LAPPEENRANTA-LAHTI UNIVERSITY OF TECHNOLOGY LUT
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Understanding DeFi ecosystem and how can it change or transform existing financial system

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ABSTRACT

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Understanding DeFi ecosystem and how can it change or transform existing financial system
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53 pages, 20 figure, 3 diagrams, 0 table, 0 appendix
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At current research work will be represented information about all main layers of technology and terms about decentralized finance services. It is necessary for creating theoretically structured base of knowledge, which was one of the goals of that work. In addition, current work represents people's opinion about DeFi, and represents statistical of knowledge about DeFi. Moreover, current work will represent models of current practical usage for DeFi, which is connected to centralized finance services. All of this represents main goals and thesis of this work.

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LIST OF SYMBOLS AND ABBREVIATIONS

DeFi	Decentralized Finance services
DEX	Decentralized exchanges
BTC	Bitcoin
ETH	Ethereum
BP	Business process
CeFi	Centralized Finance services

1. INTRODUCTION

1.1 Background

Centralized finance was a key of the finance system for a long time of human history. The first bank was created in 1407, for next 600 years humanity does not have other options for financial systems and their realization of the society. In 2009, humanity creates new opportunity for new financial system, based on peer-to-peer financial services, provided by Bitcoin Protocol [1]. It is creating new ideas and new realization as well. In 2021, blockchain platforms became more popular, and contain many different platforms, services and investors who became interesting in this kind of investing. One of the biggest invests in decentralized finance was made by Tesla, and make more than 1 billion dollars profit the organization. It is creating a huge interest between all investors worldwide, which increase value from Bitcoin from 20.000 dollars to 41.000 dollars. Moreover, became one of the most important invest for all world, and targeting the interest of all people in this theme and sphere.

Blockchain platforms create a new opportunity for the freer kind of financial system, which create a name for them – Decentralized finance system and service. The main difference between centralized and decentralized finance depends on renouncement from centralized moments like a bank or government. It is creating a possibility for all people who became a part of the decentralized financial service to be a part of the new financial system. Moreover, that also creates a new type of money transferring and become cheaper transferring worldwide because of less requirement money for all kinds of taxes. In addition, it is creating new way to collecting new type of money that do not have physical analog by using their computers. That process receives a name: “mining”. In April 2021, it’s becoming possible to mining Bitcoin, Ethereum and other kind of decentralized currency by using SSD and video card, that also create a deficit for that computer’s component. That also represented growing popularity of that phenomenon between big players on the investment market, and private players, who became interested in this.

Blockchain platforms and Decentralized finance services became one of the highest growing trends of modern life. Some government like Japan, also noticed that, and makes it possible way to pay at their country for some services and goods by official way. It happens at 2017 April 1st, and it makes Japan first country that approves that kind of finance. [2] That also increases value of Bitcoin at that moment of time. However, between all goods and positive way of DeFi, it also creates many challenges and dangers for humanity. Like it was mentioned before, decentralized finance services and platforms free from government and banking control, which creates an opportunity for terroristic organizations to safely transfer money, or buying illegal license, passports, etc. [3]

Analyze of the background was a big part of work, because it was important to collect all information about changes that happens to cryptocurrency as a part of DeFi, that makes it real, and about changes at

DeFi technologies. [4] A short shot of main cryptocurrency or platform history connected to DeFi will be represented in figure 1 below

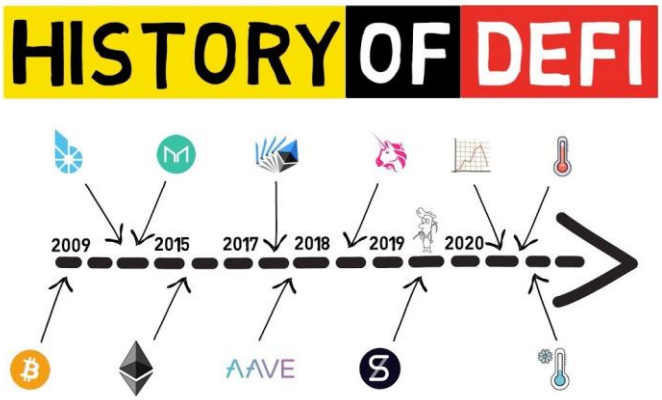

Fig. 1. History of DeFi. [5]

DeFi is one of the youngest part of technologies, but even with that, it already contains a big history behind it. Many people think that DeFi story begins in 2007, after first published work from Satosi Nakamoto about Bitcoin. However, it is not corrected, because Bitcoin became first cryptocurrency, it's true, but DeFi begin their own story much later. It has begun at 2013. Main points about DeFi history:

- November 2013 – Vitalik Buterin announces the Ethereum project in a white paper titled: "A next generation smart contract and decentralized application platform".
- December 2014 – MarketDAO is founded by Rune Christensen, Nikolay Musheigan, and others. It would eventually become one of the first decentralized autonomous organization to launch on the Ethereum blockchain.
- March 12, 2015 – Rune Christensen introduces eDollar, the precursor to Single-Collateral Dai, built on a testnet for the forthcoming Ethereum project.
- July 30, 2015 – The Ethereum blockchain launches, two years after publication of its white paper and one year after being crowdfunded through the sale of 60 million ETH for a total of 31,500 BTC. The launch makes trustless computing a reality and sets the scene for the creation and release of decentralized application (dapps).
- April 30, 2016 – A decentralized autonomous organization known simply as The DAO (no relation to MarketDAO) launches with a token sale on Ethereum. Slock.it, the software company behind the DAO, designed it to operate as a community-run investment fund, through its crowdfunding effort at launch, The DAO, the first of many DAOs to come, raises more than 11.5 million ETH worth 150 million dollars. The project's code was later exploited, eventually leading to its demise and the famed Ethereum hard fork, which resulted in two competing chains, Ethereum and Ethereum Classic.

- Middle of 2016 – OasisDEX (now oasis.app), the first decentralized exchange on Ethereum are launches.
- December 19, 2017 – Single-Collateral Dai (SCD) is launched on the Ethereum mainnet. Users of Dai Stablecoin System (now known as the Maker Protocol) are able to generate Dai tokens against ETH collateral. SCD provides proof of concept for the idea of a decentralized stablecoin.
- Beginning in 2018, the DeFi ecosystem starts to expand as more dapps launch on Ethereum:
- September 27, 2018 – Compound Finance launches. By 2020, Compound would popularize borrowing one digital assets against another locked as collateral, charging variable fees and offering rewards to liquidity providers based on supply and demand.
- November 2, 2018 – The Uniswap decentralized exchange (DEX) launches. Uniswap popularized the Automated Market Maker (AMM) model for DEXes in the crypto space, using liquidity pools and algorithms to set trading prices instead of the order books used by centralized exchanges. While numerous other DEXes, including Curve, SushiSwap, and Balancer, would gain traction, Uniswap would quickly become most popular.
- November 19, 2019 – Multi-collateral Dai (MCD) is launched, enabling anyone to generate Dai against any of the digital assets in the Maker Protocol's diversified portfolio. The launch sets the stage for the Maker foundation to accelerate its work towards its long-promised dissolution.
- September 11, 2020 – Total value locked (TVL) across all DeFi protocols exceeds 10 billion dollars for the first time.
- November 13, 2020 – A new milestone is reached for decentralized stablecoins: 1 billion Dai generated.
- December 1, 2020 – Ethereum 2.0 (Phase 0) launches, marking the first stage of an ambitious series of upgrades to enable DeFi to scale on the platform and improve the network's security, sustainability, efficiency, and decentralization. [6]

To represent more about increasing value from DeFi markets, and how much it's growing up for last several years, beginning from 2013 DeFi increased their popularity really high. With increasing popularity, more and more people begin to understand that market, and increased their value. Figure 2 below will be represented main achievements of DeFi on a moment of the end of 2020.

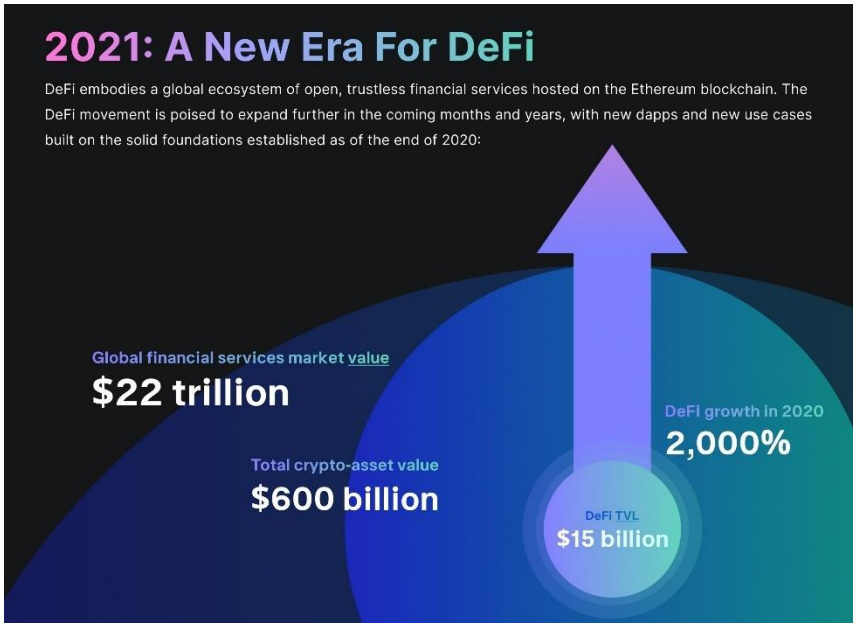

Fig. 2 – Main achievements of DeFi markets. [7]

Cryptocurrency and DeFi became one of the most important trend of investment sector. Highly increased numbers of value and profits, important new features and opportunity, and their possible pros already can be seen in society. It makes a comfortable requirement for DeFi, to become a part of everyday life at more official level, like government. Like it was described before, blockchain that a part of DeFi also a part of Industry 4.0, which was accepted by a lot of different governments and countries, it makes using decentralized finance combined, or even besides centralized finance – is just a matter of time. Current work will contain prediction-based example of possible usage and way of used, based on current usage DeFi, different opinions about that question from scientific society based on literature review. In addition to that, current work also will represent information about possible challenges, which can be created by DeFi.

As it was mentioned before, cryptocurrency and DeFi have a little bit different stories, even if some people think that 2008 and Bitcoin concept was a beginning. [8]

DeFi markets shows one of the fastest growing all investment markets. The phenomenon of this can be explained by interest investors to new segments, new technologies, and some features that provides by DeFi. One of the most important of them is decentralized mechanisms and anonymity. Currently, it is impossible to find out all investors interesting at this market, besides, they do not represent themselves publicly. Most non-anonymous people who connected to DeFi – is a developer and innovators of that segment, like Vitalik Buterin, who creates Ethereum. Controlling users of that market are impossible, because of anonymous registration, and absence of tracking assists the security of users and their private information. That makes impossible to collecting information about numbers of people connected to DeFi, that explains why the main part of the market analyzes can be based only on value and profit increased for years.

1.2 Goals and delimitations

The main goal of current research is creating a theoretical base for DeFi, based on literature and historical review. The next important goal of current research is searching a way for combining decentralized finance system and centralized finance system, and finding an example at available practice for current moment of time. Research will be providing information about technical instruments and tools of DeFi markets and ecosystem that already represented as a part of DeFi. And the last goal of that work is creating an understanding of knowledge about DeFi between different people via survey. For creating theoretically structured information about decentralized financial services, literature review was based on the main papers from developers of cryptocurrency market, the research work of other scientific and economical notes, papers and articles. Main delimitations of current research are fidelity of the points of view expressed at the current time. Something is changed, something was evolved at technical layer, etc. Current work will be represented actual information for moment of May 2021. Creating any kind of practical model is a hard option for DeFi for current moment of time, because of the importance of experiments, which required a change at any kind of social sphere. This can create a lot of trouble for people, who became a part of the experiment. For now, none of governments are not interested in experimenting with the financial system. In that case, main delimitations became an analyze of model, which were created before, but keep the actuality of the information represented at this kind of models. Delimitations for creating understanding of DeFi ecosystem were based on open information from different DeFi like penance. Most of all parts represented at the ecosystem of DeFi were checking possibility of usage and keeping the user comfortable.

1.3 Structure of the thesis

Short structure of the thesis will be provided in this section of work. Section 1 represented the main information about the background of DeFi, goals and delimitations of this work and information about the structure of the current master thesis. Section 2 contains the main information about DeFi, and thesis represented in current research. In addition, section 2 contains the main information about features and challenges that DeFi faced already, and can faced in future. Moreover, main pros and cons of DeFi also a part of third section. Section 3 will be representing information about the DeFi ecosystem and practical usage of DeFi, including information about the survey's result and models, which were a part of practical work, which became important for practical approval of the thesis. In addition, section 3 contains an overview of whole practical part of work and little discussion from the author about the main topic of the thesis. Section 4 represented discussion and summaries all information, which were provided through the work. Section 5 represented conclusion and summaries of all work, with focusing on main result of research work.

2. DEFI AS IT IS. FEATURES AND CHALLENGES

2.1 DeFi Explanation

Decentralized financial services, or DeFi - a general name for analogs of traditional financial instruments and system, which collected many different technologies for creating decentralized network architecture. That kind of architecture creates a new opportunity for DeFi as well, more about that will be described below. The heart of DeFi is a blockchain technology. All software that contains in DeFi is an open-source software that used smart-contract. For decentralized financial services, non-custodial protocols for lending against crypto assets, decentralized exchanges (DEX), prediction markets, and protocols for issuing synthetic assets and derivatives. The new important moment of DeFi became Tokens. Tokens create an opportunity for stablecoins. Currently, DeFi creates many different technologies; more about them will be at practical part of that work. In addition. Main features of DeFi will be represented in section 2.3.

Decentralized network architecture – is distributes workloads among several machines, instead of relying on a single central server. This trend has evolved from the rapid advancements of desktop and laptop computers, which now offer performance well beyond the needs of most business applications; meaning the extra compute power can be put to use for distributed processing. One of the main technologies in the middle of DeFi is a Blockchain, which is a part of Industry 4.0 [9].

Blockchain - a continuous sequential chain of blocks (linked list), built according to certain rules, containing information. The connection between blocks is ensured not only by the numbering, but also by the fact that each block contains its own hash-sum and hash-sum of the previous block. Changing any information in a block will change its hash sum. To comply with the rules for building a chain, changes in the hash sum will need to be written to the next block, which will cause changes in its own hash sum. In this case, the previous blocks are not affected. If the block to be changed is the last in the chain, then making changes may not require significant effort. However, if, after the block being changed, a continuation has already been formed, then the change can turn out to be an extremely time-consuming process. The fact is that usually copies of block chains are stored on many different computers independently of each other. Some important properties, that realized by Digital Ledger Technology (DLT) will be represented in figure 3 below.

Fig. 3 - Properties of Digital Ledger Technology (DLT) [10]

Open-source software – is a software that contains open source code. This kind of software creates opportunity for programs to be available for viewing, study and modification, which allows you to make sure that there are no vulnerabilities and unacceptable functions for the user (for example, hidden track of the program user). It makes possible for the improvement of the open program itself, use the code to create new programs and fix errors in them - through borrowing the source code, if the compatibility of licenses allows it, or through the study of the algorithms, data structures, technologies, techniques and interfaces used. Since the source code can significantly supplement the documentation, and in the absence of such, it serves as the document itself. [11]

Smart-contract – is a computer algorithm designed to generate, control and provide information about the ownership of something. Most often, we are talking about the use of blockchain technology. In a narrower sense, a smart contract is understood as a set of functions and data (current state) located at a specific address in the blockchain. [12]

Token - it is a unit of account, which is not a cryptocurrency, designed to represent a digital balance in a certain asset, in other words, performing the function of a “substitute for securities” in the digital world. Tokens are a ledger entry distributed on the blockchain. Token management is usually implemented using a smart contract, in which the values of the balances on the accounts of token holders are recorded, and which provides the ability to transfer tokens from one account to another. The token can be accessed through special applications that use electronic signature schemes. The bulk of the tokens that exist today are formed on the Blockchain protocol from Ethereum in accordance with the ERC-20 standard. Today there are many varieties of tokens, and their numbers increased every day. More about the main stages of that system will be represented in figure 4 below.

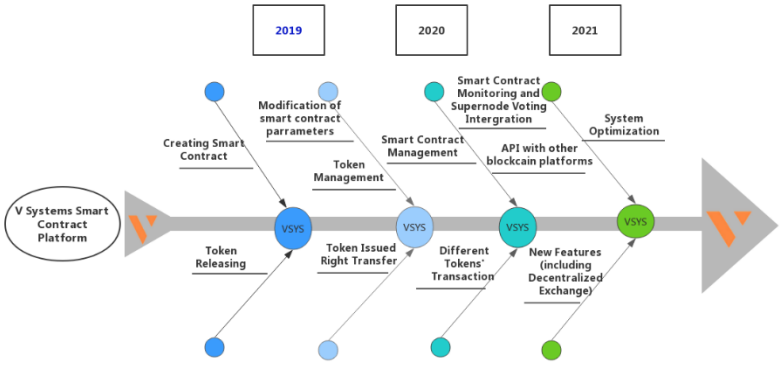

Fig. 4 - History of Token. [13]

ERC-20 – is a standard of token that used for all kinds of tokens that currently can be found at cryptocurrency markets. Firstly, Ethereum used this kind of tokens. By itself, ERC-20 – is a block chain-based asset that has their own value, and they can be sent and received, that open an opportunity to use token technology as an exchanged transfer between different cryptocurrency by adding a connection to currency traditional classical centralized financial system. Most of the time they are connected to dollars, and creates a new kind of technologies called Stablecoin. More about stablecoin will be represented at section 3. To create better understanding about working of ERC-20's interface, there is a figure 5 below that represented a point of working for ERC-20 [14] between different smart-contracts, that create an ability for exchange different kind of cryptocurrency, and connected them to centralized finance currency.

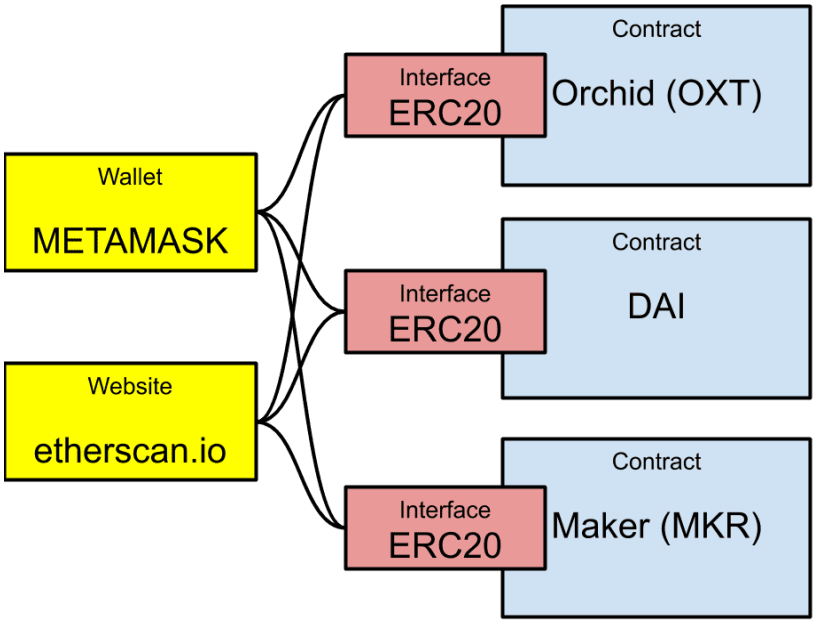

Fig. 5 - ERC-20 interface. [15]

Mining - activities to create new structures (usually we are talking about new blocks in the blockchain) to ensure the functioning of cryptocurrency platforms. For the creation of the next structural unit, a reward is usually provided at the expense of new (issued) cryptocurrency units and / or commission

fees. Usually, mining comes down to a series of calculations with an enumeration parameter to find a hash with given properties. Different cryptocurrencies use different calculation models, but they are always long enough in time to find an acceptable option and fast to test the solution found. Such computations are used by cryptocurrency algorithms to provide protection against re-spending of the same units, and rewards incentivize people to spend their computing power and keep networks running. Mining is not the only technology for creating new blocks and ensuring emission. Alternatives are forging (minting) and ICO [16]. Usually only one technology is used, but some cryptocurrencies use combinations of them. As an example, hash calculations are used, similar to calculations in the Bitcoin system, where the mining process consists in selecting such a value for a special additional parameter Nonce, which will allow you to get a hash, the numerical value of which will not be more than a certain specified number - Difficulty Target, which is the target for a given. An example of hashes for the same phrase, but with different values of the additional parameter. The last line in the example has the small hash value. The example will be represented in figure 6 below:

Fig. 6 - Example of hashes. [17]

In the Bitcoin system, the difficulty level is recalculated every 2016 blocks (approximately every 2 weeks). It increases or decreases depending on how much the creation time of this batch of blocks differs from 20160 minutes (2016 * 10). This mechanism ensures that blocks appear, on average every 10 minutes, regardless of the total power of all miners. In other cryptocurrencies, the recalculation of both

the hash and the target difficulty level can differ significantly. In many altcoins, the average block formation time is significantly lower, down to a few seconds.

Public space - One of the most important characteristics of blockchains is that they are public: anyone can see what has been published on one or get a copy for themselves. Blockchains are therefore in public space. Public space can be defined as the space created by the public set, the set of all data that can be publicly accessed.

Public space has no real structure or boundaries; it is compact and unchangeable is the accessibility. To test whether or not certain data is part of the public set, just try to capture it. Repeat with observers from different backgrounds. If everyone is successfully accessing the data, it is safe to say that it is in public space.

Public space is not a true metric space; since not all information is cryptographic, we cannot measure how difficult it would be to decrypt it. Everything in your local library is a good example, unless they are digitized and have factored their book collection. The connectedness of this space is an interesting debate, however.

Connectedness - Most of all data go into the public area separately from the rest of the public area, e.g. By the moment a new website goes live on the World Wide Web. However, it is extremely easy to hash such web data and combine it with other hashes in a Merkle tree. In this way, you can bring the entire WWW together, thereby connecting the corresponding data elements. This has the advantage that you can check: If you save a web page after removing it, you can prove that you have an authentic picture of the original by comparing its hash value with the Merkle root calculated previously. This process is known as the proof of existence, which can be described topologically as the connection of two data elements in the public record.

Users can do this for the price of a bitcoin transaction fee by including the web hash. It is then hashed along with the other Bitcoin transactions in this block and connected to the entire blockchain. You can then calculate the difficulty from the original data to the top hash of the last block that forms the boundaries of a connected metric subspace.

Crypto space - People will inevitably want to back up their data on more than one blockchain in a fail-safe manner. This effectively ties their records together to form a single metric subspace of the public domain. There are several advantages to hashing one blockchain into another. The combined effect is that many blockchains are put together.

Proof of existence will soon become standard practice. With technologies like Factom, it is possible to quickly combine thousands of entries hashes into a single Merkle root without relying on a central authority, making proof of existence even cheaper and more reliable. It's as easy as using a Bitcoin wallet, and the cost is negligible compared to the rewards. The end result is that most of the data in the public space is connected. The little information that is not hashed into a Merkle tree alone is easy for

intellectuals or ideologues to deal with. We will call the topological space created from this data set the crypto space in honor of the community willing to achieve this.

Predictions - Hashing data is easy, so the crypto space is growing much faster than the public space and they will eventually converge. How quickly public data get into the cryptoset depends on its connectivity, that is, on its tendency to use it or to use it as proof of existence. This mainly depends on how likely it is that the authenticity of data will be contested. Financial reports like loans are better connected than what you dreamed of last night, for example.

Another important factor in data connectivity is authenticity. Authenticity refers to the likelihood of data being authentic, a competition dominated by blockchain technology. The authenticity of a blockchain is a factor in the current difficulty of duplicating a transaction (the number of active miners or minters) and the health of its peer-to-peer network (the number of full nodes).

Like many emerging or "controversial" scientific theories, these hypotheses will be difficult to test. We will have to rely on simulations and observations for a long time, but this is not uncommon in the hard science. We can predict astronomical events, climate change, and even the evolution of species.

The crypto space is becoming just as important as the crypto industry itself, one of the structures on which society is built. Its general form is still in the making, but we will soon know what it looks like and it will be the subject of intense study.

Last important part of DeFi is a cryptocurrency and crypto space. It is not a technology by itself, but it became a main value that can be generated by DeFi. It creates a needing to providing extra information about cryptocurrency. In addition, cryptocurrency and their history provide a spotlight for some old features of crypto space and DeFi.

Cryptocurrency - is a type of digital currency, the accounting of internal accounting units, of which is provided by a decentralized payment system (there is no internal or external administrator or any of its analogs), operating in a fully automatic mode. By itself, the cryptocurrency does not have any special material or electronic form - it is just a number that denotes the amount of data of payment units, which is recorded in the corresponding position of the information packet of the data transfer protocol and is often not even encrypted, like all other information about transactions between system addresses.

The term “Cryptocurrency” begins to be used after the publication of an article about the Bitcoin system “Crypto currency”, published in 2011 in Forbes magazine. At the same time, the creator of Bitcoin, and many other authors, used the term "electronic cash".

Cryptographic methods - are involved in the mechanisms for generating an address and verifying authority for operations with it (a digital signature based on a public key system, the order is available exclusively to the owner of the secret key corresponding to this address), as well as the formation of a transaction package and its relationship with other packages (sequential hashing, which makes it impossible to change information about the amount of cryptocurrency). At the same time, the system does not have any information about the owners of addresses or the fact of creating an address (the

address can be generated completely autonomously, even without connecting to the network and not reporting anything to the network in the future). In addition, there is no mechanism to make sure that the recipient's address really exists or that the access key to it is not lost. The lack of information about the owner is the basis (but not limited to) the anonymity of the participants in the transactions. In terms of their economic conditions and consequences, cryptocurrency payments are more similar to cash payments than non-cash payment options, although cryptocurrencies are developed primarily for distance purchases (for example, over the Internet).

Payment (transfer of cryptocurrency between addresses) occurs without intermediaries and is irreversible - there is no mechanism for canceling a confirmed operation, including cases when the payment was sent to an erroneous or non-existent address, or when the transaction was made by third parties who became aware of the private key. No one can block (arrest) a cryptocurrency either at a specific address or in general, even temporarily, it is always at the disposal of the owner of the private key to this address. True, multi-signature technology allows you to voluntarily engage a third party (arbitrator) and implement "reversible transactions" that can occur against the will of one of the parties. More complex conditions (smart contracts) are implemented using special scripting languages. The problem of double spending inherent in electronic payments is solved by using such technologies as blockchain, directed acyclic graph, consensus ledger and other technologies. Information about transactions is usually not encrypted and is available in clear text without registration in the system

The rules for the formation of a new amount of cryptocurrency (emission) are initially established by the protocol. Usually they are of a lottery nature, with various factors influencing the probability of winning - the speed of solving the set problem (mining) or the amount of ownership of the set resource (forging). In some cases, part or all of the declared volume of the cryptocurrency is initially formed and distributed by the organizers by subscription (ICO). Usually only one technology is used, but some cryptocurrencies use combinations of them. Discussions are underway about the economic essence and legal status of cryptocurrencies. In different countries, cryptocurrencies are considered as a means of payment, a specific product, an electronic asset, may have restrictions in circulation (for example, a ban on transactions with them for banking institutions).

Current part of the work represented basic information about the main topic theme. Creating understanding of basis mechanisms of DeFi is an important part of the topic, because currently, many people know about cryptocurrency and DeFi as itself, but most of the time that understanding are mediocre, and not suitable for creating understanding of possible usage and profit from using DeFi. That thesis will be proofed by practical part at section 3. Creating understanding of main mechanisms is important, because if humanity will have better knowledge of that topic, it increased a possibility to make governments and countries interested in combining or connecting centralized finance system and DeFi, because of creating a huge amount of opportunities. Some of these opportunities will be described at practical part of the work, together with possible challenges, that's already known for DeFi. More

about that can be found at current section. New technologies coming into our society as fast as it never was before. Most of technologies were not government creation, but humanity. Whole 20th century fulfill with stories of different people from different culture and country by creating something new, which became a part of everyday life. Before it was computers, and software, now its new ecosystems of technologies that creates new ways of creating and providing goods, services, etc. DeFi has the same case of that evolving, but because of high connection to investment sector, its popular among investors, and other high rate players in that market, and markets that supports investment sector. In addition, DeFi already shown a result of work and knowledge of the common people. One of the most famous examples is Vitalik Buterin, creator of Ethereum, cryptocurrency that was first which used token technologies, and open them for all people connected to DeFi, which led that technologies to creating stablecoin, and makes opportunity for connected decentralized currency in a centralized currency like the dollar. The result of that technology can be easily understood and analyze. Investing into stablecoin became a new possible way of creating passive profit, with the more comfortable rate, than banks can provide. For now, 4.6% can be created every month because of keeping some stablecoins. Similar results can be created by using banking passive profit's offers for a year. It makes advantages for common people who interested to become investors, but who don't sure of their knowledge and skills, because centralized financial systems make passive profit one of the most non-dangerous way of investment. However, because of the connection to centralized finance currency, stablecoin and token technologies provide similar level of safety for users of that kind of passive profit.

To summarize all information, DeFi is a concept that connected to a huge amount of different technologies that makes possible for this concept to exist. The amount of this technology, evolving and current way of progressive makes DeFi highly growing up trend, which became more and more popular between all people and humanity. Blockchain, one of the most important technologies that used by decentralized finance, and its technology is a part of Industry 4.0. Industry 4.0 is a concept of fourth industrial revolution, which supposed to change the industry in a huge way, as 3 industrial revolution did it before. Industry 4.0 became one of the most special industry revolutions, because, besides all other of them – this one is digital.

2.2 Early DeFi

Decentralized financial services, or DeFi - a general name for analogs of traditional financial instruments, implemented in a decentralized architecture. These services are publicly available, open source projects and most often based on smart contracts. Decentralized financial services include non-custodial protocols for lending against crypto assets, decentralized exchanges (DEX) [18], prediction markets, and synthetic asset and derivative issuance protocols. Financial instruments that exist on the

same blockchain platform can be linked together in various ways due to software compatibility of smart contracts and standardization of tokens.

One of the very first services of this kind was the MakerDAO project, launched in 2017 and allowing people to get a loan in the Dai stablecoin secured by the Ethereum cryptocurrency. As of June 2020, the most popular decentralized financial service is the Compound lending platform. In February 2020, the total amount of digital assets held by decentralized financial services exceeded 1 billion dollars for the first time. In April 2021, the volume of liquidity in this sector exceeded 100 billion dollars. The largest players globally are MakerDAO, Compound Finance and Uniswap.

Growing up interest to investment into cryptocurrency begins in April 1, in Japan, because it was a first country, that approved Bitcoin (one of the most popular, and expensive cryptocurrencies nowadays) on government level. That makes Japan first country in the world, which begin to combine centralized and decentralized finance. This situation makes Bitcoin more expensive, and interesting for investors on investment way. Japan's government noticed growing up interest from investors, and on 2018 July 3rd, Bitcoin was disapproved as possible payments at country. However, Japan did not close all kinds of interest to DeFi. Bitcoin became an investment tool officially, because of hacker attack on DeFi exchange platforms called Coincheck. The consequences of this attack have been evaluated in 500 million dollars to all cryptocurrency keepers, who worked with that. That creates a new kind of challenge to all people who was interested in to block chain technology and DeFi by itself. Japan does not have a suitable law for controlling and keeping people from situations like this before. After approving cryptocurrency as an investment tool, people have more safety, because it connected all cryptocurrency to Investment's law and limitations, that fully similar to common investment. Currently, many different countries approved Bitcoin and other cryptocurrency as a playable unit, like America. The European Union also approved cryptocurrency as fiat currencies that can be payment for services, using at exchanges, and they are tax-free. Most of all countries also did not make new law for cryptocurrency, and do not control them, because it is impossible. That also can create challenges for possible fraud and other scum scheme. For opposite example, Russian Federation does not approve cryptocurrency as an investment tool or currencies at all. For this reason, Russia does not have any kind of law for controlling this kind of market, but from the other side, it is not prohibited, and people from Russian also can invest at cryptocurrency, but it makes people unsafe from any kind of fraud. Anyway, most of all Russian investors used Japan or American platforms, which have a control from the law. However, many counties control it via connected cryptocurrency to more habitual currencies that can protect people from different kind of possible fraud like a hacker's attack, but it has not controlled cryptocurrency from investment fraud, like creating fake cryptocurrency. More information about that will be described in the current section of work. However, more and more counties create a law and plans for growing and improving they digital economy. Japan currently the only one country that faces some hard challenges in a face of cryptocurrency. They still are improving legislation for cryptocurrency, possible ways to

control it and implementing them as a tool that can be a part of the future economic system that can be better that classical centralized finance.

For now, it is hard to predict the possible practical way of transformation between DeFi and centralized financial systems, because of it, current work collecting information about practical combination between DeFi and CeFi, which available for current moment of time. In addition, current work will provide predictive information about DeFi based on current people's thoughts and opinions. The main thesis of current work – It is possible to combine DeFi and CeFi, even with usage current technological.

2.3 Main features of DeFi

DeFi as a part of technologies provides a many functional features as technology. Some of these features create an understanding of possible cons and pros, which will be represented in the current section research. Some of these features create a challenge and opportunity for DeFi and some possible problems will be described in this part of the work, with representing main information about the main features for creating a deeper understanding of that part of the work. This is important for other parts of the thesis, which can provide connection from current features and predictions about possible changing, combining or transform of the current centralized [19].

This point of practical work will contain most important features of DeFi, and explained them with short terms describing.

Decentralized - As one of the most important aspects for cryptocurrency. The codes are not written by the employees of institutions or have institutions managing them. Instead, the code is written via smart contract and they deploy it on the blockchain. Anyone can write these smart contracts and nobody has control, allowing complete decentralization.

Transparent - Blockchain system allows users to build a strong bond of trust on the platform. The transparency of the code on the blockchain allows everyone to see and audit. Now you may wonder if all transactions are transparent, then aren't the user's privacy in danger? While all transactions are transparent, the user's identity is made anonymous using code.

Global - Perhaps, one of the most exciting features of the system. This allows to have access to the same DeFi services globally. Technically speaking, this allows anyone with internet access to have a wide array of financial services. With DeFi, anyone with an internet connection and a smartphone can gain access to financial services. Due to its permissions nature, users do not have geographical restrictions. So even when they block IP addresses, users can still access the network remotely via VPN. In contrast, most traditional financial services limited is geography. (E.g., a North Korean citizen would not be able to open a bank account in HK) [20]. Apart from geographic limitation, traditional financial services also favor the wealthier population. Clients with more assets typically enjoy better rates and have access to

wealth management tools. DeFi minimizes the inequality and users can enjoy similar services regardless of size.

Permissionless - Is another important feature of the DeFi platform. This allows anyone to participate, create, and use DeFi apps. Users do not have to interact with a financial institution and can instead interact directly with the smart contracts from their smart wallets.

Flexible - This is one of the reasons why more and more people are starting to use DeFi services. If a user does not like the interface of a dApp, they can easily use another interface or even build their own. This allows users to choose and alter the DeFi services best fittingly to their own needs.

Interoperable - A feature on the DeFi platform that allows applications to be built by combining other DeFi products. Hence a wide variety of applications or products can be put together to create.

2.4 DeFi pros

Understanding of the main features of DeFi creates an ability to better understand and analyze them main advantages and disadvantages. The current point will be explaining main pros from using DeFi:

- Safety from printing money – Currently, if any kind of government has financial trouble, they begin to print new money, that increased their numbers at market, and as consequences, makes them cheaper economic rules of supply and demand. Besides, it is increased value and importance of other goods, like gold, stock, and cryptocurrency as well [21].
- Crisis – Classical Centralized Finance system for a lot of years of her lifecycle meet with crisis a lot of times. One of the biggest examples of that phenomenon is a Crisis of 2008, that began with the US mortgage crisis, bank failures and falling stock prices. It is creating an understanding of humans, that centralized finance can be not so ideal, that creates a needing in new finance system, or at least new way of controlling finance system. Digital economic and DeFi by itself creates an opportunity to be safer from the crisis. However, most of all transactions at DeFi still connected to Centralized finance (For example, some of cryptocurrency that take a part at transactions and exchanges connected to centralized currencies like dollar), but from the other side, all popular cryptocurrency creates their capitalization based on a lot of different currencies, that makes it easier to be safe, even if any kind of currencies will be depreciate [22].
- Investment – Currently, becoming a new player of investment games is almost impossible for people, because it requires a great capital and depends on the non-stop analyzing market, besides the people that already were players don’t have issues with that, because they also have much more information in front of new players. Besides, cryptocurrency creates new ways of investment and creates an opportunity for new players, to find their own cryptocurrency, that will be more comfortable for new players. Increased interest to this market also helped new players, to increase their own capitals.

- Mining - activities to create new structures (usually we are talking about new blocks in the blockchain) to ensure the functioning of cryptocurrency platforms. For the creation of the next structural unit, a reward is usually provided for at the expense of new (issued) cryptocurrency units and / or commission fees. Usually, mining comes down to a series of calculations with an enumeration parameter to find a hash with specified properties. [23]
- Growing – as it was mentioned before, market of cryptocurrency increased and developing every day. That provides some important pros for that market like: highly increasing capitalization of different cryptocurrency, stimulate to create new cryptocurrencies and develop that market faster than any other one market, because even new people that became interested in this opportunity can use or even created their own cryptocurrencies or DeFi platforms. Figure 7 will represent a growing of that market for 3 months, that also wasn't most successful in DeFi market.

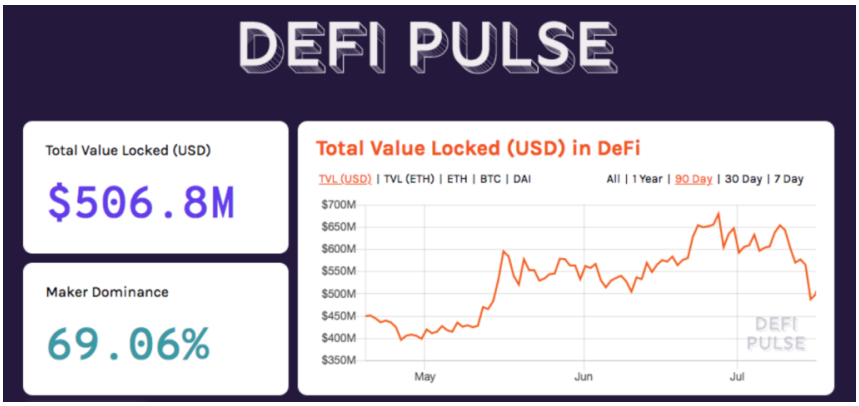

Fig. 7 – DeFi market share for time from April to July 2019. [24]

Other important benefits from usage DeFi depends on using DeFi Smart Layer (DSL). More about that opportunity created by DeFi will be represented below by providing benefits that created by DSL and its structure.

Instadapp DeFi Smart Accounts (DSA) are one of the proven DeFi systems with more than 18,000 accounts created, $ 1 billion in TVL, $ 3 billion in flash loans and $ 1 billion in swaps performed through DSAs. Many of DeFi'es most innovative features, including the first iteration of Flash Loans and Instant Loan Swaps, were first developed on Instadapp. [25]

With the DeFi protocols explosion and the next wave of users and developers, the time has come to upgrade DSA to an open, intelligent layer that aggregates across protocols to make DeFi much easier to develop.

By tokenizing and opening up governance, DeFi aim to incentivize collaboration and encourage participation of the three main groups of stakeholders - users, developers, and DeFi protocols. Infrastructure layers of DSL will be represented in Figure 8 below:

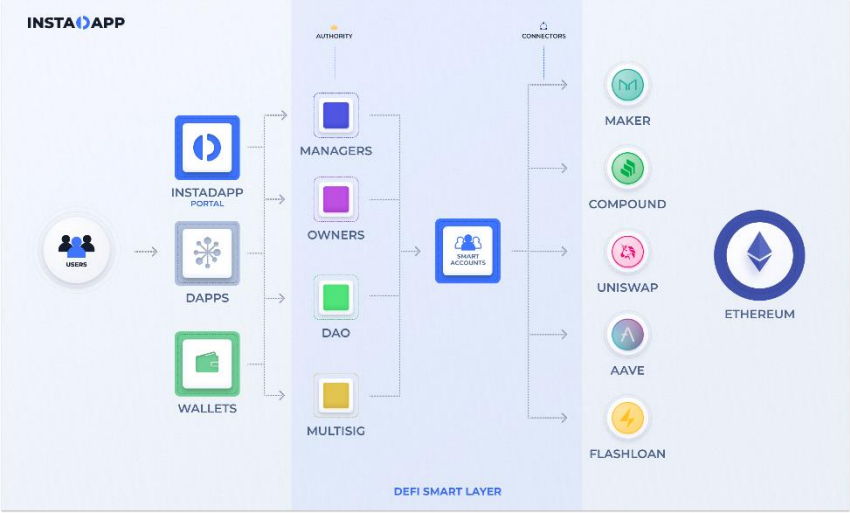

Fig. 8 - Infrastructure layers of DSL. [25]

DeFi Smart Layer (DSL) is a financial infrastructure layer for the decentralized Internet to make it easier for all users and developers to access and maximize DeFi. DSL consists of a smart contract account standard, composable connectors for basic DeFi protocols and an authorization framework that enables extremely modular authorizations.

Smart Accounts, which are updateable contract accounts that users trust. This is where assets are stored and DSAs can execute compound transactions across connectors.

Connectors, standardized modules that interact with the various protocols, make important actions accessible to smart accounts. Developers can create complex DeFi transactions across protocols using pure JavaScript.

Permission that allows users to designate guards, managers, or automation bots to manage their DSA. Authorizations can be modular down to the connector level. For example, users can allow certain addresses to rebalance their assets to minimize interest payments or maximize returns, but nothing else. Users access DSL through multiple channels, including the Instadapp portal, third-party dapps, and wallets / UIs that use smart accounts.

Benefits from usage DSL was not describe and represented before. Main of them will be represented infigure 9 below:

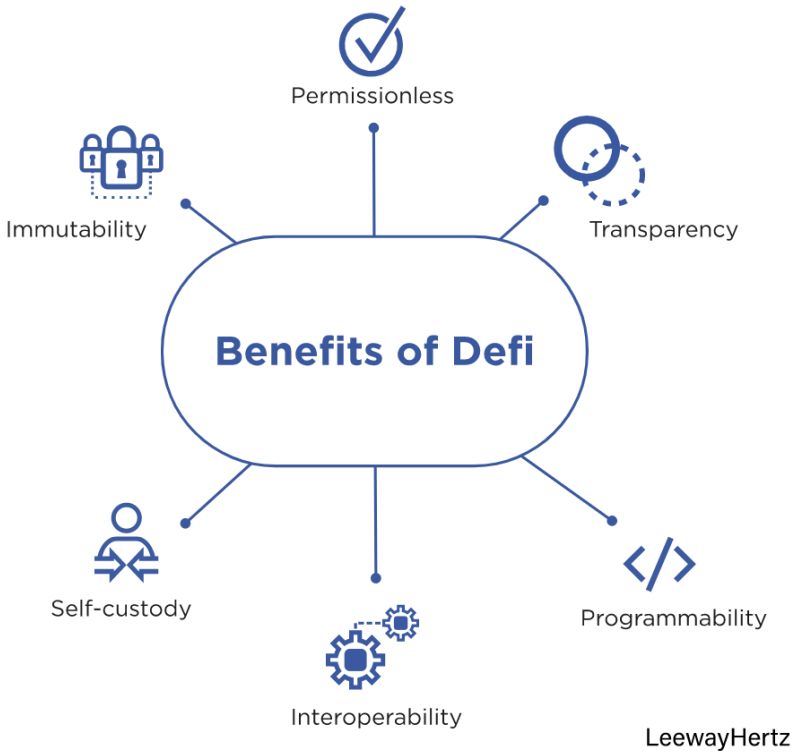

Fig. 9 - Benefits of DeFi connected to DSL. [26]

Main benefits of DSL are Authority framework DSL aims to aggregate across DeFi protocols and abstract the complexity for users and developers. This creates a number of important benefits for DeFi development, including:

Instant JavaScript access to all DeFi functionality including building use cases across protocols without the need to deploy smart contracts.

Easily develop key features like social recovery and customized permissions.

Aggregate liquidity across smart accounts and basic logs to use for flash loans and grow the L2 environment.

Build new revenue streams and networks by automating or helping users delegate their DeFi activities and add their fee structures.

All DSL transactions are secure by default as no new smart contracts are provided, which greatly simplifies and removes attack methods.

By removing the key technical, security, and upgradeable barriers to building DeFi, it focused to make DSL the easiest place for mainstream developers to begin this journey.

2.5 DeFi cons

DeFi also contains some cons that was mentioned before in the main part of current research work, main of them will be explained at this point of work:

- Anonymous transfer – current point can be verified as pros, but unfortunately it creates a high possibility for people to invest in illegal services. Currently, Darknet used cryptocurrency, especially Bitcoin as main value between many different illegal platforms, that contain illegal services, like drug-selling, fake id and passports of different countries, and even creates the possibility of investment into terroristic organization. However, countries that approve cryptocurrency are working and improving laws and types of control, for that kind of cons because of dangerous of that.
- Internet connection – for current moment of time, the internet is used by 59% of all humanity, that means, that 41% of all human cannot use DeFi or investment into it. [27] It especially touches people from African countries, for example Burundi (One of African countries) contain only 2.7% internet users between all people whom living there.
- Hackers attack – as it was mentioned before, via Japan example, it is possible for hackers to hack DeFi platforms and stealing money from their own users. The huge number of platforms has already increased their protection to keep users safer. Still, it is possible to hacking DeFi platforms.
- Scalability – current full capacity of DeFi takes a huge amount of time. For example, Ethereum at full capacity cam process 20 transactions per second, besides centralized finance works with millions of them all over the world [28]. However, important to provide, that DeFi makes all transactions much faster, if we will used worldwide transfers (For example, transfer from Russian bank to American can take 1-5 hours, besides DeFi will finished transfer for 1-15 seconds that depends on numbers of transaction), for avoiding that issue, people create a different kind of transaction cryptocurrency and tokens.
- Fake cryptocurrency and tokens – as it was mentioned before, many people can create their own crypts and tokens that creates possibility to make fake crypts. The first example of that, happened on 2021 May 5th. A blogger named Andre Louise create his own cryptocurrency as a joke, and called it SCUM. He does not mean to lie to people, because he was sure, no one will buy anything that called in that way. After a week of creating and advertisement his own development – capitalization of SCUM became 75 million dollars. Author controlled 10% of all SCUM tokens. However, after that, he apologies to all people who spent their time into it, because he does not expect so high interest to his joke. Currently, he is working and keep developing his own cryptocurrency that still have 5 million dollars capitalization. Currently, he is working and keep developing his own cryptocurrency that still have 5 million dollar capitalization. However, important to keep in mind that if something like that happened in Russia, for example, it would be fraud without possibility to judge swindler. Current cons are mew one. Before an accident that was described before, there wasn't something like that. That affected some of the real token cryptocurrency rate as well [29].

2.6 DeFi challenges

To summarize all information that was used before, DeFi is a concept that already has proof-of-concept, which exist in real life. Humanity already creates one of the way of usage DeFi at some segments of social or economic life. Current chapter contains the main information about pros and cons, and features of DeFi. Current part of the work will summarize all information represented before.

One of the most popular and the trendiest usages of DeFi was noticed in investment. All other uses are not available for current moment of time. That fact makes current work more applied, because of the narrow ability to analyze practical use cases, or the results of ongoing experiments, since this topic is closely tied to centralize financial systems, and various experiments are limited. That creates an importance of collecting theoretical examples, current practical usage, and create a prediction based on features that already released or provide white paper published concept.

Main represented features already were shown at current chapter and it's possible to create an understanding of the connection between features and pros and cons. For example, one challenge that was created by DeFi is an anonymous mode for all users without ability to tracking all users, because it makes a possible to making an anonymous investment for terroristic organizations, and buying different kind of illegal products. That challenge was noticed by governments, more about that was mentioned before in current section research.

Another dangerous challenge, which became one of the newest challenges at DeFi sphere, it is fake cryptocurrency. Before, creating any cryptocurrency takes a lot of time, investment and development. After creating tokens, which is simple to create, makes this challenge rough one, because for now, DeFi are not represented a tool for users security from it. Besides, DeFi platforms can focus on tracking new cryptocurrency, and don’t add any currency that can look suspicious. It is a possible non-automated answer for challenge like that. This one challenge is similar to hacking-attack, but harder to solve at technical plan. From 2018, there was zero successful hacking-attack on DeFi, which was damageable to users. Nevertheless, creating fake cryptocurrency can become a dangerous challenge, because the only one fake cryptocurrency that was recorded in history – makes capitalization of it equal to 70 million dollars. Author of that cryptocurrency controlled 10% of all of that cryptocurrency. The author was not interested to fraud people, who became interested to his cryptocurrency, but after accepting a fact, that this is not serious token, capitalization faster fallen down to 5 million dollars. After all of this, author realize what he is done, and he begins to keep working with his cryptocurrency.

Another dangerous challenge, which became one of the newest challenges at DeFi sphere, it is fake cryptocurrency. Before, creating any cryptocurrency takes a lot of time, investment and development. After creating tokens, which makes it process easier. Tokens do not require any kind of specific skills and knowledge. Creating and advertisement new cryptocurrency is a too simple process, and it need to have more technical based tools for controlling fake cryptocurrency and normal cryptocurrency.

Hacking-attack also will be a problem for DeFi and cryptocurrency as well, because anything fully digital has this kind of challenge. However, it is possible to notice, that this challenge controlled by different kind of business and organization. Current digital security became an important part of IT-segment and begin high-qualified work for specialist of that sector. This challenge will be keeping accomplished like one of another IT challenges. The current security system that has created for DeFi already provides a comfortable level of security for users, which can be proofed by growing up capitalization of DeFi market. Important to focused warning to main and more new moments of that kind of manipulation. While the advantages of decentralized financial services are the availability and minimization of counterparty risk, their use carries new risks due to possible market manipulations and errors in the code of smart contracts. Example of that happened in February 2020, the bZx lending platform lost $ 350,000, or about 2% of its total assets, due to the actions of an attacker. [30] In March 2020, due to a sharp market crash and an overload of the Ethereum network, many liquidators in the Maker system were unable to perform their functions, which allowed some users to buy back

3. DEFI ECOSYSTEM AND CEFI COMBINATION.

3.1 DeFi ecosystem

DeFi ecosystem became a large ecosystem that contains into itself many different platforms and tools between several areas. Some of the tools are used for multiply areas, and these tools based on tokens tools. Tokens are based on smart contract ERC20 that was created based on Ethereum tokens. Besides the common kind of cryptocurrency, smart contract ERC20 easier to deploy, and current standard solves some problems that were a part of another kind of cryptocurrency, block chain-based marketplaces and crypto-wallets need single and standardized set of commands. Moreover, tokens can use different rules based on different tokens that make them more comfortable in usage, and allow to be used in different areas at the same time. For a moment of May 2021, main areas of DeFi ecosystem cover next areas:

Wallet and Asset Management - Wallets and asset management applications allow individuals and businesses to safely secure their assets. ERC-20 compatible wallets are required, as it means they can be connected to the wider DeFi ecosystem through a variety of asset management tools.

Compliance and Identity - Compliance and identity solutions are needed to implement rules and regulations on the blockchain. Standard ERC-20 tokens do not provide this functionality. Compliance and identity protocols are therefore imperative to enable the legal transfer of tokenized private market securities.

Prediction Market - Prediction markets are exchange-traded markets created to trade the outcome of events. The market prices can indicate what the crowd thinks the probability of the event is.

Decentralized prediction markets can be created on any type of bet. Users can currently place no limit bets on sports, economics, world events and many other markets. [31]

Assets Tokenization - asset tokenization platforms enable companies to dematerialize assets on a decentralized blockchain and digitally subscribe eligible investors. They enforce the compliance, onboard the investor and provide an interface for investors and issuers to manage their assets. Ultimately, through the digitization of securities, they improve the accessibility to more and new types of investors.

Payments - Payment providers allow for the secure, scalable and instant transactions for individuals and institutions on a decentralized network.

Lending - Lending applications remove intermediaries involved in this traditional banking function. They provide the ability to secure loans and allow individuals and companies to collateralize their assets and earn interest.

Marketplaces and Liquidity - These actors provide buy-side users for the ecosystem. In this interoperable world, they connect to the ecosystem to provide new opportunities and improve the levels of liquidity for their audiences.

Infrastructure - These tools provide seamless integrations with blockchains to allow web 3.0 developers to easily build on top of. They include oracles that provide secure external reference data to smart contracts and cross-blockchain networks that connect specialized blockchains and enable interoperability.

Stablecoins - reserve assets that can be bought and sold through algorithmic mechanisms. They can be backed by FIAT currencies [32] or commodities such as gold but they live on a blockchain and thus reap the benefits of privacy and efficiency of blockchain-based transactions. They were created to mitigate the volatility of cryptocurrencies.

Ledger protocols - These are simply the blockchain or Distributed Ledger Technology (DLT) protocols currently supported by EBSI. Each protocol brings specific features, levels of interoperability, and performance in support of the EBP Mission and Vision, which EBSI enables. These are the base building bricks of blockchain infrastructure.

Interledger protocol - is a blockchain protocol used for payments across different payment networks. The open-source protocol connects ledgers from two or more different banks, thereby removing intermediaries and central authorities from the system.

Platforms for Managing Insurance investment - solution provides the rich functionality and the flexibility needed to professionally manage financial assets, generate investments' accounting entries and meet regulatory requirements. It has become the preferred choice in its category with advanced functionality to automate processes and comply with the company and country's policies. It is the next level in investment management software that delivers all the needed capabilities for Insurance Companies to manage their assets.

Biggest tools and platforms that worked at current ecosystem will be represented in Figure 10 below:

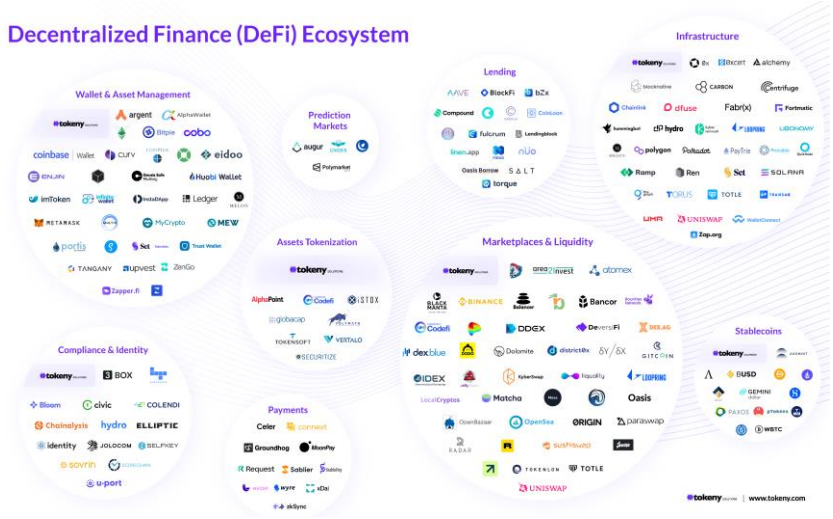

Fig. 10 - DeFi ecosystem from platform point of view. [33]

Another important part of technical aspects of DeFi ecosystem is layers. Different layers are responsible for a different part of DeFi. Main of these layers will be explained below:

Settlement Layer: The settlement layer is also referred to as Layer 0 because it is the base layer upon which other DeFi transactions are built. It consists of a public blockchain and its native digital currency or cryptocurrency. Transactions occurring on DeFi apps are settled using this currency, which may or may not be traded in public markets. One example of the settlement layer is Ethereum and its native token ether (ETH), which is traded at crypto exchanges. The settlement layer can also have tokenized versions of assets, such as the U.S. dollar, or tokens that are digital representations of real-world assets. For example, a real estate token might represent ownership of a parcel of land.

Protocol Layer: Software protocols are standards and rules written to govern specific tasks or activities. In parallel with real-world institutions, this would be a set of principles and rules that all participants in a given industry have agreed to follow as a prerequisite to operating in the industry. DeFi protocols are interoperable, meaning they can be used by multiple entities at the same time to build a service or an app. The protocol layer provides liquidity to the DeFi ecosystem. One example of a DeFi protocol is Synthetix, a derivatives trading protocol on Ethereum. It is used to create synthetic versions of real-world assets. [34]

Application Layer: As the name indicates, the application layer is where consumer-facing applications reside. These applications abstract underlying protocols into simple consumer-focused services. Most common applications in the cryptocurrency ecosystem, such as decentralized cryptocurrency exchanges and lending services, reside on this layer.

Aggregation Layer: The aggregation layer consists of aggregators who connect various applications from the previous layer to provide a service to investors. For example, they might enable the seamless

transfer of money between different financial instruments to maximize returns. In a physical setup, such trading actions would entail considerable paperwork and coordination. However, a technology-based framework should smoothen the investing rails, allowing traders to switch between different services quickly. Lending and borrowing is an example of a service that exists on the aggregation layer. Banking services and crypto wallets are other examples. More practical example of layers will be represented in figure 11 below based on example of ETH layers:

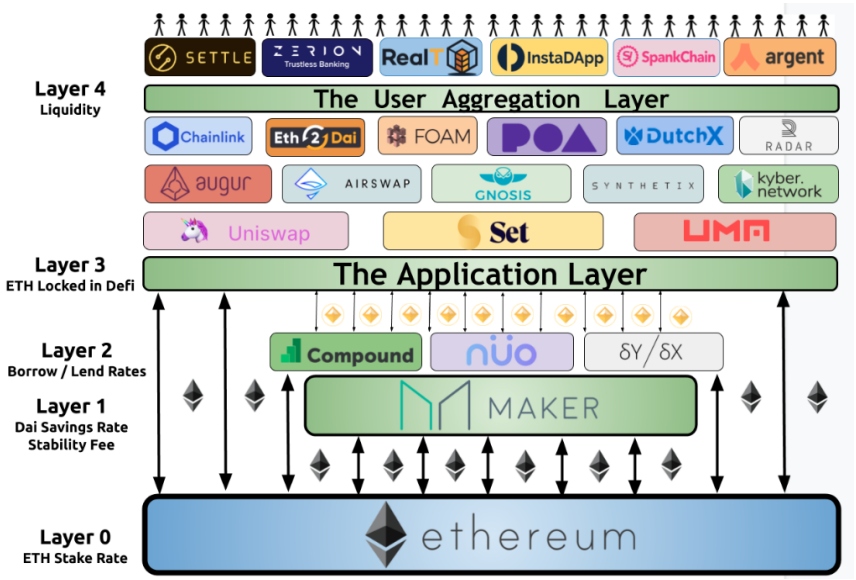

Figure 11 - ETH based example of layers. [35]

All of these layers are part of technical ecosystems of DeFi, and one of the most important parts of these layers is protocol layers. Defy circulate many different protocols inside of it. Protocols provides main opportunity and function that important for workable to DeFi and cryptocurrency as well [36], because they are one of the most important part for most of all technologies. Understanding of protocols was created before at the current. That challenge was noticed by governments, more about that was mentioned before in current section research work. However, the protocols have another important mentioned feature. It is lending. Lending of protocols one of the most important part of current research work, because they are creating an availability of Stablecoins protocols and their connection to the traditional centralized finance system. To classify DeFi lending protocols it important to decompose current protocols between degrees to create an understanding what features will be a part of the protocol for different lending. The lesser degree of DeFi will be closer and more connected to centralized financial system. All next degree will be more and more decentralized. Currently, the last possible degree at number six were represented as possible feature of Ethereum 2.0 on protocol layer. However, for current moment of time there is no examples of DeFi platforms or services that can be attributed to that degree. To providing that decomposition, it is necessary to using frameworks. More about it will be represented in Figure 12 below:

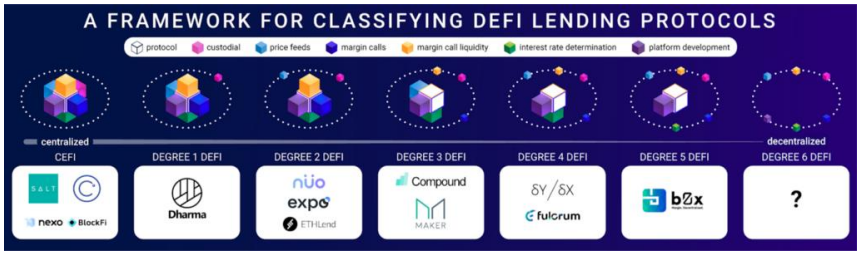

Figure 12 - Framework for classifying DeFi lending protocols. [37]

For now, DeFi already has high connected and combining ecosystems that work with different technologies, most of them based on protocols and blockchain, but some of them are services, which were created via usage new technologies that were created before. Most important examples of that are Stablecoin, which changed understanding and way of progress for whole DeFi market. Stablecoins makes one of the most important connections to centralized finance systems, and makes non-physical cryptocurrency one of possible exchange currencies for centralized financial system. Besides of representing layers, DeFi also contain more practically more practical example of layers will be represented in figure 13 below:

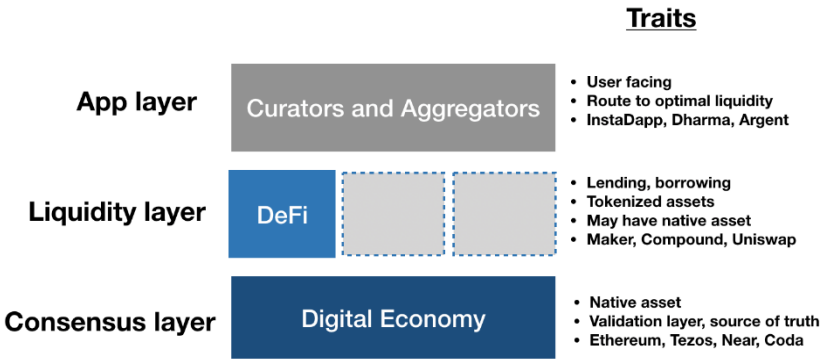

Figure 13 – DeFi layers. [38]

To summarize information above, DeFi or Decentralized Finance implies an assortment of financial application that leverage blockchain networks and technologies. DeFi has introduced a formidable change in viewing financial transactions beyond the existing assumptions of the prevailing, closed finance market. More about that and a possible use case of DeFi will be represented in figure 14 below:

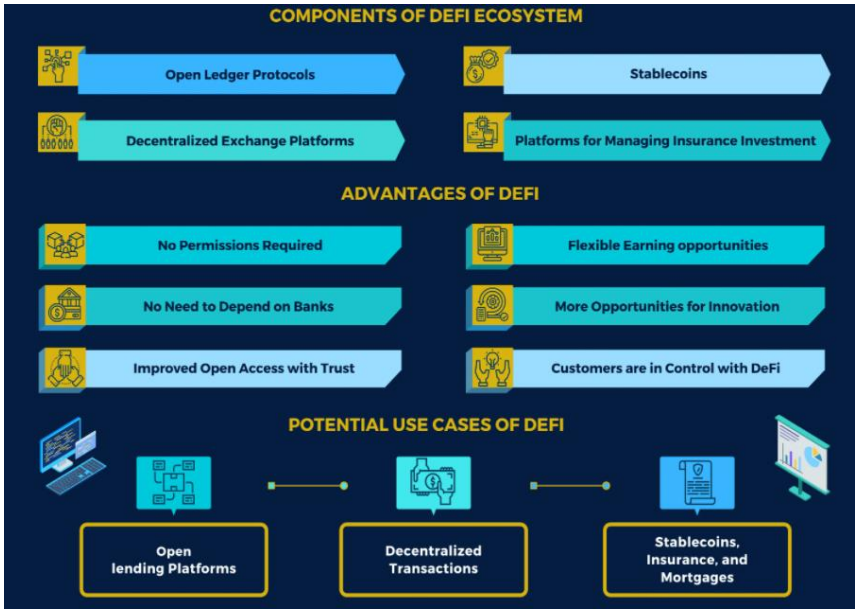

Figure 14 - Components of DeFi ecosystem. [39]

Figure 14 also represented open ledger protocols as a component of DeFi ecosystem. [40] In reality, DeFi and cryptocurrency contain a lot of different protocols like Stablecoin protocol, asset management protocols, etc. All of these protocols also unique and represented only at crypto space and DeFi a part of block chain technologies. Some of these protocols were described before in the current section of work. Important notice, that besides all represented ecosystems of DeFi, it is also contains an ecosystem for different cryptocurrency. Ecosystem represented before were described main platform and services of DeFi ecosystem. Moreover, some of cryptocurrency creates their own ecosystem that circulated at represented ecosystem. For example, ETH has some services and platforms that work only with ETH. Because of protocols that were described before, it is easier to make that ecosystem a part of main ecosystems, because for now it is possible to change all popular cryptocurrency for another cryptocurrency or traditional centralized finance system's currency. Examination of ETH ecosystem, and representing consist services and platform that circulate into it will be represented in figure 15 below, and important to notice that this ecosystem will represented main services and platforms that highly connected to ETH for a long time, and already receive a trust of users, because of some of their features.

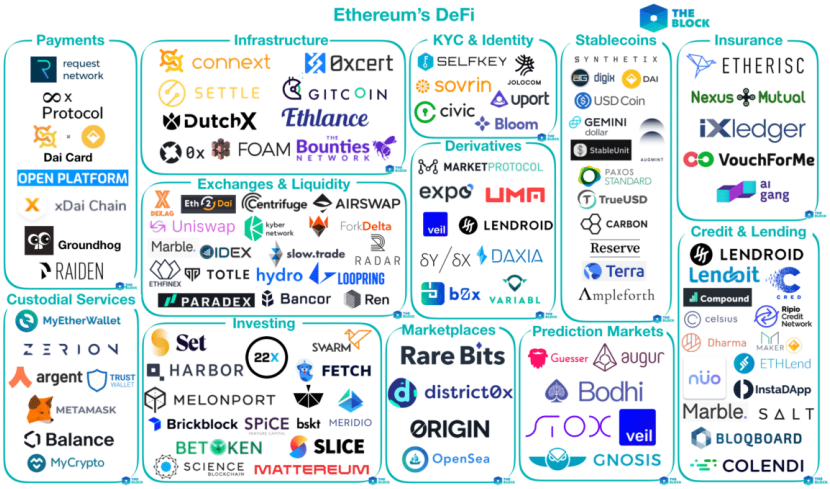

Figure 15 - ETH's DeFi ecosystem. [41]

3.2 **Possible areas of combination DeFi and CeFi.**

For the current moment of time, DeFi can be used with limitations in the centralized financial system with different areas. Main of them – Investment, because of already existing base of investors. Currently, even an organization like Tesla begin to invest into cryptocurrency, that confirmed usage of some cryptocurrency as a possible way to using it for increasing capitalization of organization based on investment, and increasing capital of the organization that exist into centralized financial system.

Stablecoins, that's always connected to physical money 1:1, also creates opportunity for usage cryptocurrency as a payment after exchanged, that became possible to use it in everyday life, as a way of living via passive percentage with the exchange percentage into real money (most of all stablecoins connected to the dollar). Comfortable wallet platforms also help people to keep their cryptocurrency without banking, that creates an opportunity to fast exchanges between physical money, DeFi platforms and wallet platforms, that will take several seconds for any kind of transactions [42].

Business usage of DeFi – Currently many banks are locked into huge and cumbrous legacy systems, which makes transformation opportunity almost impossible, DeFi assists SMEs and startups entering the market. Many different institutions depend it as a threat. However, some of the largest banks ready to rely on the agility of small businesses and run incubators and accelerators to get their block chain solutions to market [43].

The first challenge of implementing the DeFi as a part of a centralized finance system is to select an appropriate offering that will fill a gap in the target market. There are many use cases, ranging from traditional financial models, such as payments, two new instruments that have evolved because of the capabilities of decentralized ledgers, like tokenization and stablecoins (Both of them were mentioned before).

For example, the global bank; collected a huge amount of operations, we see a reduction of 300 to 1000 full-time equivalent (FTE) for any functional or sub-business direction in areas such as payments, banking, compliance, data analysis, treasury and service management. In addition, cryptocurrency can

become a new currency for centralized exchange. It is possible to realize that by using different protocols. Main of them will be borrowed and lending protocols. It is possible to connect this protocol together with stablecoin protocols. More information will be represented at Model, that can be found in the current section of research.

Educational usage of DeFi can be directed to creating new cryptocurrency for making a new kind of specialists that already recommended themselves and create a capitalization at current market. It became possible for fast learning after creating token standard and making use of that technologies one of the most popular tools on the market in 2021. For now, it is possible for creates a new kind of IT-services and creates specialists that will be improve that kind of financial services, and allow humanity to implement a new kind of profession, that won't create a trouble of unemployment that happens because of implementing new technologies. In addition, it can decrease some the main challenges from Industry 4.0 for some percentage. Decreasing challenges of Industry 4.0 will be more important in close 30 years.

Investment usage of DeFi one of the most common case for that market and platforms. It is easy to understand, because DeFi allows for all people, who interested to become a user of DeFi services without any kind of permissions, that can keep all user safe from losing private data. Besides, all other big investment exchanges will be asking a lot of different proofs of payment's source. All of this, together with requirement of huge amount of money at the beginning can easily scare new investors. However, DeFi accomplished that challenge already.

Token technologies allow creating new cryptocurrency without any kind of specific knowledge. Besides, it is a simple process, which can be understandable for most of all mediocre PC-users. This is increased a speed of upcoming new cryptocurrency, and this popularity affected DeFi as well. There are more and more new markets and services, which using DeFi ecosystem. However, most of all people are interested in old market that exist already, have good reputation, and receive trust from users. It is one of the aspects that simple to understand. Cryptocurrency is fully digital currency. It is increased a possibility of fraud. Nevertheless, most of all old DeFi services do not attack their own users, because it is disadvantageously for their owners.

DeFi can become an important advantage for conquering crisis, and make them more comfortable for people, like it was mentioned before at current work. Decentralized finance can create extra markets, as it happened already, connected to investment sector. It can help countries to decrease, losing value from main currency, because of keeping their value with the support of decentralized finance, and possible cryptocurrency. In addition, it's created a space for ordinary people living in government – to make this softer to face the crisis, without losing huge amount of value from centralized financial system. It can be described as a main advantage in front of centralized finance, because of a history of that finance system, humanity is already facing a different kind of crisis and always it is decreased a speed of evolving economic of the country, and it takes a lot of time, to return to before-crisis numbers at all

kinds of economics' sectors. Overall, DeFi creates a new possibility for centralized finance, even as a support system, providing extra value by itself.

3.3 Survey results

Survey became a necessary method because of importance to create an understanding of medium knowledge about the main topic of that work. To provide this information, and do not overwhelm surveyors and makes it not boring to go through this survey, it contains 3 main questions:

- "Does Surveyors contain at least any kind of knowledge about DeFi?" – in case, that surveyors respond – "No", survey are closed, in case to not collecting uncorrectable answers and opinion about possible usage, surveyors with that answer finished survey. All other people going through else question.
- "Does Surveyors understand the ecosystem of DeFi?" – For all answers for this question, all people receive a short remark about that ecosystem, similar to one, that was used in this work.
- "What kind of area can be used by this technology at the centralized financial system? – All respond from this question was the most important part of the survey, because it can create an understanding of human's opinion and how much ready they are for implementing decentralized finance technologies.

Collecting information from survey begins on 23.03.2021 and was finished at 01.05.2021. For 1,5 months of collecting information, more than 5000 people became a part of that survey. Main information will be represented in the diagrams below.

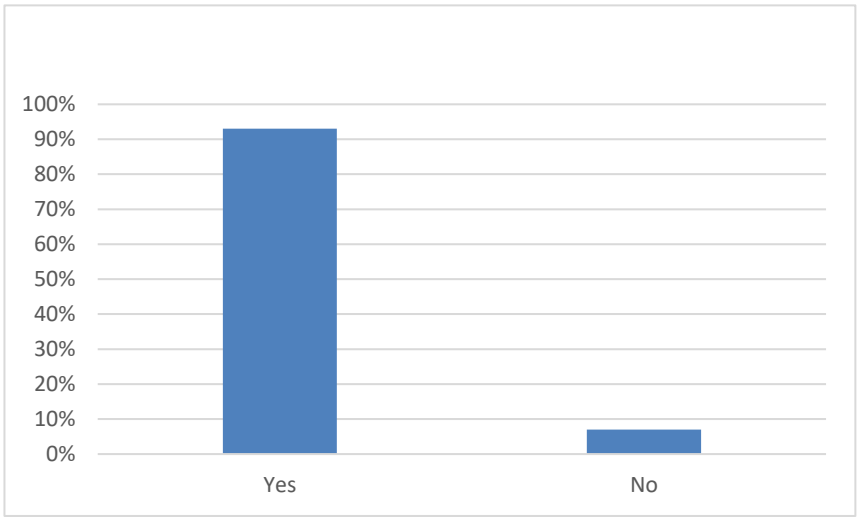

Diagram 1 - Survey information about knowing DeFi.

As represented in Diagram 1, 93% of all people who became a part of the survey. 7% of all people do not ever hear about DeFi that makes data from that users inappropriate, not all of this data will become

a part of the final information. 5507 people were a part of the survey, 7% or 385 people creates data not necessary to collect, if answer “no” was chosen – it is closed survey immediately, with keeping data of users, that they became a part of the survey. It is represented that most of all people, at least hear about DeFi, after this, next important information for current practical work was – How many people have any kind of understanding for Decentralized finance servers and platforms. Diagram 2 represented collected information about people, who knows about DeFi ecosystem and mechanism of work.

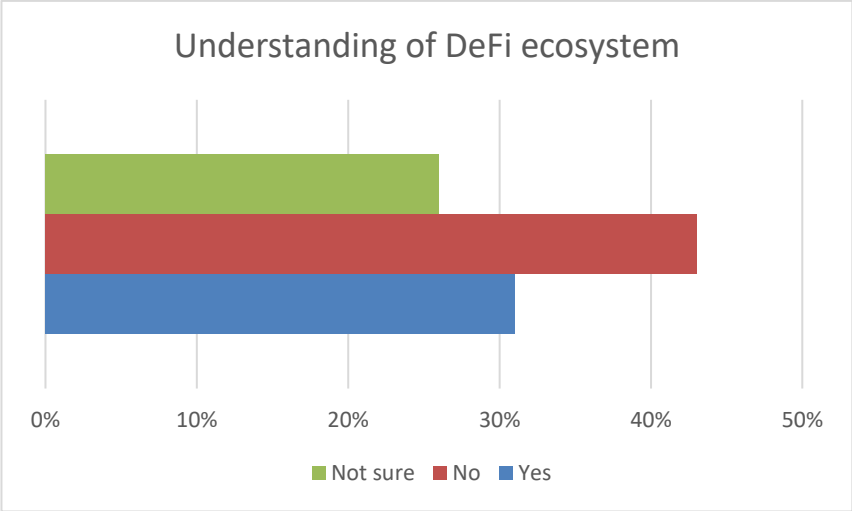

Diagram 2 - Understanding of DeFi.

However, for collecting last part of information, for all people were created a short notice about main parts, contain pros and cons about ecosystems, to create an ability to collect more correct information from all surveyed people.

Last diagram represented the main information about possible usage of DeFi combined with centralized finance, that was ranged by area of usage, split between 5 main parts, that was described at point 3.2. Surveys show, that 53% of all, people think, that DeFi can be a part of Investment, and works only with that sector in close 10 years. 7% of surveyed people think about possible education usage, 5% chose business as a possible way to create new advantages for organization, 26% of people think about possible usage in innovative areas, because of high growing technology for last 10 years, and 9% of all people decide to choose Banking system as a part, that can be combined with DeFi. Final diagram of the current survey will be represented below at Diagram 3, and provides the main information about the mind of surveyors about future areas and possible usage for DeFi, connected to centralized financial systems.

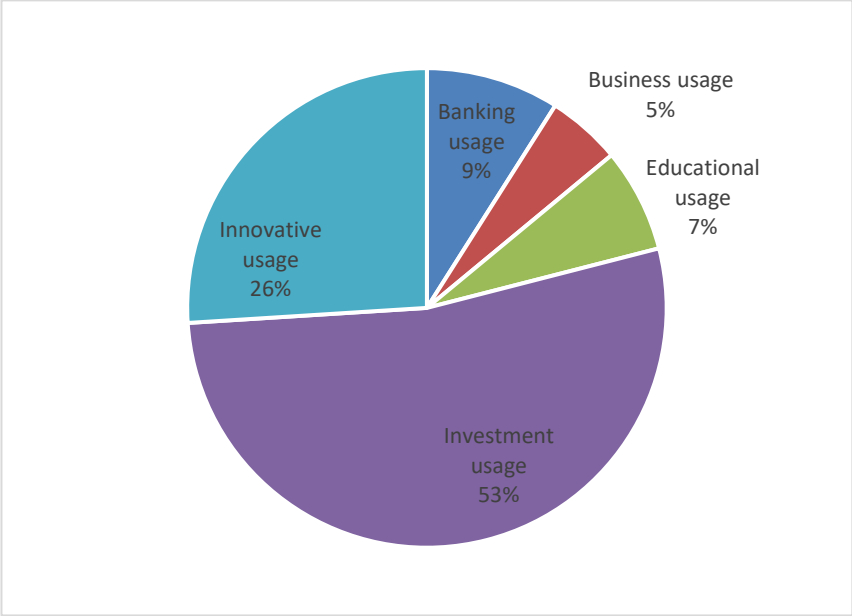

Diagram 3 - Possible areas for usage DeFi in 10 years.

3.4 Model of DeFi combined with centralized finance

As it was mentioned in the current section, this point of fourth chapter will represent main information and model description with summarizing main information about both of the models. These models will represent two kinds of connection between crypto space and traditional centralized finance system and decentralized finance system and centralized financial system.

The first model will be represented currently existed usage of combination between crypto space and traditional financial system that a part of political and legal system besides crypto space and decentralized finance system. It will be created deeper understanding of network mechanism that were represented at current work before. This is a proof of practical combination that also support the thesis of an availability combination of decentralized financial system and centralized systems.

Currently, a centralized financial system can be combined with crypto space and DeFi systems. Both of these models will use block chain technologies, but with different mechanical and presets, which can affect and created differences between DeFi and crypto space usage in the traditional centralized finance system. In addition, it provides a practical usage of DeFi and crypto space, that contain DeFi into it as a subset of crypto space more about it will be represented in Figure 19 below:

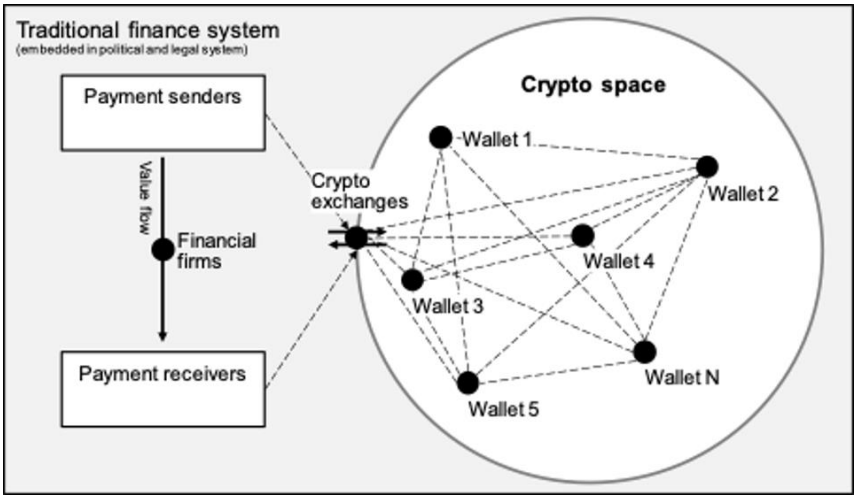

Fig. 16 - Traditional finance system connected to crypto-space. [44]

A model that represented in Figure 16 can examine main mechanisms and connections between centralized finance system and crypto space. For the current moment of time, crypto space used network connected to all wallets at crypto space. More about that mechanism were represented at second chapter, at point 2.6. All of this wallet can use crypto exchange to make payments on centralized finance system and payment receivers will receive this payment. In addition, current model represented a value flow that also connected to centralized finance financial firms. Besides, crypto space allows to make exchanges between different wallets without that kind of value flow.

The connection between all users are not dangerous to wallet keeper at crypto space, because it's part of features that were represented before at this research work in the second chapter. Security protocols that contain at DeFi and crypto space do not allows receiving a private information. More about this were explained before in section 2. It’s possible to notice, that current model uses crypto-exchange, besides centralized one. Next model that will represent a connection between traditional finance centralized systems and the DeFi system as a subset of the crypto space will be used centralized exchanges. More about it will be examined by the figure 20 below:

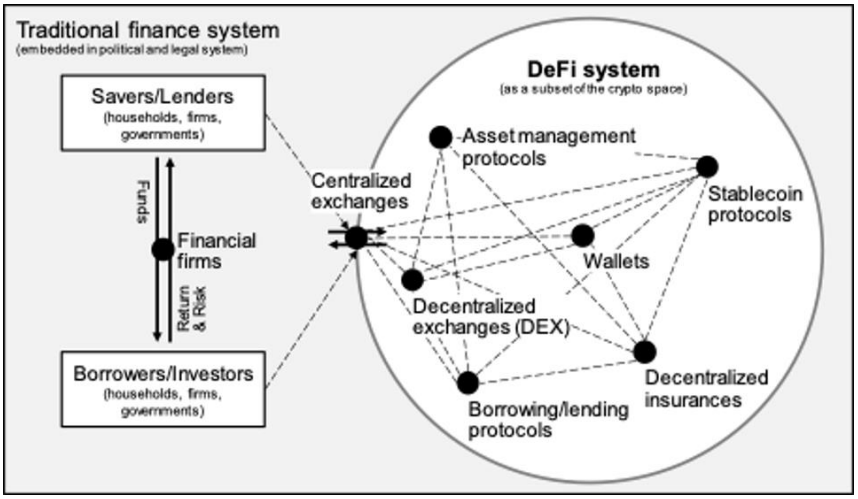

Fig. 17 - Traditional finance system connected to DeFi-system. [44]

Second model that represented DeFi system as a part of centralized financial system, show main mechanisms of network of DeFi. Centralized exchanges sending protocols and information to Stablecoin protocols as an only one way that practically provided an opportunity to be a main part of the connection. Second connection goes to wallets because of the main function of centralized exchanges as an exchange service. Another part of the connection is decentralized insurances, decentralized exchanges (DEX) and borrowing/lending protocols. More about them will be examine at the current point below. One of the most important connections is centralized and decentralized exchanges (DEX). This can be realized because of borrowing or lending protocols (Depends on type of operation that the user is used). Current model represented an idea of anti-crisis reaction that can be created by DeFi in the case of combining both of finance systems. Wallets connected Stablecoin protocols, decentralized insurance and centralized exchanges. It is possible to notice, that wallets do not use DEX. This is easily examining because of connection to Stablecoin protocols, which already have connection with traditional finance system currency. In addition, this is the main reasons, why all protocols and services are connected Stablecoin protocols. As it was mentioned before at this work, stablecoin became a main part of this combination, which makes it possible for usage at centralized finance. All other parts are connected at similar way, and ignoring wallets, because of stablecoin protocols.

In traditional financial system, it is possible to notice that current model represented Borrowers or Investors that can include in their households, firms and governments. However, for now, it's more structured flow between them and Savers of Lenders, which also creates a return and risks. It is a simple change improves possibility and proofs that usage of DeFi in the traditional centralized financial system can become a reality.

This model became a base for different model connected and using at the same way, but used business process modeling. The business process model will use a Russian law limitation for that kind of investment. This is affected a few processes at BP mode, because of tax limitations connected to DeFi and cryptocurrency as an investment tool. This makes the next model similar at the key - activity of the process, but describing business process model will provide an extra understanding of possible usage. Investment kind of usage realized by DeFi connectivity to centralized finance system, will be represented by business process model, that showing key activity and technologies that circulates at both finance systems at figure 18.

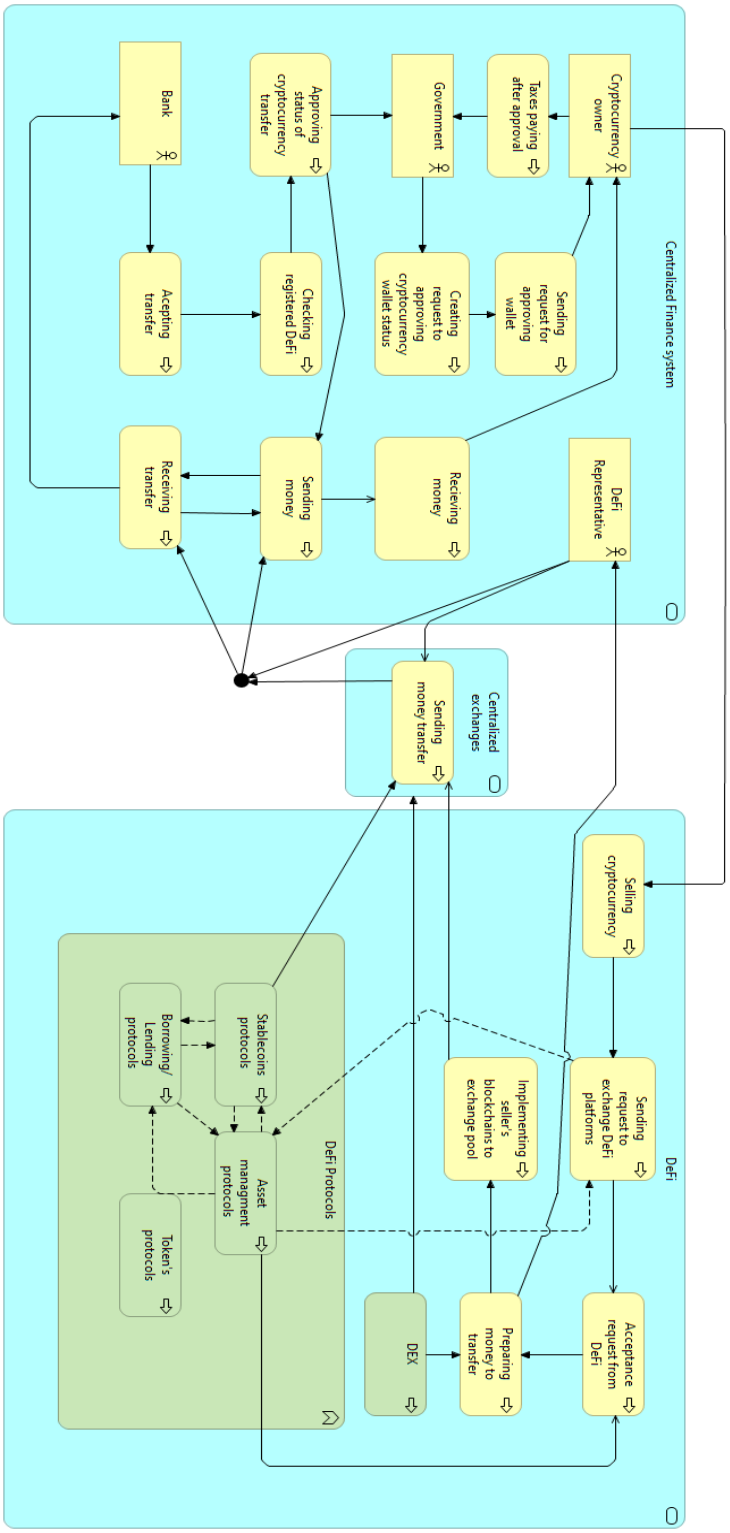

Fig. 18 – BPMN model of DeFi combination with centralized finance system

A current BP model showing all activities between government (based on Russian law), users of DeFi, who wanted to sell out his cryptocurrency, bank, and official DeFi representative. DeFi representative is used by big DeFi markets. It has created an ability to keep working lawfully and using exchange market services, which can be comfortable for all users, who interested to receiving centralized finance system currencies. First of all, cryptocurrency owner sending request to DeFi services (like Binance.com), which is a combination of decentralized and centralized exchange market. After

receiving requests acceptance, user sending his cryptocurrency, that he wants to sell. After this, DeFi begin to generate an exchange for selling cryptocurrency and stablecoins, after that stablecoins transfer to centralized finance system currencies, and sending transfer of the user. Firstly, banking system receives information about cryptocurrency exchange, which is understandable because of the representative of DeFi. After checking databases to DeFi markets, in case that this is cryptocurrencies activity, bank supposed to send information to the tax office. It is creating a request to money receiver to provide information about wallet with cryptocurrencies. It is creating a needing to paying a tax.

DeFi has been growing at an amazing pace since 2020 and billions of dollars have been invested in the ecosystem. The growth is mainly being led by applications (also known as protocols) based on the Ethereum blockchain. In the following, will be provided an overview of the actors in the DeFi ecosystem from an economic point of view, present the maturity levels of DeFi and explain the potential of DeFi to surpass the centralized finance system in the years to come.

The main business model of commercial banks is to take deposits and provide loans to their customers. Borrowing and lending are a fundamental cornerstone of an efficient financial system as it gives fund owners an incentive to add liquidity to the markets in order to generate a return on their otherwise unproductive assets.

DeFi protocols make it possible for the first time to borrow or lend funds on a large scale between unknown participants and without intermediaries. These applications bring lenders and borrowers together and automatically set interest rates based on supply and demand. In addition, these logs are very comprehensive in that anyone can interact with them anytime, anywhere, and with any crowd.

In fact, the recent hype surrounding DeFi applications is mainly due to the advancement of loans and loan protocols like Compound. In contrast to conventional financing, DeFi loans are usually over-collateralised. However, companies like Aave are currently working to provide unsecured loans that are similar to traditional financing.

The business model of investment banks usually includes advice on financial transactions. In addition, the creation or trading of complex financial products and asset management fall into the realm of investment banking. DeFi protocols already offer similar products. For example, Synthetix is an emissions protocol that enables the decentralized creation and trading of derivatives on assets such as stocks, currencies and commodities. The decentralized asset management for cryptocurrencies is also developing further. Yearn Finance, for example, is an autonomous protocol that looks for the best returns in the defy space and is automatically invested for its users.

The function of an exchange is to organize the trading of various assets such as stocks or foreign currencies between two or more market participants. Even the exchange of cryptocurrencies of FIAT currency (e.g. US dollars) can be attributed to CeFi, as the regular holder of cryptocurrencies must use exchanges such as Coinbase or Binance (which are centralized organizations) to exchange a unit of a cryptocurrency for a to exchange others.

With the advent of decentralized exchange (DEX), cryptocurrency holders no longer need to leave the crypto room to exchange their tokens. A prominent example of a DEX is Uniswap. DEX consists of intelligent contracts that hold liquidity reserves and function according to defined price mechanisms. Such automated liquidity protocols play a key role in developing an independent, decentralized ecosystem with no CeFi intermediaries. An important function of insurance is to offset the risks and provide security to market participants. An example of decentralized insurance is Nexus Mutual, which offers insurance that covers errors in smart contracts. Since everything in DeFi is based on smart contracts, weaknesses in the smart contract code are a fundamental risk for DeFi users. Decentralized insurance is still in its infancy, but it is to be expected that a larger number and more sophisticated insurance models in the DeFi area will emerge in the future. So-called stablecoins are based on blockchain protocols that inherently encode the principle of price stability and thus fulfill the function of a reserve currency. The introduction of stablecoins forms the basis for a functioning decentralized financial system, as they allow participants to come into contact with one another without the underlying risk of price volatility. There are three ways a cryptocurrency can achieve price stability.

First, stable coins can achieve high levels of price stability by pegging one currency other assets. For example, one real US dollar is held in reserve for every USD coin unit issued.

Second, from a decentralized finance perspective, another interesting approach is to issue stable coins using other cryptocurrencies as security. A central protocol for the DeFi ecosystem is Maker DAO, which issues the cryptocurrency DAI supported by other cryptocurrencies and uses its algorithm to ensure that the value of 1 DAI is hovering around the value of $ 1 [45].

Third, more experimental approaches aim to achieve price stability without the use of collateral. For example, the Ampleforth protocol automatically adapts the supply of tokens to demand. Crypto-based finance has reached the next maturity stage, as it covers all basic functions of a financial system.

It is arguable that DeFi has taken an important intermediate step in becoming a replacement for traditional financial solutions. While crypto-based financial solutions were only able to realize efficient value transfers in the past, the time value of money is now reflected in crypto financing.

So far, centralized exchanges and wallet providers have been the only successful large-scale blockchain business models. The reason centralized exchanges are successful is because they are the main entry point into the crypto space (watch Figure 1). The normal user has to exchange fiat money (e.g. US dollars) for a cryptocurrency before he can interact with services in decentralized financing. Wallet applications are also being set up to allow users to securely store and transfer their cryptocurrencies.

Based on these two applications, exchanges and wallets, efficient value transfers between unknown parties could be carried out for the first time without the need for traditional financial actors. This enabled the crypto space to perform limited functions of a financial system, namely speculation about (crypto) assets and facilitating payments. This led to a disintermediation of financial companies - but only if savers of traditional financing wanted to diversify their portfolio in the direction of crypto assets

or needed a smooth payment system. We propose that this is the first phase of maturity of a decentralized financial system.

The ability to handle flows of money from savers to borrowers and vice versa was still lacking. In the years that followed, additional elements of a more advanced financial system were developed. The function of a payment system could be expanded through the development of stable coins, decentralized exchanges and credit / credit protocols. DeFi developed the necessary platforms to facilitate the flow between savers and borrowers.

It is no coincidence that the start of explosive growth for the entire DeFi ecosystem could be seen with the advancement of the Compound credit / credit protocol. Since Compound started distributing its governance token COMP in June 15, 2020, the entire DeFi ecosystem has shown a steep growth path. Working credit / credit protocols like Compound could have been the missing cornerstone for the foundation of a properly functioning decentralized financial system. This can be described as the second phase of maturity of the decentralized financial system. It is no coincidence that the beginning of explosive growth for the entire DeFi ecosystem could be seen with the advancement of the compound credit / credit protocol. Since Compound started distributing its governance token COMP on June 15, 2020, the entire DeFi ecosystem has shown a steep growth path. Working credit / credit protocols like Compound could have been the missing cornerstone for the foundation of a properly functioning decentralized financial system. This can be described as the second phase of maturity of the decentralized financial system.

DeFi can be described as a platform that competes with traditional financial firms for the same resources. However, DeFi is an encapsulated system that doesn't follow the same rules as traditional finance. In particular, national law does not apply and regulatory guidelines can hardly be enforced in the DeFi area. This could be a huge competitive advantage over the highly regulated traditional financial firms.

For example, financial innovations in DeFi can be freely developed and implemented without considering regulatory limits. On the other hand, the lack of common legislative and political principles certainly has major disadvantages. It can be doubted that savers would view the current DeFi environment as a trustworthy target for their retirement investment. Therefore, the crucial question for DeFi’es progress into the next evolutionary stage will be:

To which degree are borrowers of traditional finance willing to access funds from DeFi applications?

To answer both questions at this point in time: only to a very limited extent. The reason for this is that most traditional financial savers or lenders do not trust the crypto space or just do not know about DeFi. The inflow of capital into DeFi applications since June 2020 is most likely due to unused assets in crypto wallets, i. H. A redistribution of assets within the crypto area. However, the increasing use of DeFi protocols shows that the system is scalable and works. Today, DeFi users belong to the group of "innovators" or "early adopters" (i.e. a very small proportion of households). Tomorrow, users could be mainstream households.

3.5 Overview of DeFi

To summarize all of the important steps of current research work it is necessary for making last overview of all represented information before. A decentralized financial system for current moment created an innovative kind of system and technologies. All of this creates a huge possible way of feature evolving and progressive, especially demands on time of usage. For a long-term DeFi have a lot of possible ways of improving their technology and technical layers.

Current research provides a thesis that it is possible to use decentralized finance system combined with the traditional centralized financial system. Current work represented all main aspects of DeFi; it is technologies and other kind of basis information that connected to decentralized finance services. Completely practical part and theoretical explanation are connected to main created thesis and proofing it via modeling, experience, and practice of currently represented DeFi features that available and working every day. However, accepting DeFi and possible speed of implementing this kind of solutions based on a lot of different aspects. More about them will be represented at current overview.

As a part of the work were represented some examples of society, affecting to DeFi, and described main aspects that can increase a probability of implementing DeFi as a part of the traditional centralized financial system. Main of them:

1. Changes in People's Interest and Trust - DeFi may become a better solution than centralized financial systems because of some of the opportunities that arise from it.
2. Innovative Activity - Blockchain and DeFi are part of one of the fastest growing, most advanced and evolving technologies. By increasing the opportunities with decreasing challenges and their negative effects - one of the most important competitive characteristics
3. Capitalization - A high rate of growth in capitalization has become a habitual phenomenon and may not come as a surprise to people who already learn about cryptocurrency and decentralized financial platforms and services. In the event that the current market brings an increasingly central financial currency into circulation, DeFi will be an increasingly interesting way of making passive and active profit as the quality of life improves. It can affect the centralized financial system in many different ways.

Current audience - especially users who use decentralized financial platforms and services - are investors who are growing their own profits and DeFi capitalization. It eases DeFi on how to get money and challenges DeFi who almost destroyed that type of problem. Another important part of DeFi users are developers and innovators who are making this market more interested and popular on a level similar to investors but the technical aspects of this issue. As it’s possible to notice, DeFi is taking many different steps to improve the quality of services and the speed of transactions, as well as creating new technologies such as tokens that can be used to create stable coins that are linked to centralized financial currencies.

In addition, it provides the opportunity for all users to have better passive profit and enables cryptocurrency to be exchanged for a centralized financial currency such as the dollar. It enables DeFi to influence the indirectly centralized financial system, which enables users to create cryptocurrency as one of the most important parts and avenues in this life and continue to create enough value for comfortable real life.

Another aspect that can affect speed of acceptance of DeFi and decrease it - is a challenge that DeFi can facing, and creates. Some of challenges makes it more trouble to accept the decentralized finance system as a possible component of the traditional centralized financial system is fully anonymous connection and possibility for financing different illegal structures. Besides, at tyranny government it is possible to keep investing some of news makers and other journalists. However, possible positive feedback of DeFi creates most important features, and people's warnings to that theme can easily help DeFi to become more official part of everyday life, like it is happening in some countries already. Some of this opportunity depends on technologies. More about the challenges and technologies will be represented in figure 19 below:

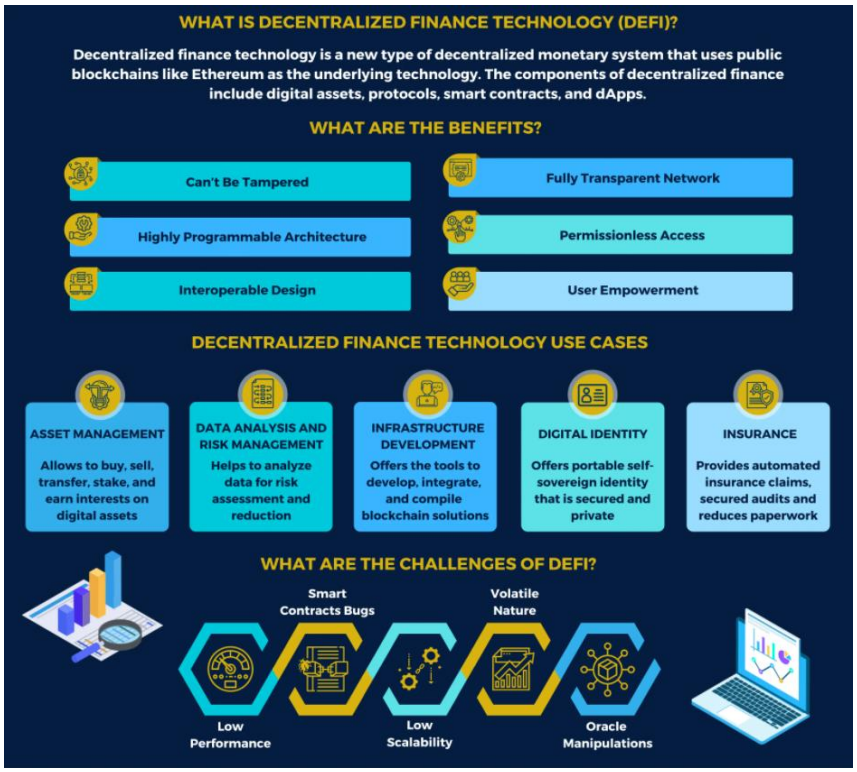

Fig. 19 - DeFi technology benefits and challenges. [39]

As it was mentioned in this work, centralized finance and decentralized finance systems have already created an affection to each other. DeFi have already created a deficit of video cards two times. First deficit appears at 2016, and the second happened in the first half of 2021 [46]. It is can examine the possibility of DeFi for current moment of time. Besides, the centralized financial system also created an affection for the decentralized financial system. For example, it is easy to be noticed that every time when any governments or high tier investor are accepted or invested a huge amount of money into

cryptocurrency and DeFi – it is always increased a capitalization of DeFi and cryptocurrency. It makes DeFi one of the most popular trend of his growing up rate timeline. It has kept increasing average numbers of total users who directly used DeFi. More information about feedback of users are rough data to collect because of anonymous mode, that makes it harder to analyze data, because of zero statistics data collected at the current moment of time of that theme.

Last aspect that highly decreasing a speed of implementing DeFi as a part of everyday life depends on extremely unfriendly testing and practicing environments. As it was mentioned before, even a little experiment on little society are almost impossible. It is requiring a government's interest to DeFi, society interested, and creating comfortable environment. The hardest part of practical studying affection DeFi on a centralized financial system depends on connecting economic sphere between all spheres of life. Even creating environments for little experiments can affect testing part of society, because in case of every time exchange cryptocurrency on centralized finance, it will make an experiment or testing unnecessary, because it will provide the same functions, that DeFi provides already. This makes experiment, and possibly creating requirements much harder, because of limitations, troubles of collecting correct and important data, but even collecting this data became extremely harder. It depends on already existed functions of DeFi connected to the traditional centralized financial system, that connected to, money transfer, money exchange, and the exchange market's function that is part of centralized financial system. Discussion based on all aspects, thinking, and explaining of future for DeFi will be represented at the last part of work, which is discussion about all aspects, that wasn't a part of all previously part of the work.

4. DISCUSSION

Current research work completely collected main ideas and opinions connected to the decentralized finance system and possible way of usage, transform or combining decentralized finance systems. Creating predictions about total transferred of humanity at the current moment of time is impossible. Many different aspects must happen, and predictions are overwhelmed because of practical's knowledge limitations. Scientific and economic society's opinions are divided. Some analysts think that cryptocurrency overhyped theme, and one of the examples of economic bubbles, that was a part of centralized financial system history. Scientific discourse is more positive at the decentralized financial system. Science discourse overview DeFi as a promising concept that builds on innovative technologies, integrating them, and unlocking new opportunities for each of them. In addition, the scientific community is interested in empirical examples of research, but for any practical study, this topic is currently too applied, and does not go beyond predictions and theoretically based concepts and models. Besides, economists represented more divided point of view, than science discourse. Many of them sure

that DeFi is nothing important, but just a trend. Another part of economists thinks about possible usage of DeFi as a part of centralized financial system. Most of all models were created by economists. Science discourse makes deeper focus on technological layer of DeFi or even protocols layer [47].

For the current moment of time, DeFi slowly coming into possible combinations with traditional centralized financial system. It happens step-by-step, because of creating and providing new technologies and features. Moreover, growing up news trend and It-trends support DeFi as well. All of these moments highly increased a possibility for using DeFi combined to CeFi. However, full transformation is unbelievable and unpredictable part of DeFi history. [48] It is possible to become more functional than centralized financial system. However, from other hands, these functionalities can be practically represented at a combination of both finance systems. One example of that combination was represented as a model in current research work. Represented model was an example of a simple model, which do not affect many different spheres. Most of modeling conception was based on connection between DeFi service features, which already exist, because of importance to create a practically possible kind of model.

The main opportunities of DeFi, that can make it possible to be sure, that DeFi have a future – is an investors and investment segment. Understanding of this understandable, due to current usage of DeFi, that already exist and can be viewed practically be people. However, increasing capitalization creates an opportunity to DeFi to keep progressing and evolving as a technology, service and concept. Currently last big announced cryptocurrency is Ethereum 2.0. However, information about it are different, because there is possible to collect speculative data, which can affect final results of collecting data. Currently Ethereum 2.0 is a theoretical concept with possible launch data without any kind of promise. One of the only represented information about Ethereum 2.0 contains at model in figure 20 represented below at current part of research work:

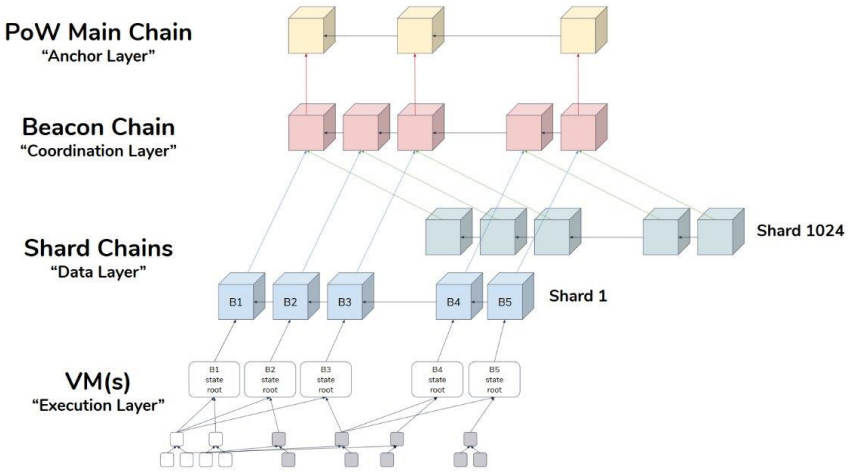

Fig. 20 - Layers of Ethereum 2.0. [49]

It is representing evolving cryptocurrencies technologies and DeFi as well, because of a strong connection to each other, and they current usage's sphere. Creating new protocols can become something more, than just a new protocol. Tokens protocols created by ETH became an innovation, which makes cryptocurrency exchange market – one of the biggest and comfortable markets between all offers of centralized finance system exchange markets.

For now, because of token technologies it is possible for using big capital for old players from centralized finance exchange market, moreover, it has kept being the most comfortable type of investment market for new players because of permissions, and every year growing index's rate for cryptocurrency and DeFi market consequently. In addition, agiotage created by ETH 2.0 represented interesting from all investors worldwide. Some of investors believe at new technologies as it is market advantage and future for whole world. Some investors interesting because of the innovative possibility of DeFi. Some of them, are players, who interesting at rates, capitalization, indexes and money. In addition, last part that representing new players also became comfortable for experimenting and making first tries at investment activity. For now, DeFi and cryptocurrency are suitable for all of those investors, which make this investment activity unique, especially for new players, because of hard competition and the importance of information on this kind of activity. It makes an entering for new players harder and it is getting worse because of permission, which requirement for centralized financial system. In addition, because of the high rate of passive profit, that represented for users via stablecoin like Tether. Cryptocurrency owners receive their profit every week, besides of month payments providing by banks. Possible question that can be created is – "What exactly happens to cryptocurrency from an owner?". [50] All cryptocurrencies owners receive their percentage because of a transaction that happens between different cryptocurrency. Especially, it is useful for stablecoins. Because they are taking central part of the exchange mechanism between centralized finance and decentralized finance systems.

5. CONCLUSION

As a result of surveys, literature and historical reviews, DeFi create many different opportunities for different sectors of the current financial system, and can become one of the most important and highly growing parts of Industry 4.0, that also have some challenges, but most trouble challenges depends on human factors (It was mentioned in section 2). Overall, if described technology by itself, it creates an advantages in front of centralized finance by different ways, that was explained over all current practical work.

The main results of practical work can be defined by next moments:

- Creating a deeper understanding the DeFi ecosystem by explaining main features and areas of possible usage and implementing DeFi to centralize financial system.
- Explained main features, pros and cons of those technologies that contain technical limitations, most of them were fixed because of token technology.
- Created a statistical sample based on 5507 responses. Without taking an inappropriate information based on people, who do not hear about DeFi, for keeping correct collecting data of all surveys. Most of all respondents think about keeping usage DeFi as an investment tool and platform, but from the other side, it is an area, where DeFi have already recommended it.
- Represented a model, based on a concept that was created before based on scientific opinion and researches that connected to the theme.
- Represented a historical improving and growing DeFi market capitalization and technologies progressive as well.
- Represented information about the challenges that were faced and accomplished by DeFi already, and opportunity, that still increasing their numbers and technical innovation. Represented an historical review for cryptocurrency as a main value and accomplish of DeFi.

As an author of current research work, in my opinion DeFi will become a part of everyday life as it did computers more than a half century ago. It will create new opportunity for the whole humanity, and can increase a quality of life for many different peoples. For now, DeFi at the historical top of popularity and user usage, because of highly growing up rates and profits that can be created. Another important point for humanity is innovative technologies, which do not have any kind of analogs. DeFi makes non-physical money more expensive than any other money that consisted of centralized financial system. However, some of centralized finance system goods still have bigger price for it. In addition, research work covers a main factor, which can decrease or increase the speed of implementing DeFi as a part of everyday life, which connected to the traditional centralized financial system. It creates a new advantages, opportunity and challenges. One of the most important factors for DeFi – it is the human factor, and social appreciating of that kind of technologies, in a bigger way than investment market and

tool. Different kind of implementing DeFi into the centralized financial system was represented in addition.

To summarize, all information explained as current research work, DeFi definitely have future, and it will keep evolving and progressing. The main question of future implementation and usage, it in everyday life depends on government interested in this kind of technologies, like it already made Japan. In addition, block chain technologies are a part of Industry 4.0, that can make challenges creates by Industry 4.0 easier to accomplish, and a lot of government, and for now, even organizations are interesting in this kind of solution. For now, after developing token technologies for DeFi platforms and services, it increases interest of all people at DeFi, because it became one of the most important technology for people, who interested in a new kind of financial system. However, question of full change centralized finance and DeFi are impossible to predict because of different aspects, represented and analyzed in current research work. In addition, it is possible to predict combination and possible transforms between DeFi and CeFi.

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