Use of Blockchain Technology in the Financing of DEASH

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Abstract - Technological developments that accelerated in the 21st century, while providing great positive contributions to societies, bring with them some problems. Especially the using of technological opportunities in the crime world is a new threat to public security. DEASH “ad-Dawlah al-Islamiyah fil-Iraq wa ash-Sham” (using term "ISIS" the acronym "Islamic State of Iraq and Sham" is not correct because each terrorist organization is named according to their local language (PKK, ETA, IRA etc.) terrorist organization is actively using financial and visual tools of the Internet for the financing of terrorism in cyberspace. In this study, it is explained how the blockchain technology and Bitcoin used by DEASH terrorist organization have been used in recent years with sample cases.

Key Words – DEASH; Cyber Terrorism; Financig of Terrorism; Blockchain; Bitcoin

1. Introduction

The evolving technology, on one hand, facilitates our lives and on the other hand it sparks off new security threats to emerge. New threats caused by evolving technology and older threats reconstructed based on the evolving technology are observed to threat the individuals and societies while the conventional threats continue to exist. For instance, PKK/KCK terrorist organization unsuccessfully attempted to utilize the rc plane technology being developed as a pastime activity targeting the annual event of commemoration of Mustafa Kemak ATATURK, the founder leader of the Republic of Turkey [1]. El-Kaide terrorist organization converted the passenger airplanes, which facilitates the life of mankind, into conventional missiles and resulted in the death and injury of thousands of people.

Information Technologies brought about advancements that contributed most to the development of individuals and societies. These positive developments have been adapted by terrorist organizations into their activities. Terrorist organizations utilized the cyber space, which emerged as the result of the developments in IT field, for their activities, which gave rise to the invention of the notions of cyber terrorism or cyber-attacks.

DEASH is considered to be the most notorious terrorist organization for their presence in the cyber space. Top quality broadcasting of the atrocious executions conducted by DEASH in the cyber space since the era when it was called Iraqi El Kaide led its sphere of influence to grow wider quickly. The organization, thanks to these activities and by means of propaganda, found the opportunity for recruitment and financing on a global level.

The organization published videos and magazines such as "Dabiq", "Constantinople" and "Rumiyah" in cyber space for propaganda purposes as well as the guides such as the one under the name of "Hijrah to the Islamic State" for the purposes of recruitment, for FTFs (foreign terrorist fighters) to travel to the conflict zones. The organization also carries on El Kaide's application of cyber terrorist camps. In this regard, making explosives, how to conduct attacks with weapon, knife and car are taught by means of infographics, videos, digital magazines and books all in detail. Organization's calls to lone-wolf attacks on a global scale are made through the cyber space. The organization led to the emergence of a new phenomenon called the "radicalization in cyber space" with these practices. Individuals radicalized in consequence of being affected by the activities of the organization in cyber space started conducting lone-wolf-type attacks.

These activities have become serious threats to the daily lives of individuals on international level. These threats depicted the obligation to fight back with terrorism in cyber space taking into consideration the balance between security and freedom. It is evaluated that individuals who do not have direct connection to the organization but act upon being influenced by their cyber activities cannot be prevented by means of conventional investigations and intelligence. The fact that governments commenced taking precautions in this regard resulted in DEASH terrorist organization to canalize its activities into the cyber space such as Darknet, TOR network, and bitcoin generated via the blockchain technology. It is observed that DEASH canalized its recruitment, propaganda and financing as well, which are all very significant in order to carry on its activities, into their accounts in TOR network.

In the light of the fact that the organization cannot carry on its activities without financing, we are going to examine the organization's financing methods and transformation, blockchain technology, bitcoin and the organization's endeavor to utilize bitcoin in its financing.

2. Financing Methodologies of DEASH Terrorist Organization

DEASH acquires its financing through various resources including; a) deposits of banks located within the area captured via their attacks, which are tried to be legitimized by the organization considering them as war prize [2], b) oil fields and refineries, c) assets of killed people, d) taxation of goods, e) charges on transit through the regions under its control, f) ransom obtained upon abduction, g) donations from charitable organizations, h) funds and goods obtained through the FTFs, i) fund raising through modern communication networks [3].

The organization acquired a significant amount of goods and cash including heavy weapons such as tanks in the regions they occupy. The organization also legitimizes acts of crimes such as robbery, fraud and extortion under different names provided that they are committed against the masses they demonize [4]. The organization included in magazines they publish in cyber space its communication info and the photos of people they abduct, whom it presumes it might acquire ransom from, in order to bargain with their families [5]. It was asserted that some notable French company paid fairs for its trucks to and bought oil from DEASH when it occupied the region wherein their cement plant was located [6]. It is an undeniable fact that DEASH holds a significant cash reserve taking into consideration the oil fields and banks within the areas under its control.

Goods and funds from FTFs and from those who radicalize without going to conflict areas is another method of the organization's financing. These are collected through FTFs, couriers, hawala system and banking systems, therefore it is quite difficult to detect crime revenues.

It contacts affiliates via social media such as Twitter, Whatsapp, Telegram and Skype and gives instructions that monetary aids acquired through modern communication networks shall be conveyed to the organization [7]. The underlying reason why the organization utilizes these social media accounts is the fact that few countries are able to detect the users and follow the communication traffic. This utilization, at the same time, depicts the ability of the organization to adapt the trends embraced in technology into its activities.

In spite of all these funding resources, the expenditures of the organization reach to significant amounts. According to the data in 2014-2015 the organization pays 350-500 USD of monthly salary to its members. Merely based on these data 10 million USD is spent out of its vault [8]. In addition to this, expenditures made for providing for its members' families and for the folks within the region under their control amounts to significant numbers [9].

The organization provides an alternative political system like other terrorist organizations. As a requirement in this scope, it prints money of 1 golden denarii, 5 golden denarii, 1 silver drachm, 5 silver drachm, 10 silver drachm, 10 fulus copper, 20 fulus copper coins and determined their worth in USD [10]. In the light of its loss of human and other types of resources and its ability to adapt the technology into its activities, the organization is predicted to increase the utilization of cryptocurrency systems, which has been used by the organization since 2014 for financing.

3. Blockchain Technology

With a new perspective about decentralized architecture Blockchain is now recognized as the "fifth evolution" of computing, the missing trust layer for the Internet. Reinventing an old technology with modern ways is the innovative fact behind blockchain [11].

Blockchain is a software technology built on distributed network architecture secured with cryptographic technologies. The chain consists of blocks which are added consecutively. Each block is a logical part that contains the transaction records between the nodes over the network.

Genesis block is the first block of the chain and it is created by the developer manually. Then every transaction between nodes is added to chain as new block automatically [12].

Blockchain is a constant and shared ledger that facilitates the recording of transactions and tracking of assets in a business network. These assets can be concrete (home, car, cash, land) or abstract (intellectual property, patent, copyright, trademark).

Almost any value can be monitored and processed on a blockchain network, which means reducing risks and costs for all sides [13].

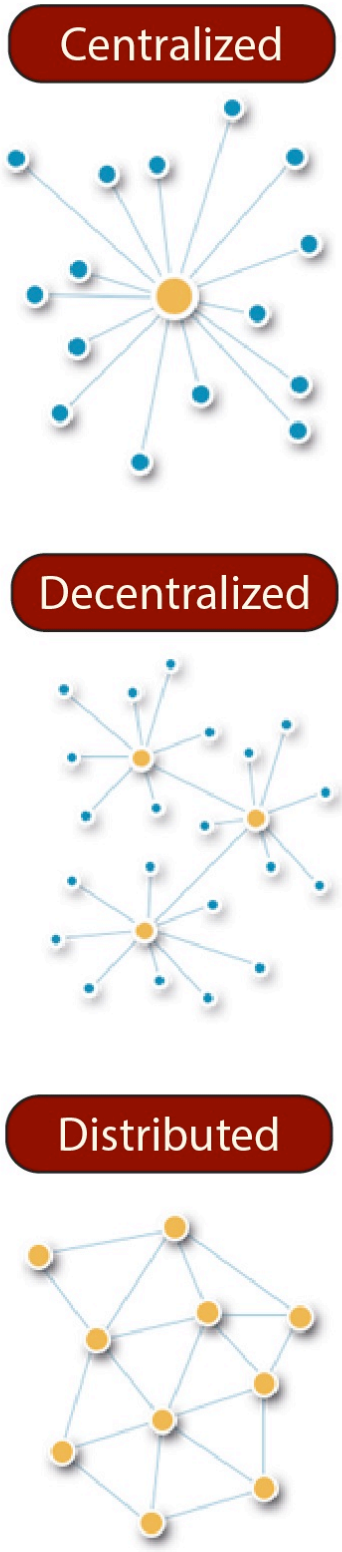

Fig. 1. Network architectures [14].

3.1. Types of Blockchain

According to user profiles there are three types of blockchain [15].

a) **Public Blockchain:** every user who has an internet connection can join the network. Bitcoin and Ethereum cryptocurrency blockchains are well known public blockchain networks.

b) **Private Blockchain:** Every user is not allowed to join the network. A user should be invited and allowed by the administrator of the network. Generally, this type of blockchain is developed for organizational process over the private network.

c) **Consortium Blockchain**: Consortium blockchain is partly private designed between different organizations for collaboration.

3.2. Benefits of Blockchain

The advantage of blockchain is the reason of preferring then the other technologies. The power of the blockchain is not only based on the technology but also the idea behind the design.

In classical central software technologies trust issues, security issue, privacy issue and cost and time factor for transactions are the main problems which could be solved by the blockchain. Elimination of intermediaries, easier and genuine verification of transactions, increased security with lower cost and greater transparency are the solutions for these problems [16].

The leading advantages of blockchain [17];

a) **Transparency:** The accessing of record ledger and databases by everyone brings more transparency than classical technologies.

b) **Removal of intermediaries:** In blockchain transactions occur directly between users, so there is no need an intermediary or third party involved.

c) **Decentralized:** Shared ledger is not stored centrally. Each node has a copy of whole transactions. On the other hand, centralized databases are prone to cyber attacks and able to be out of service.

d) **Trust:** The equality between users involved in transactions makes everyone feel trustworthy because no one is capable of affect the other one.

e) **Security:** Data entered into blockchain is immutable and non-reversible. Thus, data integrity one of the most important requirements of Information Security is guaranteed.

f) **Wide range of potential uses:** Blockchain technology can be usable for both financial and non-financial applications for vary purposes.

g) **Easily accessible technology:** With open source platforms and frameworks building blockchain applications does not require big investments.

h) **Low cost high speed transactions:** Decentralization and removal intermediaries make transactions fast and cheaper.

Blockchain Durability and robustness comes from the fact that cannot be controlled by a single identity and has no single point of failure [18]. System is totally built on transparency and zero mistake. Each transaction can be viewed by any user that means highest level accountability. The risk of making mistakes by humans or computers is eliminated by the system.

Blockchain solves the manipulation problems in the finance and related sectors [19]. Most of the people in the west and east world still believe in big banks and companies like Google and Facebook are using personal data about themselves to make profit. Blockchain comes into action when people seeking more privacy and respect their lives in the cyber space.

3.3. *Usage Areas of Blockchain*

Cryptocurrencies are the most common area of use of blockchain. The main reason for this is Bitcoin being the first known and common blockchain application of. Bitcoin, which started to be used by everyone in 2009, is still the most known and used blockchain application. However, the potential benefit of blockchain is much more than just financial field. Blockchain has such a technological capacity that it can offer solutions to many political, humane, social and scientific problems [20].

Many blockchain applications in various fields were put into practice after "Smart Contract" [21] technology, which came up first in 1994, started to be used along with the blockchain.

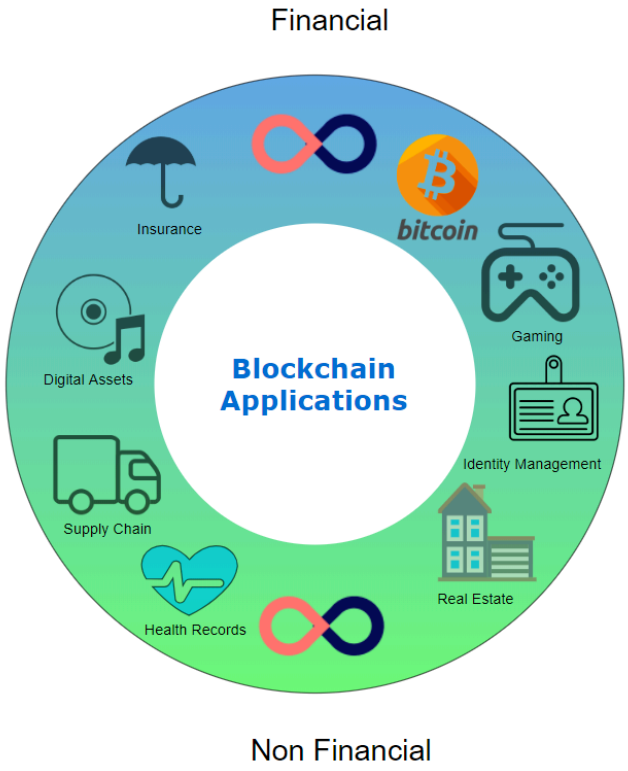

Fig. 2. Blokchain Applications

Smart contracts are software that ensures that some script of code is triggered with a given set of data (Money, data etc.) and rules out the 3rd parties in-between and operates automatically and monitors the whole process all along transparently as well as cyphers so as to prevent undesired exterior interventions [22].

Aside from the financial operations, there are tens of blockchain applications actively used in such fields as notarial acts, monitoring chain of procurement, authentication, distributed data storage, gift card and affiliate programs, real estate, insurance and health.

4. Cryptocurrencies

It is defined as a means of payment which is used for Exchange of money, goods or services and produced in paper or metal [23]. Digital currency, on the other hand, is a type of money which is in electronic form and transferrable via information systems. Digital currency represents real money in a bank or in the eye of a government. Virtual currencies do not represent real money in a bank or in the eye of a government while it represents a certain value in online commercial transactions [24].

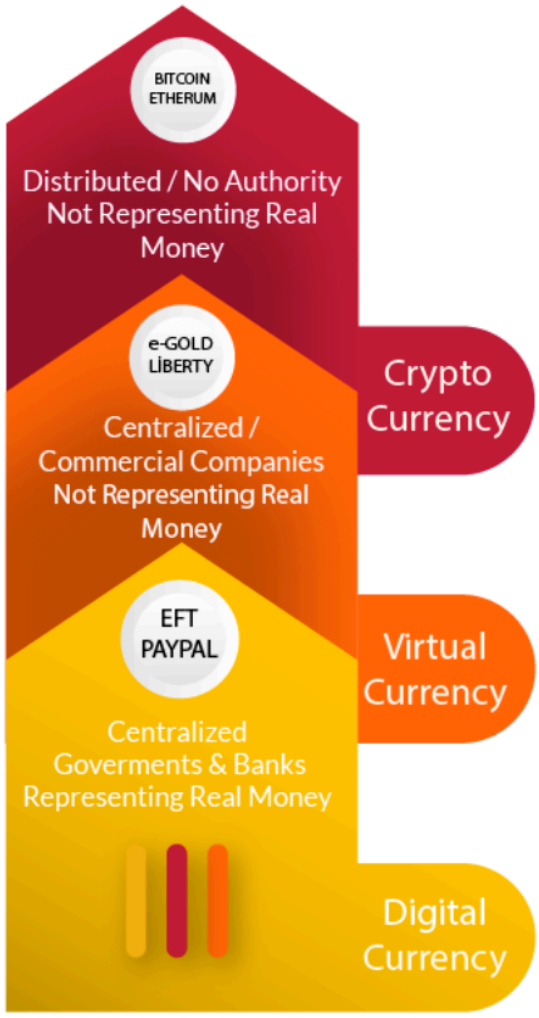

Fig.3. Digital, Virtual and Crypto Currencies

Bitcoin, which is the first notion to come to mind, is not actually the first virtual currency. Central virtual currencies have been used since 1990s. However, Bitcoin took the place of the notion of virtual currency particularly in the recent years. The important question to ask at this point is why there is no mention about virtual currencies aside from Bitcoin and other crypto-currencies.

"E-gold", which came into use in 1996 and reached to 5 million of users is accepted as the first virtual currency. It was asserted that the gold managed by E-gold was actually physically present in a bank and users could do online transactions with this gold in their accounts. E-gold was shut down by the government of USA for its utilization in committing crimes and for some other reasons [25].

"Liberty Reserve" is another virtual currency which came into use in 2006. It could be converted into Dollars or Euros over the system and could be transferred to different accounts in return for a transaction fee. However, the system was shut down by USA government since it was abused for money laundering in particular [26].

PayPal, which was founded in 1998, is still actively used for online transactions as it operates in accordance with the legislation and international protocols [27].

There are more than 2090 known crypto-currencies in the open market aside from Bitcoin.

Table 1. Cryptocurrencies according to market volume [28].

	Symbol	Cryptocurrency	Market Volume (Billion Dollar)
1		Bitcoin	62,9
2		XRP	13,1
3		Ethereum	12,2
4		Bitcoin Cash	2,1
5		EOS	2,1
6		Tether	2,0
7		Stellar	1,9
8		Lietcoin	1,8
9		TRON	1,5
10		Bitcoin SV	1,3
11		Cardano	1,1
12		IOATA	0,8
13		Binance Coin	0,8
14		Monero	0,7
15		Dash	0,6

4.1. How to Have Cryptocurrency

There are two ways of acquiring any cryptocurrency;

a) Mining; validation of transactions in blockchain, which cryptocurrency is built upon, by conducting a set of advanced mathematical processes through particular hardware and transfer of the fee of the transaction, in return for it, to miner's account.

Fig.4. Bitcoin mining device.

a) Open Market Trade; There exist cryptocurreny markets in which almost every cryptocurrency is sold or bought with real money or exchanged with other cryptocurrencies. It is possible to buy or sell cryptocurrency insantly and to invest in these markets operating online. Besides, one can own cryptocurrency by selling a product or a service in return for cryptocurrency.

Table 2. The largest cryptocurrency markets according to market volume(30d) [29].

	Logo	Market	Market Volume (Billion Dollar)
1		Binance	19,5
2		OKEx	17,4
3		Huobi Global	12,5
4		Bit-Z	12,0
5		DigiFinex	11,7
6		CoinBene	9,4
7		BitMax	9,3
8		LBank	9,1
9		ZB.COM	8,9
10		Bibox	7,8
11		HitBTC	6,9
12		BitForex	6,3
13		UPBit	6,2
14		BitMart	5,9
15		Bitfinex	5,9

Table 3. Cryptocurrency markets in Turkey [30].

	Logo	Market	Market Volume (□ TL)
1		Paribu	15.795.703
2		Vebitcoin	14.128.407
3		BtcTurk	10.952.140
4		Koineks	2.875.152
5		Koinim	245.440

4.2. Bitcoin (BTC)

The best-known cryptocurrency Bitcoin is a collection of concepts and technologies that form the basis of a digital money ecosystem. Bitcoin (BTC) currency unit means a value that can be stored and transferred between users on the Bitcoin network. Bitcoin users communicate each other using the Bitcoin protocol over the internet. This specific open source protocol can be run on a wide range of computing devices, including laptops and smartphones even in the cloud, making the technology easily accessible for everyone [31].

In 2009, the first cryptocurrency based on blockchain technology Bitcoin was announced by Satoshi Nakamoto nick name of someone or a group [32]. For the first time, a person could send and receive money to another person without a third authority.

With this developments users have relied on the cryptography-secured software system, not an organization. In cryptocurrency each coin has a virtual value but does not represent the real money, and the money sending and receiving costs are in very low rates compared to other international systems.

A bitcoin wallet is required to send or receive bitcoin. The Bitcoin wallet is a program that stores private key and public key and interacts with blockchain to allow users to send, receive and display digital currency balances.

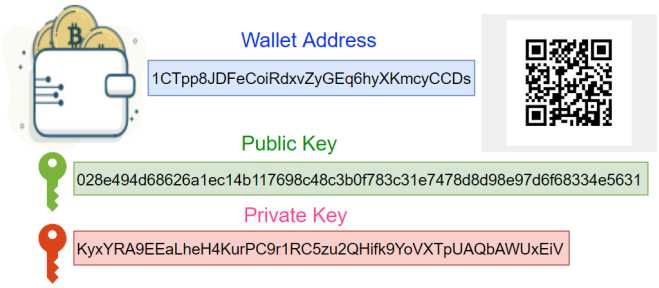

Fig. 5. Bitcoin Wallet Public and Private Key

Bitcoin wallets can be run on different platforms [33];

a) **Online Wallets**, web-based applications which every internet user can access. Easy to register and use. Makes it possible to transfer or receive/send bitcoins with a web browser.

b) **Mobile wallets**, smartphone applications generally installable to iOS or Android devices. Generally, a PIN code is used to login into wallet application otherwise if a hacker access to phone physically or programmily will be able to transfer the money.

c) **Desktop wallets**, applications which are installable to desktop or laptop computers. Some of the desktop wallets download all the transactions of database but some light versions download only small size of blockchain data. If the computer infected by malware or viruses, money in the wallet can be transferred.

d) **Hardware wallets**, private key of the wallet is stored in a physical device and unless the device user can not be able to access the wallet or make a bitcoin transfer. Hardware wallets are accepted the most secure wallets for Bitcoin and other cryptocurrencies.

Fig. 6. Hardware Bitcoin Wallet [34]

e) **Paper wallets**, wallet address, public and private key of the waller printed to a paper. It is possible to receive bitcoin with wallet address written on the paper but to transfer the bitcoins to another wallet the owner of the wallet has to use the online software related to paper wallet.

If someone access the private key written on the paper wallet, all bitcoins can be transferred to another wallet!

Fig. 7. When a Bitcoin paper wallet is shown for a television program in 2013, a person who saw the private key of the wallet transferred 20$ balance of the wallet to his account [35].

Bitcoin transaction steps;

1. Open your wallet and scan the address to which you want to send money.
2. Select the amount of money and send the transaction.
3. The wallet secures the payment, so you know the sender of the money.
4. The transaction is validated by the network and made part of the mining process.
5. Mining is in progress and is done when a miner earns a bitcoin.
6. The network validates the result of the mining process.
7. The receiver of the money gets confirmation of the successful transaction.

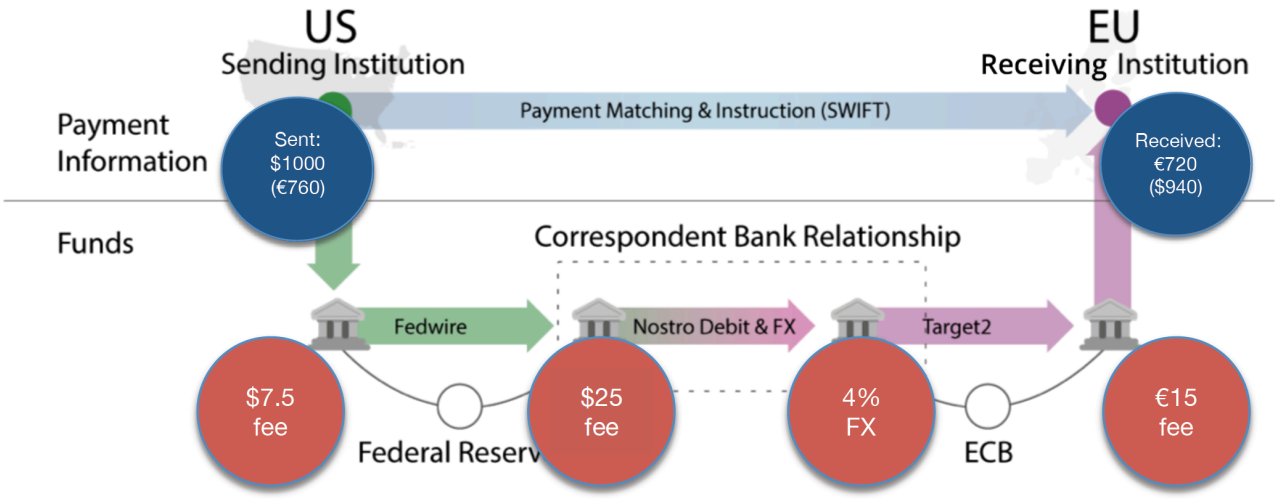

Fig. 8. Money transfer steps over the Banks and International Institutions [36].

Fedwire (formerly known as the Federal Reserve Wire Network) is a real-time gross settlement funds transfer system operated by the United States Federal Reserve Banks that allows financial institutions to electronically transfer funds between participants. Nostro account refers to an account that a bank holds in a foreign currency in another bank. Target2; Eurosystem (RTGS) Real Time Gross Settlement.

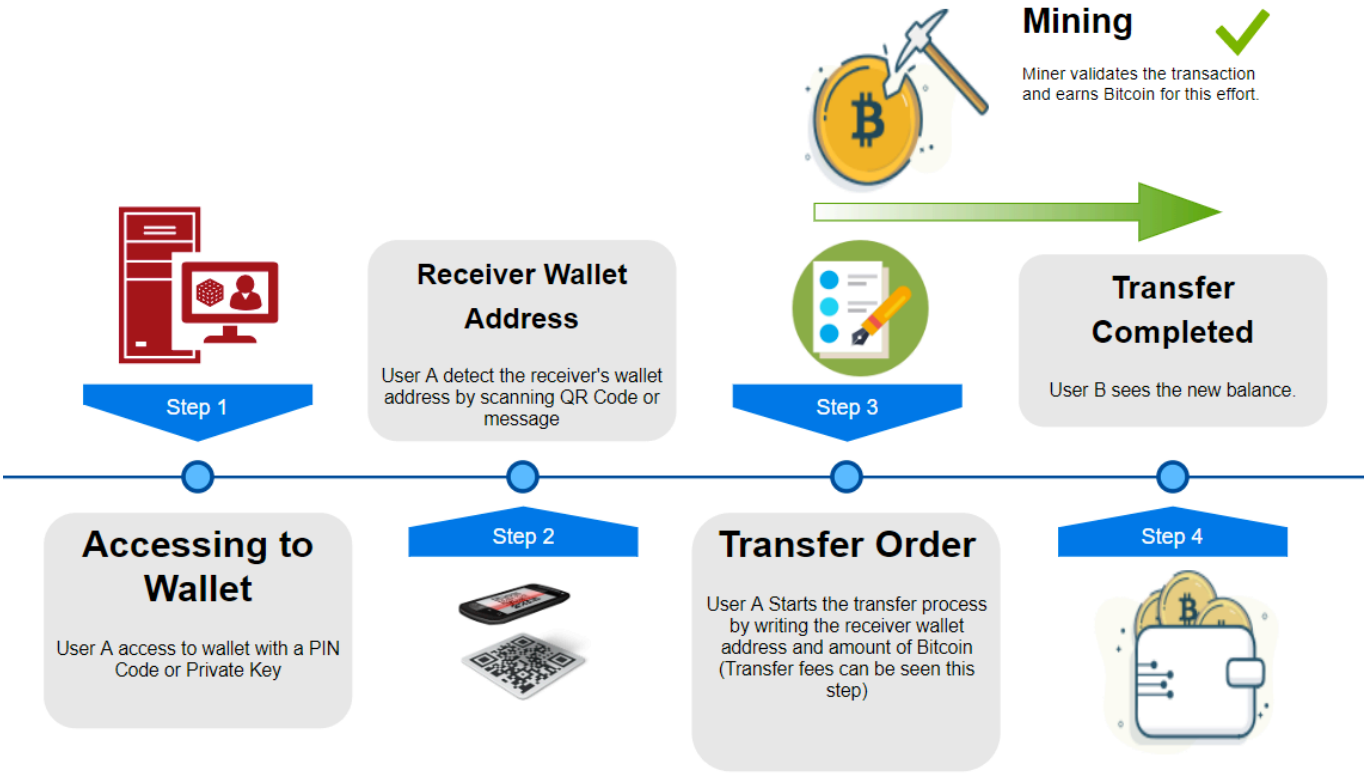

Fig. 9. Bitcoin transfer steps.

5. DEASH's Use of Bitcoin in Transformation of Financing

Although crypto-currencies have been developed for different purposes, the lack of a control mechanism due to the challenges in detecting the users and obtaining the traffic data makes the utilization of them by trans-border criminals appealing. Sales of drugs and weapons by Bitcoin, money laundering, illegal pharmaceutical sales, fake passports sales, blackmailing through ransomware virus via TOR network called "dark web", in which crypto communication is provided for users who thus can surf the net anonymously, have been detected [37]. It is obvious that an environment in which such a wide range of illegal services are offered appeals the terrorist organizations.

Utilization of crypto-currencies for financing terrorism is still accepted as the most substantial risk [38]. According to the European Parliament, terrorist organizations utilize the crypto-currencies for direct donations or fundraise through criminal activities, money transfer by converting into cash the money transferred to the regions near the conflict areas and funding the activities to be conducted by organization members or travels [39].

An application was developed by affiliates of terrorist organization called "DarkWallet" to complicate the monetary traffic since money transfers through bitcoin could partly be monitored [40]. Moreover, crypto-currencies that are more difficult to monitor such as Monero, Dash and Zcash started to be preferred by terrorist organizations [41].

iOCTA 2018 (Internet and Organized Crimes Threat Assessment) Report published by Europol suggested that funding trans-border terror activities was going to be facilitated and emphasized DEASH terrorist organization's fundraising under the disguise of donation through crypto-currencies such as Bitcoin and Zcash between 2014-2017 [42]. It is depicted that donation demands are made through donation websites and instant messaging applications such as Telegram [43]. The organization makes propaganda, through such programs, such as giving orders for activities, giving instructions for preparing materials such as bomb-making for activities and giving instructions for those who are to make donations about how to transfer money. The website called "Muslim News" (ou7zytv3h2yaosqq.289n2.ml/37080) has been observed to carry our activities on Tor Network. The website's link to the organization has been examined on the basis of the content. It is established that a) the amblem of DEASH, depicted in figure 10, appears as the logo of the website, b) the website broadcasts in Arabic, c) it reads in a text published on 30.09.2018 as "The donation page has been updated, ways of buying bitcoin in order to make donation to the website have been added", d) a text published on 07.12.2017, which is translated into English as follows, reads "My brothers, make your donation, not your Zakat, in the name of Allah", various Arabic propaganda videos [44] were published and in one of those videos the following content was shared "To those who ho would like to operate bitcoin, the sales are done through PayPal and Visa". Videos, publications and symbols published on the website are assessed as the same as the ones published in the digital magazines and telegram channels of DEASH.

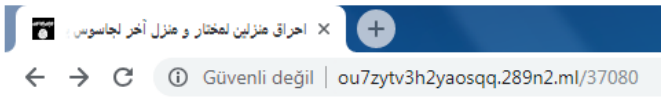

Fig.10. – A Dark Web Page belongs to DEASH.

It is understood over the publications on the website that the organization got inclined to electronic currency which is difficult to follow for financing after being pushed by lack of finance and resources. It is instructed in a video prepared in detail how to donate to the organization via bitcoin.

The main reasons that affects DEASH to be inclined to electronic currency for financing are it is stuck in a small area in Syria and Iraq [45] and the need of financing of groups that declare their loyalty to DEASH. The organization carries out activities on a very large area and operations are made against their cells all over the world. Therefore, the organization needs to conceal the identity of its members and its sympathizers [46], to direct its funds in larger amounts to crypto-currencies such as bitcoin for financing in order to be able to carry on its activities.

The organization, in spite of recession, obtains significant amounts of money through sales of oil

products in Syrian region. In addition to this, the organization acquires financing through abduction of local businessmen for ransom, goods and money plundered, tax collection in the regions under their control. The organization still continues to make investments infiltrating the exchange offices, agricultural businesses, fishing, real estates and construction enterprises. The funding from outside of the conflict areas takes place over hawala system, money transfer systems and couriers [47]. It is evaluated that these funds to be directed to crypto-currencies in inverse correlation to the loss of territories. In addition to the financing issues, it is envisioned that the organization is going to incline towards the field of cryptocurrency for weapon, travel document and other materials needed for activities.

6. Conclusion and Sugesstion

The underlying reasons of the organization to incline towards the "dark web" and utilization of crypto-currencies are to obfuscate of the identities of its members and sympathizers, to carry on the propaganda activities and to be able to continue obtaining finance. It is envisioned that the current utilization is going to spread out in inverse correlation to loss of territories and that other organizations following the ideology of El Kaide are going to increase their activities in the cyber space over time.

In regard to the activities of DEASH terrorist organization, it is observed that terrorist organizations target the maximum effect and damage in their activities day by day. The impossibility is obvious that individuals realize themselves and feel safe in an environment in which the daily life is threatened to such an extent. Therefore, it is a necessity to take global precautions taking into consideration the notion of increasing globalization of terrorism.

It is obviously impossible that the countries solitarily implement the precautions taken in cyber space. It is considered necessary to make decisions as for legal amendments for enforcing international cooperation, operating secret investigators within the body of INTERPOL and Europol, providing multinational virtual patrol services, making overseen deliveries in-between states, registering the crypto-curreny manufacturers and cryptocurrency miners in the scope of UN.

Blockchain applications are being widespread not only in legal area but also in criminal world, brings new challenges for fighting against cyber terrorism. To prevent cyber terrorism actions related to blockchain both international organizations and enterprise companies have to take technical and legal measures.

Cooperation between governments and international organizations is compulsory to fight against cyber terrorism effectively because of cyber terrorism is a multi-discipline matter like other computer-related crimes.

User awareness, which is the most important element in the information security concept, should be followed with precision in blockchain applications.

Especially in order to reach the sufficient level of awareness of cryptocurrency users, trainings, conferences, seminars and social responsibility projects should be organized in the medium and long term.

Most of the studies about the blockchain are technology related. The number of studies about the effects of the blockchain to the social community is not enough for public managers to attract their attention. This subject has to be considered by academicians.

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