DECENTRALIZED FINANCE (DEFI) – THE LEGO OF FINANCE

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Abstract

Blockchain Technology can enhance the basic services that are essential in traditional finance and it has the potential to become the foundation for decentralized business models, empowering entrepreneurs and innovators with all the right tools. By means of a trustless and distributed infrastructure, blockchain technology is optimizing transactional costs and allows the rise of decentralized, innovative, interoperable, borderless and transparent applications which facilitate open access and encourage permissionless innovations.

DeFi stands for "Decentralized Finance" and refers to the ecosystem comprised of financial applications that are being developed on top of blockchain and distributed ledger systems.

The Decentralized Finance (DeFi) or Open Finance movement takes that promise a step further. Imagine a global, open alternative to every financial service you use today - savings, loans, trading, insurance and many others - accessible to anyone in the world only by means of a smartphone and internet connection.

DeFi is the movement that leverages decentralized networks and open source software to create or transform old financial products into trustworthy and transparent protocols that run without intermediaries.

This article will analyze several studies and researches on Decentralized Finance with focus on its features and subsets, intending to offer a synthesis on how the ecosystem is evolving and the way it may reshape the structure of modern finance by creating a new landscape for innovation.

Keywords: Decentralized Finance, Decentralized Applications, Decentralized Exchange, Blockchain, Smart Contracts, Ethereum, Bitcoin, Stablecoin, Derivates, Futures.

Introduction

DeFi refers to the economic paradigm shift enabled by decentralized technologies, particularly blockchain networks, which started a whole movement with the introduction of bitcoin (S.Nakamoto, 2008). Blockchain and Distributed Ledger Technologies (DLT) represent the common ground for enabling borderless, immutable and transparent technology. Launched in 2015, Ethereum is the world's programmable blockchain as the concept of Ethereum Virtual Machine is based on fact that it can execute more complex applications, having digital assets being directly controlled by a piece of code and implementing methodic rules or even blockchain-based decentralized autonomous organizations (DAOs) (V. Buterin, Ethereum Whitepaper, 2015).

Ethereum is programmable, which means that developers can use it to build new kinds of applications (G. Wood, 2014). With smart contracts as a base for Decentralized Applications (dApps), it is possible to execute program logic in a decentralized way as all peers in the blockchain network validate transactions to maintain the integrity of the ledger. These transactions trigger

the execution of the program logic, which inflicts changes to the state of globally shared objects (A.M. Antonopoulos, G. Wood, p67,442-444, 2018).

The idea is to develop and operate financial dApps on top of a transparent and trustless frameworks, such as permissionless peer-to-peer (P2P) protocols. This new concept of Open Finance, generally refers to the digital assets and financial smart contracts, protocols, and decentralized applications built on open blockchains or Distributed Ledgers Tech.

By June 2020 there were identified 214 DeFi projects listed, from which 199 were using the Ethereum Blockchain architecture. (DeFiPrime, 2020).

Summing up, the DeFi movement is shifting traditional financial products to the open source and decentralized world, which removes the need for intermediaries, reduces overall costs, and greatly improves transparency.

What is DeFi and why is everyone talking about it?

DeFi, also referred to as 'Open Finance', is a set of Blockchain/DLT-based financial services and applications intended to augment or replace the currently existing financial system, which is comparatively referred to as 'Centralized Finance'.

When compared to traditional financial services, Decentralized Finance brings numerous benefits through the use of smart contracts and distributed systems. As the ecosystems mature, deploying a financial application or product becomes much less complex and demanding. For instance, many dApps are being developed on top of the Ethereum blockchain, which provides reduced operational costs and lower entry barriers (Binance Academy, 2020).

There are already many initiatives making headway in the various sub-sectors that comprise the broader DeFi landscape. These particular initiatives have been built on the Ethereum network, but others have been created or exist

on other permissionless blockchains such as Bitcoin. By using permissionless networks, DeFi creators are able to make their services accessible to anyone as long as they have a device and an internet connection.

To fully understand this, it is important to understand the nuance in the way terms like Bitcoin and Ethereum are used. The term 'Bitcoin', for example, is used to describe both the Coin (a part of the application layer) that is exchanged as well as the network (a part of the protocol layer) that the coin is exchanged on. When it is said that a DeFi application uses Bitcoin, this means that it is a separate application in the application layer which operates on top of the underlying Bitcoin Network Protocol. In effect, this can help to shield DeFi services from the immense volatility that discourages some from recognizing Bitcoin as a viable store of value.

From a DLT and Blockchain perspective, one of its greatest promises and drivers of value is the notion that it facilitates decentralized peer-to-peer transactions without the need for a third-party intermediary and their associated fees.

By bringing this technology into the traditional finance system, DeFi is the potential to create new avenues to access services and activities like: payments, lending, borrowing, funding or investing (A.Rossow, 2020).

DeFi hit new heights with more than 1,000 new assets added in May 2020 and total users number reaching 550,000. It continues to grow at an exponential rate with the number of new DeFi assets increasing by almost tenfold over the same time last year (J. Mapperson, 2020).
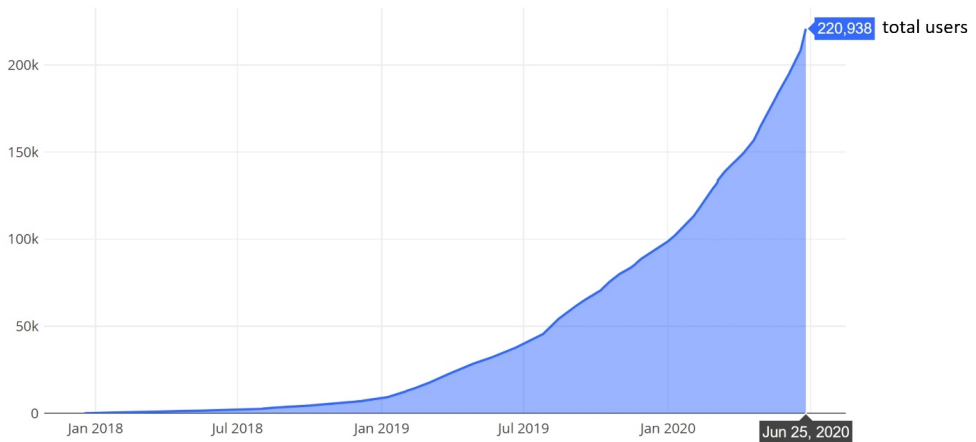
Total DeFi users over time

Fig. 1 – Total DeFi users over time. Source: Dune Analytics, Data from 25th of June 2020. Excluding Dai users. Retrieved from https://explore.duneanalytics.com/

Although the total numbers remain small in the overall scheme of things, adoption is growing and this is likely to increase as projects become more user-friendly. The market cap of all DeFi projects has surpassed $6 billion according to DeFi Market Cap (DefiMarketCap, 2020).

Currently, the three largest functions of DeFi are:
- Translating monetary banking services (e.g., Issuance of stablecoins);
- Providing peer-to-peer (or pooled) lending and borrowing platforms;
- Enabling advanced financial instruments such as Decentralized Exchanges (DEX), Tokenization Platforms, Derivatives and Predictions Markets.
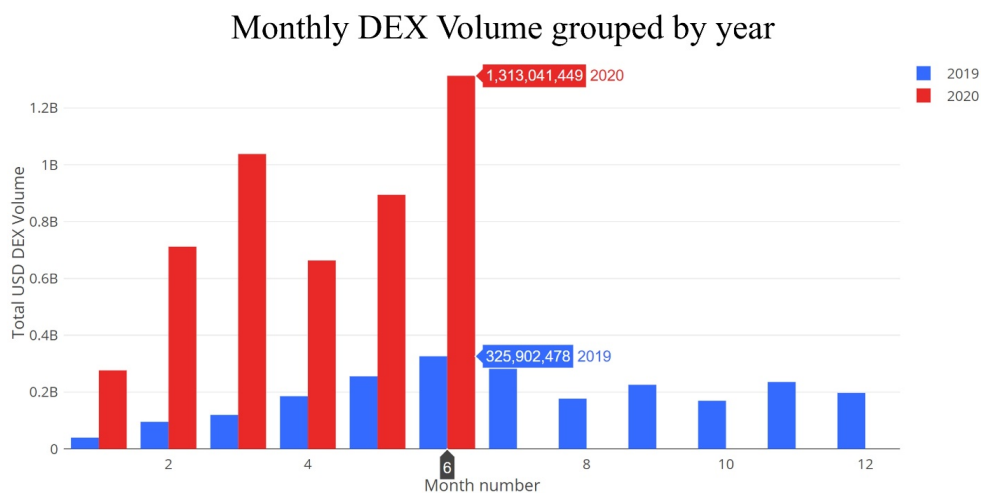
Fig. 2 – Monthly DEX volume grouped by year. Source: Dune Analytics, Data from 25th of June 2020. Retrieved from https://explore.duneanalytics.com/

Some of the most common use cases

Stablecoins

A stablecoin is a type of cryptocurrency that is designed to maintain a stable market price. Recently, this type of digital currencies has grown in popularity, and we now have numerous stablecoin projects.

The idea behind stablecoins is to provide some of the advantages of both fiat currency and cryptocurrency worlds. Currently, stablecoins are mostly used as a hedge against the high volatility of cryptocurrency markets, but depending on the context, they can also be used as a stable currency that provides increased transparency and decentralization. Also, when compared to traditional fiat currencies, they present faster transactions and lower fees, with an average of $0.2/transaction (Ethgasstation, 2020), making them quite useful for everyday payments and international transfers.

Although the exact mechanisms vary from one coin to another, stablecoins are supposed to be somewhat resistant to market volatility, so they should not experience significant price changes.

Many stablecoins have their values fixed by pegging them to the price of another asset. While most of them are pegged to the US dollar, there are stablecoins pegged to the price of other cryptocurrencies, or even commodities, like silver or gold. By being pegged to real-world assets, these coins avoid the wild price swings caused by the high levels of volatility, very common in cryptocurrency markets (Binance Academy, 2020).

Borrowing and Lending

There quite a few Blockchain powered lending and borrowing dApps – one of the most flourishing categories of open finance. Users can deposit their crypto in the Smart Contracts as collateral and can borrow against it. It then automatically matched lenders and borrowers and adjust the interest rate dynamically on the basis of demand and supply and open lending protocols (C.Bhardwaj, 2020).

Decentralized Exchanges

2020 is quickly shaping up to be the year for decentralized exchanges to take the mainstage. With optimized usability, deeper liquidity, and emerging composability, the DEX ecosystem is getting stronger by each day.

When it comes to exchanging crypto, many have long been focused on centralized players due to their fiat onboarding and ease of use. Despite these notions, many have been quick to point out that centralized exchanges come with their own inherent risks – namely those of custody.

Famously highlighted by hacks on once-prominent exchanges like Mt. Gox in 2014, many traders have come to recognize the value of non-custodial solutions offered by decentralized exchanges.

In the past year alone, DEXes have made serious improvements in both usability and liquidity – signaling that they are ready to compete with their goliath counterparts (Defirate, 2020).

A few other examples of products and use cases include: funding protocols, software development tools, index construction, subscription payment protocols, and data analysis applications.

The most important feature of DeFi: Composability

Money Legos

Everyone in the DeFi community likes to use "Legos" as the metaphor for composability. The core philosophy of the DeFi space: build for interoperability; this allows the ecosystem to benefit from individual progress, pushing decentralized finance continually forward (Totle, 2019).

There are roughly 200 projects listed on DeFi Prime alone, each with their own unique features and infrastructure (Defi Prime, 2020).

As people visit this large bin of random Legos, pieces get combined together in new and creative ways. This means that if you picked any 3 out of the roughly 200 listed tools, you'd have 1,313,400 different combinations to choose from to build a new financial product.

Then when new people dive into the Lego bin, they find preassembled combinations of Legos that they can use, creating bigger and better things. This eventually snowballs into a whole universe of exciting Lego creations.

Composability is a feature of design wherein the various components of a system can be easily connected to form any number of satisfying results. Beautiful examples of composable infrastructure as code in software design are seen in Dai-integrated Decentralized Finance blockchain applications. The Lego-like building blocks of the Maker Protocol allow developers to quickly and easily construct financial solutions that offer the benefits of Dai, Maker's decentralized stablecoin, to their users. By taking advantage of Maker's Github library of open-source code, DeFi components can be used over and over or reconfigured as building blocks for further innovation (MakerDao, 2020).

A perfect example of composability in DeFi: Utilizing the Gnosis Safe Vaults with the Makerdao DAI stablecoin, that you lend on a lending platform in order to have access to a token that you can invest in a decentralized exchange to implement a futures contract, all driven by a Flash Loan.

The emergence of the money Lego narrative is great because it focuses on the idea that blockchain is best used as the underlying framework for how we interact in general rather than as a platform for a single type of application.

Another theory, compares it to a puzzle, as pieces can be designed in multiple ways:

- One connecting side only (usually user-facing and not developer-facing);
- Two or three connecting sides (usually a middleware protocol);
- Infinite edges (platforms).

If more dApps are built with composability and open ecosystems in mind, we would start to build a larger puzzle with more possible edges. When puzzle pieces are latched onto existing pieces, they are deemed more innovative, but with less upfront work to build (B. Flynn, 2019).

There is a huge opportunity for DeFi founders to educate the public on their DeFi offerings. The wider the awareness is raised, the faster they can claim market dominance.

DeFi' s fragmentation problem

Despite its novel vision, DeFi is becoming overly complicated. From a user perspective, interacting with different protocols and even tracking your portfolio is a logistical nightmare. It's very rare to see dApps and wallets that facilitate direct transactions for multiple protocols. Consequently, a DeFi user who wants to put their money into 7 different DeFi assets most likely needs 7 open tabs to assemble their portfolio.

Users lose out because over time, the protocols and DeFi assets offered to them are not based on what they want, but rather on what's available to developers (C. Russo, 2020).

The Benefits of DeFi

Wider global access to financial services

Currently, 1.7 billion adults worldwide remain unbanked (World Bank Group, 2017) and have zero access to a financial institution. Decentralized Finance should help to tear down the status, wealth, and location barriers that prevent global access to the financial world most developed nations take for granted, bridging elementary financial services for all its participants by means of a smartphone and internet connection.

Affordable Cross Border Payments

By eliminating the need for certain intermediaries, DeFi services are predicted to lower the average global remittance fee from its current, often prohibitively expensive 7%, to a much lower 3% average (C. Hoffman, 2020).

Improved Privacy and Security

Data breaches at centralized institutions, like the May 2019 breach of First American Financial exposed approximately 885 million personal and financial records (Krebson Security, 2019). By definition, a decentralized system does not have a centralized single source of failure that would allow for this type of breach to occur.

Censorship resistant transactions

A full DeFi system cannot be censored or shut off by governments or large corporations. A system such as this can bring a sense of stability and an

alternative option in nations where existing governments and financial institutions may be corrupt or untrustworthy.

In efforts to bring their services to the mainstream, developers of these new DeFi applications will focus on creating a smooth and intuitive user experience to allow any user to take full advantage of the new system that is being put in place.

While each of these benefits are powerful in their own right, their combination can really bring profound implications.

The Dark Side

Despite all of the promises and benefits, there are still some considerable challenges that lie in the path. The major challenges that DeFi needs to overcome:

Legal environment

As it stands the legal financial system is deeply intertwined with the legal system in many countries of the world. As a result of this, any attempt to draw the financial system away from this interconnected setup will create a series of legal challenges that will need to be addressed in order to achieve wide scale adoption.
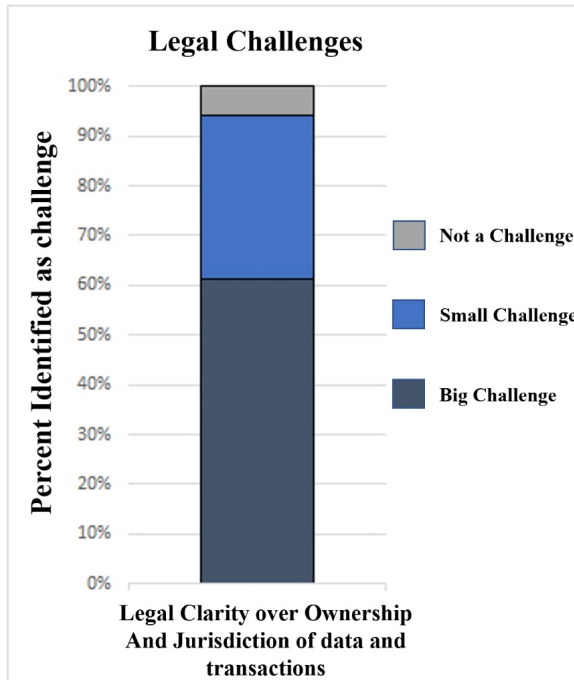
Fig. 3 - Legal Challenges around Distributed Ledger Technology. Source: International Chamber of Commerce, Trade Finance Global and World Trade Organization - Blockchain for Trade Survey, October 2019. Responses from corporates, banks, consultancies and vendors, n = 202. Retrieved from https://www.tradefinanceglobal.com/posts/what-is-defi-decentralized-finance/

Lack of interoperability between chains

An important issue that is addressed is a lack of interoperability between chains. In the permissionless world of DeFi applications, a lack of interoperability between chains means that an application built on one chain, say the Ethereum blockchain, cannot easily transact with an application built on a different chain, like the Bitcoin blockchain. While there are some bridging chains and protocols that allow this type of transactions, the infrastructure is still in early stages of development.
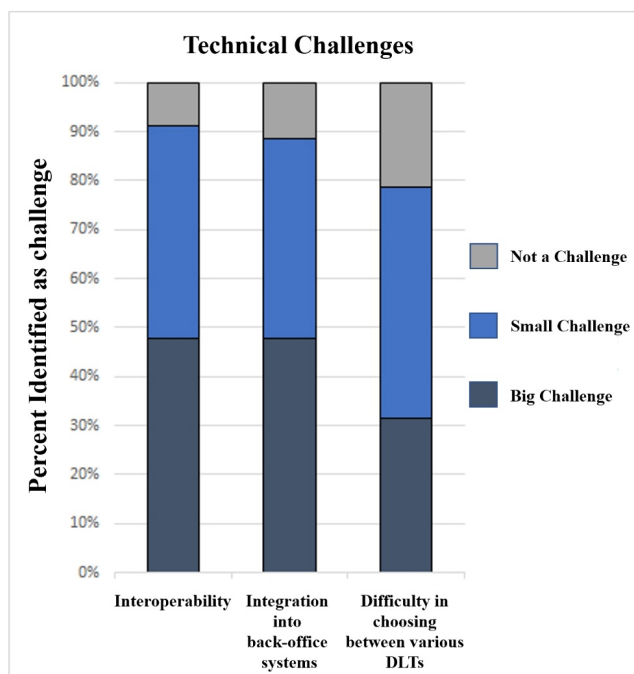
Fig. 4 - Technological challenges around Distributed Ledger Technology. Source: Trade Finance Group, International Chamber of Commerce and World Trade Organization - Blockchain for Trade Survey, October 2019. Responses from corporates, banks, consultancies and vendors, n = 202. Retrieved from https://www.tradefinanceglobal.com/posts/what-is-defi-decentralized-finance/

Transaction Speeds

      A commonly cited drawback for blockchain based applications is their limited transaction throughput. The Bitcoin and Ethereum networks can each process 7 and 25 transactions per second respectively, but these numbers pale in comparison to Visa's 24 000 transaction per second throughput (Visa, Security and Reliability, 2020). Overcoming the issue of speed will be a crucial challenge for DeFi to pass for scaling purposes.

Currently, most DeFi applications are built on top of the Ethereum blockchain. Examples of DeFi decentralized applications (dApps) include: Kyber Network, Maker, Nexus Mutual, Compound, and PoolTogether (Defi Prime, 2020).

DeFi has seen strong growth and in February 2020, it hit the $1 billion mark for the first time, in total value locked in smart contracts (Defipulse, 2020).

DeFi - Total Value Locked (TVL) in USD

TVL (USD) | ETH | BTC | DAI   All | 1 Year | 90 Day | 30 Day | 7 Day

Jun 27, 2020 11:00 PM
TVL (USD) $1.648B

Fig.5 – DeFi - Total Value Locked (TVL) in USD. Source: Defi Pulse, Data as per 27th June 2020. Retrieved from https://defipulse.com/

Borderless Initiatives with Trustless Technology

With the new concept of DeFi, the questions of Know Your Customer (KYC) and Anti Money Laundering (AML) have been raised.

These issues are still in infant stages of debating, as these concepts do not really fit in the ecosystem of DeFi. Within DeFi, the platforms that have customers, they don't really need to know any other information about them, because the trust technology does not depend or rely on knowing the customers.

AML regulations require the platforms to behave without neutrality and to source destination, purpose and amounts. Without neutrality, the power dynamics change, due to the fact that the platform acts as a centralized body. Those who decide which purposes are permissible for every jurisdiction and who is vetted to participate in the financial services environment act similar to the current centralized financial system, therefore cannot be incorporated as DeFi.

This will result in fragmentation, because in different jurisdictions, the law encompasses different actions as legal or illegal, which means that the system can no longer be borderless.

Because the participants need to be vetted, the system can no longer be open, and of course, because you have to restrict permission of certain types of activities, the system can no longer be censorship resistant. Clearly at this point, the proof of concept is no longer DeFi.

Decentralized Liquidity

Protocols rely on network effects based on liquidity for their success. More volume equals more credibility. This can create a wall for other protocols trying to innovate. Even if they compete on commission, they lack the credibility and liquidity to attract dApp and wallet developers to integrate with them, which means they lose out on market share.

The idea of bringing together the liquidity of multiple Decentralized Exchanges, comes down to having a common order book which will significantly improve the operations of DEXes and not only.

The main problem about this type of scenario, is that when we pull the liquidity in this way, you're also pulling risk, especially in this emerging ecosystem. Basically, in all of the cases where you're using a smart contract to concentrate funds from many different entities, the risk is directly

proportionate with the amount of funds concentrated, as it will be seen as a target for individuals who will try to exploit its vulnerabilities.

In the long run, as these contracts become more mature and secure, they will be stress tested by the environment and they can be trusted to operate by consensus.

The ways that DeFi succeeds and it remains borderless, neutral and censorship resistant is by attempting to reduce the amount of applications that essentially become an exception to the blockchain's ability to resolve through the smart contracts. The solution clearly is to the keep the transactions and operability, as much as possible, contained within the blockchain, so you do not run into legal arguments outside. By doing so, by reducing the burden on judicial access, representation and jurisdiction, DeFi can not only remain global and transnational, but also it can remain open to more participants and give everyone the same opportunities where they have been effectively excluded from traditional financial systems.

Risks

DeFi has not reached its full potential yet, due to several challenges related to fraud, volatility, usability, and regulatory uncertainty. First, decentralized finance can be vulnerable to fraud as well as to the proliferation of untested financial innovations (Y.Chen, C. Bellavitis, p.6-8, 2020).

A DeFi savings account allow you to effectively lend to others by providing collateral that can be used to collateralize other activities that are happening in the DeFi ecosystem. So when you're saving, just like in the traditional bank, your savings are used to finance other people's spending, the difference being that in traditional finance, your savings are expanded through fractional reserve banking to extend many times more than the actual amount of savings, whereas in DeFi it's the opposite, because DeFi requires over

collateralization. It's more of a negative fractional reserve rate, as you can only lend less than what you have in savings.

However, when you're putting your savings in an account that is part of a smart contract in a DeFi system, there is a new category of risks.

The risk is not a counterparty risk, that your bank will go bankrupt and the deposit insurance will not be able to support all the covers, but that of a coding security fault of the smart contract itself. The smart contract may have a bug that leads to liquidation of your savings account or theft by another party.

This can be extended to all DeFi applications at this stage. It's not a matter of "if there are bugs", it's a matter of "how bad the bugs are" and "how easy is to exploit these vulnerabilities". Countermeasures need to be in place to rescue or bailout the smart contract if such a vulnerability is detected.

It's a very complex environment so the risk has shifted from counterparty institutions and third-party custodians, into software coding risk, where the developers of that specific smart contract made a mistake or several.

Aspirational versus Reality

As of now, DeFi is interoperable and composable mostly in theory. We need to create the instruments that allow us to easily integrate different protocols, or we run the risk of gradual centralization. This is not because dominant protocols like Maker and Compound are purposefully trying to hold back innovation, but because the way they are built creates invisible constraints on developers.

To make DeFi work as intended, it needs infrastructure that enables scaling and innovation at low cost. A good analogy is how in the late 19th and early 20th centuries, railroads connected different economic agents like factories, ports and cities (protocols) and were able to transport goods (tokens)

via a network of tracks. It was this standardization of transport that allowed for the exponential growth of the global economy (E.Yurtaev, 2020).

The value in making it easier for people to build and try out different protocols is that they may not gain huge traction, but they offer a glimpse into viable alternatives that could propel the space into more robust, sophisticated or user-friendly territory. Right now, the way DeFi is set up, that kind of diversity is not plausible.

Although most DeFi protocols have reached a high degree of architectural decentralization, full political decentralization is hard to achieve. As such, most protocols are still partially centrally governed by their central developer teams or foundations (K.Lau, 2020).

One possible reason for protocols having high brand awareness but low usage is that the protocols do not offer a strong reason for users to use them, they have a low perceived value, or, users simply do not understand the product offerings.

For protocols that have low brand awareness and low usage, it is likely that users are not actively looking for the products or do not understand the product offerings at all.

DeFi is not really focusing on banking the unbanked, but there are few cases to take in consideration. More specifically, the case of stablecoins, that can be pegged to a national currency which are recognized and used as a unit of account.

The best case to analyze is "Dai", which is a decentralized, unbiased, collateral-backed cryptocurrency soft-pegged to the US Dollar. Dai is held in cryptocurrency wallets or within platforms, and is supported on Ethereum and other popular blockchains.

Users generate Dai by depositing collateral assets into Maker Vaults within the Maker Protocol. This is how Dai is entered into circulation and how

users gain access to liquidity. Others obtain Dai by buying it from brokers or exchanges, or simply by receiving it as a means of payment.

Once generated, bought, or received, Dai can be used in the same manner as any other cryptocurrency: it can be sent to others, used as payments for goods and services, and even held as savings through a feature of the Maker Protocol called the Dai Savings Rate (DSR).

Every Dai in circulation is directly backed by excess collateral, meaning that the value of the collateral is higher than the value of the Dai debt, and all Dai transactions are publicly viewable on the Ethereum blockchain. (Makerdao, 2017).

This perspective, makes things a bit easier in the current environment, where cryptocurrencies are still quite volatile because of their limited liquidity.

What began as a handful of DeFi projects has given way to a wave of experimentation and innovation in the space, including offerings of decentralized versions of mainstream financial products. Think of Dai as the financial "glue" that connects many of these services.

Based on CoinGecko data, Stablecoins are the key entryway into DeFi and DAI is more popular than its market capitalization ranking. Stablecoins plays an important role in the DeFi ecosystem and serves as an indicator of the broader adoption of DeFi (E.Azmi, 2020).
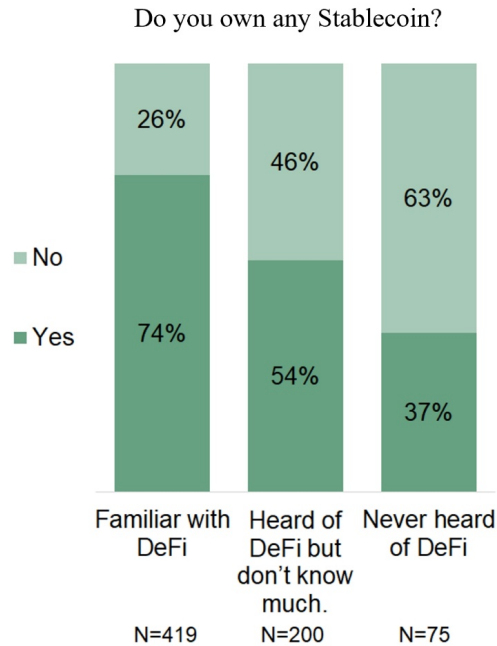
Do you own any Stablecoin?

Fig.6 – Do you own any Stablecoin? Source: CoinGecko, May 2020 Survey. Familiar with Defi- N=419, Heard of DeFi but don't know much N=200, Never heard of Defi N=75. Retrieved from https://www.coingecko.com/buzz/defi-survey

As DeFi matures, it is imperative that these financial dApps have a deeper understanding of who their main users are and how they are solving the problems of their users. DeFi can be accessible to all ages and gender and based from CoinGecko's data, adoption can be accelerated by bridging the gender gap (E.Azmi, 2020).
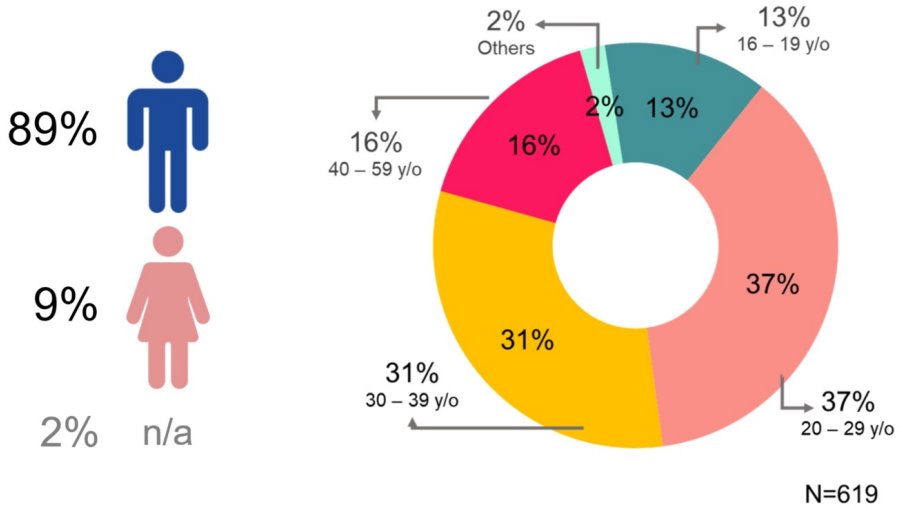
People who have at least heard of DeFi

Fig.7 – People who have at least heard of DeFi. Source: CoinGecko, May 2020 Survey, N=619. Retrieved from https://www.coingecko.com/buzz/defi-survey

Among those who have heard of DeFi, Millennials, aged 20-39 years old, are the largest group, dominating at 68%. Gen-Z, below 16 years old, currently made up less than 1% of the participants in DeFi. We expect that the upcoming Gen-Z to be an important demographic for DeFi in the coming years as they are tech-native who grew up with full access to new technology. Stakeholders need to pay attention to this generation in particular, as they are anticipated to be the main drivers for DeFi adoption in the coming years (E.Azmi, 2020).

Conclusions

Many of the most popular decentralized applications today are products built for developers rather than users. The applications that are

designed for users tend to struggle to attract users and undermine decentralization in order to create a better user experience.

Decentralized finance may be the next big disruption to the financial system. Powered by blockchain technology, this new wave of applications and services will help bring financial services to the underbanked, reduce transaction costs, and enhance security all while providing users a seamless experience from anywhere in the world. Like any new technology, it is important to take a step away from the hype and critically examine the challenges that lie in the path to mass adoption. For DeFi, these include challenges reach into the legal sphere, and touch on interoperability as well as transaction speeds. Only by addressing and overcoming these challenges, DeFi will reach its full potential.

At the moment DeFi requires a lot of understanding as the technology is still immature and prone to problems, risks and security bugs.

One major step that needs to be addressed are the user interfaces for accessing DeFi, which are not yet mature and this is something that applies to all crypto assets in general. The vision, against the reality, will take quite some time for improving the interfaces, broadening access, increasing liquidity, reducing volatility, maturing the underlying security of the smart contracts and building a more robust infrastructure so that it can be broadly applied.

The most important infrastructure developments with regards to DeFi, as per now, are happening on the Ethereum Blockchain, for the reason that it is the dominant platform in smart contracts.

It is quite a stretch to think that the network effect of Ethereum can be overcome and it can be dethroned so easily, because as with a lot of technologies, the effort required by a developer to learn the tool chain and its intricacies of a specific platform is quite high. It's not easy for developers to switch from one platform to another, and, these things especially in the smart contacts space, are driven by developer loyalty.

Reimplementing traditional financial services in a more decentralized manner is valuable and novel because it changes the power dynamic.

The incentives of power usually change the outcomes of social environments, so by changing the incentives of power, because of the decentralized nature, they change the outcome of social systems and that's one of the most powerful and novel things DeFi can do.

From a technical perspective, what we're seeing is mostly the reimplementation of most traditional financial services: borrowing, lending, savings, exchanges, derivatives, futures and various forms of currency pegs.

While they're implemented in novel ways, the functions they are fulfilling, are basically the same. This will change accordingly as the technology evolves.

All technologies usually have as a starting point, a shadow of the previous technology model within, before they gradually evolve. This makes sense, as most of the financial services come from a centralized framework.

Over time, as the capabilities increase we're going to see more novel applications that expand the range of what is possible and start reaching outside of the box of centralized financial services and moving intro applications that are simply not possible with traditional financial services.

Another interesting feature of the entire ecosystem is "composability"; this is the reason that people have named DeFi as the "Lego of Money" or the "Lego of Finance". The idea behind this feature is that you can merge a series of matured infrastructure components and combine them together.

The ability to string together all these components and create a more complex financial service that is built out of these more specialized features is really interesting. This allows developers and users to create these novel financial services and also to increasingly reuse existing components.

The reusability of such features and components will basically improve the maturity of these components, as more users try to use them in

different ways and observe their vulnerabilities, weaknesses and problems overtime.

The "perfect fit" of composability is still an illusion. Interacting with smart contracts in any language other than JavaScript means you need to create your own library for each protocol, which increases complexity. Even the simplest things such as user balances and prices are usually grossly miscalculated, not to mention asset returns and more complicated metrics. Consequently, most wallets simply do not support complex DeFi derivatives or perpetually show inaccurate data.

As the maturity increases, the burden of reinventing the wheel and having to program everything from scratch is reduced, because that will allow the users to depend on these more mature contracts with the confidence that they can operate successfully and without security problems.

Thus, the focus can shift from feasibility to new novel applications that can be built.

This resonates with the current traditional centralized financial system that we are using, where most of the central, commercial & investments banks, along with any other financial services' company, is building and using their own proprietary software solutions with few sharing solutions optimized even in the age of the internet.

With DeFi, this step is skipped, as composability brings out this very interesting environment where you can share fundamental components and build those as a common infrastructure that is based on trustless technology and gradually mature it, which means that the pace of development and maturity grows much faster than in centralized finance.

We can argue that these are not novel applications, but this is definitely a novel architecture and mechanism for development.

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