permite iniciar a resolução do problema da confiança, só que nós só conseguimos fazer isso quando estamos a falar de processos que são 100% digitais, ou que não sendo 100% digitais, nós consigamos, com alguma outra tecnologia, garantir a confiança da entrada dos dados no processo, entre o mundo físico e digital, porque se não, a blockchain no fundo vai ser só a base de dados e tu só tens confiança no sentido em que os diferentes participantes, os diferentes atores, ou os diferentes nódulos da base de dados, não a vão manipular. Só que o processo de inovação, não é um processo de bases de dados. Uma base de dados num processo de inovação não serve para muita coisa, não serve para documentação do projeto. A questão da confiança no processo da inovação diz sobretudo respeito à confiança dos participantes, estarem cara a cara a resolverem um problema e a partilharem ideias entre si e não vai ser uma base de dados que vai resolver isso, estás a perceber? Era nessa perspetiva que estava a dizer que num processo de inovação entre consortiums, não veria como é que a blockchain fosse resolver algum destes temas.”

Continuou:

“Não obstante, ou seja, apesar do processo de inovação pela sua ligação muito básica à natureza humana, e portanto, os temas da confiança terem de ser resolvidos por aí e não pela digitalização da documentação do processo. Não obstante isso, há um conjunto de pequenas coisas que de facto nós estamos a conseguir fazer em blockchain que por si podem acelerar processos de inovação, e é aí onde eu acho que pode haver espaço também interessante para explorar e para refletir”.

De seguida o Hugo elencou alguns exemplos:

Financiamentos de startups – “a blockchain sendo o passo seguinte do gradiente, ou da escala da transformação digital, de facto está a permitir que muitos processos que estavam dependentes de muita burocracia, sejam acelerados e entrem na transformação digital, quando antigamente não entravam, porque por questões burocráticas, não se podiam fazer, o caso paradigmático disto são as DAOs.”

“Com base nas tecnologias simples da criptografia e da distribuição de tokens, tu consegues confiar no processo de que os teus membros têm os tokens, então os teus membros vão poder agregar os seus recursos, ou portanto, simplesmente organizarem-se como as pessoas sempre se organizaram na vida humana, num empreendimento coletivo, angariar recursos, ou juntar os seus recursos e depois aplicar esses seus recursos e distribuí-los por outras empresas, ou por outros empreendimentos – **aquilo que seria feito em 3 meses, agora, pode durar apenas 3 dias.** “Isto é possível porque tivemos uma explosão, ai sim, inovadora, da facilidade com que as pessoas podem criar uma organização, tens templates, aragon” ...” e portanto tens uma forma muito simples de acelerar essas organizações e portanto, ao acelerar estas organizações, retiramos a burocracia e estás a facilitar a inovação porque as pessoas perdem menos tempo a tratar de tretas e estão mais focadas depois nos seus próprios projetos. Estes projetos podem ser a alocação de capital, capital de risco, produção de arte, desenvolvimento de protótipos como se fossem uma startup normal.”

Depois desta reflexão o Hugo afirmou que seria através desta perspetiva que viria a tecnologia blockchain e os tokens, como uma ferramenta que poderá acelerar o processo de inovação, cito-o, “como um veículo poderoso de aceleração do processo de inovação”.

No seguimento deste pensamento, fiquei com algumas dúvidas sobre as DAOs e por estar ainda a perceber como funcionam, questionei o Hugo sobre o processo de criação das mesma. Perguntei por exemplo se poderia criar uma DAO através da Ethereum.

Uma DAO é uma associação – “Tu estabelececes uma DAO quase como se fosse uma associação na hora, pela internet, mas não precisas de um contabilista e disto ou daquilo que normalmente precisas se tiveres de estabelecer uma entidade legal nalguma jurisdição. Numa blockchain, e depende da blockchain, no caso da Ethereum já tens isso tudo configurado, aplicou-se conceito de associação que passou a ter um novo significado, ou seja, a DAO é uma organização descentralizada, mas que também é autónoma, por que é que é autónoma? Porque o poder de computação de uma blockchain como a Ethereum, que é uma blockchain que tem um poder de computação, permite executar contratos, smart contracts, permite também, então, que a organização tenha vários processos a decorrer automaticamente.”... (continuou, deu exemplos das fintech e empresas portuguesas que usam sistemas parecidos)

“Ao criar uma DAO numa blockchain, o que estamos a fazer é criar é um conjunto de contratos que interagem entre si e que permite aos participantes da DAO executar coisas. O mais básico é um contrato que permite distribuir tokens pelas pessoas e que depois permite que as pessoas votem no governo da DAO.”

Depois desta interação do Hugo, tentei colocar isto sobre um olhar prático, dei o exemplo da Ucrânia e em como as características de uma DAO poderiam ajudar e acelerar processos - retirando a burocracia e acelerando por exemplo, a chegada de fundos monetários provenientes de vários países, a acontecer isto, para além de acelerar os processos, estaríamos a reduzir custos por exemplo de fees associadas a transações monetárias.

Depois desta minha partilha o Hugo chamou à atenção para o facto de vermos muita atividade a acontecer em blockchain (**trend**) e para o risco que isso pode trazer. Realçou que o objetivo não é aplicar esta tecnologia só porque sim, mas que devemos sempre pensar se a tecnologia está, ou não a acrescentar valor.

No seguimento do acima exposto, o Hugo, mencionou alguns recursos/frameworks para me ajudar a perceber se faz ou não sentido usar a blockchain no “meu negócio”. Uma delas é do World Economic Forum, “do I need blockchain for my business?” - <https://www.weforum.org/agenda/2021/11/heres-how-companies-make-sure-blockchain-ready/>

Acrescentou ainda, que:

“Será que o problema a ser resolvido depende da decisão, ou depende da execução da decisão? O processo de decisão, lá está, é um processo que é muito humano e que exige muita racionalização à volta disso e não vai ser uma tecnologia que o vai resolver.”

Após esta reflexão, abordámos alguns casos práticos, numa tentativa de perceber a aplicação da blockchain no processo da gestão de inovação, desde a fase “ideation” até à sua implementação. Falámos sobre dois exemplos, nomeadamente a montante do processo, na geração de ideias, um focado num problema hospitalar e outro mais político, um orçamento participativo. O Hugo concordou que a blockchain poderia ajudar no processo, mas partilhou também que a blockchain não estava a acrescentar nada de novo nestes exemplos e que estávamos a olhar mais uma vez para a tecnologia como uma base de dados.

Exemplo do governo a usar blockchain - https://www.jornaldenegocios.pt/empresas/detalhe/governo-testa-blockchain-em-concurso-para-inovacoes?ref=francisco-mendes-da-silva_UltimasHP

Para concluir o Hugo terminou com a seguinte intervenção:

“Há muito bullshit no mundo da blockchain e é preciso mesmo garantir que a tecnologia está a acrescentar valor e que não está lá a ser colocada só porque sim. No fundo esse é um dos grandes problemas do processo de inovação, é que há muito teatro associado ao processo de inovação e para um processo de inovação ter sucesso é importante garantir que as pessoas estão mesmo focadas na inovação e não no show-off.”

Annex D

Purpose Parameters	Class	Coin / Cryptocurrency		Utility Token		Tokenised Security	
	Function	Asset-Based Token		Usage Token		Work Token	
	Role	Right	Value Exchange	Toll	Reward	Currency	Earnings
Governance Parameters	Representation	Digital		Physical		Legal	
	Supply	Schedule-based		Pre-mined, scheduled distribution	Pre-mined, one-off distribution	Discretionary	
	Incentive System	Enter Platform		Use Platform	Stay Long-Term	Leave Platform	
Functional Parameters	Spendability	Spendable			Non-Spendable		
	Tradability	Tradable			Non-Tradable		
	Burnability	Burnable			Non-Burnable		
	Expirability	Expirable			Non-Expirable		
	Fungibility	Fungible			Non-Fungible		
Technical Parameters	Layer	Blockchain (Native)		Protocol (Non-Native)		Application (dApp)	
	Chain	New Chain new Code	New Chain, forked Code		Forked Chain, forked Code		Issued on top of a protocol

Table S - token classification based on literature review and empirical data (Oliveira et al., 2018)

