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## **Blockchain as a chain for humanitarian aid: Transforming the lives of refugees**

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Master in International Management

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November, 2020

Department of Marketing, Strategy and Operations

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## **Acknowledgements**

I will never forget the first time I fully understood the unlimited power of blockchain. I was preparing for a UN Side-Event organized by the Mission of Liechtenstein “How to Regulate Blockchain”. It was in October 2019 during my internship at the Mission of Andorra to the United Nations. I chose the “How to Regulate Blockchain” event because at that point I knew at least I could grasp a bit of the debate and for me it seemed an interesting topic. I had an idea of the properties of this technology but I remember exiting the meeting impressed about its unlimited possibilities. I was completely blown away. I realized a few things: it was early, something parallel, complex to understand, with potential to change our lives maybe the same as the internet did. After some months of investigating the uses of blockchain for sustainable development, learning about UN blockchain-led projects and participating in hackathons, I finally found an interesting field of application for this disruptive technology: humanitarian aid.

First and foremost, I would like to thank my mentor Renato Pereira who enabled this thesis. Likewise, I want to thank my family and friends, for their collective encouragement, support and love throughout this time. Special thanks to Imane Bouymaj and Adeline Texeira, for teaching me how to look at everything differently, for always encouraging me and pushing me off my limits, as well as making this time unforgettable. Finally, I am endlessly grateful I got the chance to intern at the Permanent Mission of Andorra to the United Nations with an amazing team. It has been by far the most rewarding, educating, eye-opening and life-changing experience I have ever had.



## **Abstract**

### ***Português***

Dados atualizados das Nações Unidas mostram que 79,5 milhões de pessoas em todo o mundo foram deslocadas à força no final de 2019. Esses já eram números recordes de refugiados e pessoas deslocadas em todo o mundo. Agora eles enfrentam uma nova emergência inimaginável e ameaçadora: a crise de saúde global causada pela pandemia de Covid-19 e a consequente crise econômica que ela gerou. Os refugiados estão entre o grupo mais vulnerável que agora enfrenta também uma pandemia de pobreza. 2020 foi um dos anos mais difíceis da história. O presente ano também se caracterizou por uma sucessão de catástrofes e desastres naturais, que agravaram um mundo já seriamente afetado pela crise da Covid-19. Grandes emergências e situações extremas exigem coordenação, confiança e eficiência. Atualmente, estamos a entrar em uma nova era de tecnologia disruptiva que revolucionará a indústria, e o blockchain é uma grande promessa para a transformação do setor humanitário.

Esta tese explora o uso da tecnologia blockchain para melhorar a eficácia da ajuda humanitária contemporânea no campo de refugiados e pessoas deslocadas, concentrando-se em duas oportunidades de casos de uso específicos: gerenciamento de identidade digital e rastreamento de entrega de ajuda. Esta dissertação descreve os casos de uso de blockchain para ajudar a mitigar o impacto e a tensão da crise de refugiados para refugiados e países anfitriões. O objetivo é refletir sobre as melhorias e armadilhas relacionadas à adaptação dessa tecnologia disruptiva no campo.

### **Palavras-clave:**

Blockchain, tecnologia disruptiva, setor humanitário, refugiados, identidade digital, entrega de ajuda.

JEL: H840-desastres naturais; I300: pobreza.



## ***English***

Updated United Nations data shows that 79.5 million people worldwide were forcibly displaced already by the end of 2019. These were already record-setting numbers of refugees and displaced people around the world. Now they face a new unimaginable and threatening emergency: the global health crisis caused by the Covid-19 pandemic and the consequent economic crisis it has generated. Refugees are amongst the most vulnerable group who now are facing also a pandemic of poverty. It is fair to say that 2020 has been one of the toughest years in history. The present year has also been characterized by a succession of catastrophes and natural disasters, which aggravated a world already severally affected by the Covid-19 crisis. Large emergencies and extreme situations demand for coordination, trust and efficiency. We are currently entering a new era of disruptive technology that will revolutionize the industry, and blockchain holds vast promise for a transformation of the humanitarian sector.

This thesis explores the use of blockchain technology to improve effectiveness of contemporary humanitarian aid in the field of refugees and displaced people by focusing on two specific use-case opportunities: digital identity management and aid delivery tracking. This dissertation outlines the use cases of blockchain to help mitigate the impact and strain of the refugee crisis for both refugees and host countries alike. The aim is to reflect on the improvements and pitfalls related to the adaptation of this disruptive technology in the field.

### **Keywords:**

Blockchain, disruptive technology, humanitarian sector, refugees, digital identity, aid delivery.

JEL: H840-Natural Disaster; I300-Poverty





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## Chapter 1: Introductory part

### 1.1. Introduction

*“Technology is neither good nor bad; nor is it neutral [...]”*

*-Kranzberg (1986)*

In the context of new technologies growing, the way we are tackling the current problems with the help of these new technologies is rapidly evolving. The international development sector is no stranger to disruptive technologies. An Accenture report in 2017 (Ford, F. & Lobo, I.) states that the velocity and intensity of the change in the sector today is unprecedented.

Emerged as a disruptive technology and often associated with the 4th Industrial Revolution, blockchain has enormous potential to solve nowadays challenges. Not only has blockchain established the path for cryptocurrencies, but also the area of smart contracts (Zwitter, A. & Boisse-Despiaux, M., 2018). Blockchain has become one of the biggest buzzwords in today's world and its uses and implementations have emerged in recent years. In this date, this technology is considered to have the potential to revolutionize not only the financial sector, but also many more industries with its possibility of application without the intervention of intermediaries or central authorities.

The evolving technology provides unprecedented opportunities for humanitarian aid to reach and help people in new, more efficient ways. In the framework of the increasing needs in the world for social protection caused by intensified climate, geopolitical, healthcare instability, humanitarian organizations must find ways to improve their approach and procedures to delivering aid and making them more effective.

With the Sustainable Development Goals (SDG's) as a framework to address current global problems and achieve sustainable development, blockchain's wide-ranging and innovative benefits make it uniquely placed to assist with the implementation of the SDG's (Horner, J. & Ryan, P. 2019). Several UN agencies and initiatives are increasingly showing interest in this disruptive technology.

In pursuance of the realization of the 2030 Agenda, the commitment *“leaving no one behind”* tries to put every human in the center and put focus in every region. As quoted by the United Nations, the Agenda of 2020 is *“...of the people, by the people and for the people...”* (United Nations, General Assembly, 2015, p. 12). The United Nations (2016) stated in the Sustainable Development Goals Report of 2016 that a precise understanding of target populations is essential in order to ensure that the commitments are materialized into effective action. The report also refers that *“...disaggregated data is needed to address all vulnerable*

*groups –including [...] refugees, internally displaced persons and migrants...*” (United Nations, 2016).

Ensuring safety and finding solutions for refugees and displaced people are the foremost priorities of the United Nations and, in fact, it is the subject of one of the very first resolutions of the UN General Assembly (Grandi, F. 2019). The basis of the rights of refugees is found in the 1951 Geneva Convention and its Protocol. Within the UN system, the High Commissioner for Refugees (UNHCR) is the key agency involved in the protection of refugees. Within finding solutions for refugees, inclusion is an essential element in order to secure their protection and solutions for them, and it intersects with the commitment of “*leaving no one behind*”. Connecting them to communities, services and opportunities in their host countries, as well as providing an environment that allows them to rebuild a vision of the future, either to permanently settle down in the new country or for the day when they will be able to return back to their home country (Grandi, F. UNHCR 2017).

On one side, one of the most frequent issues that particularly affects refugees among human groups on the move is the lack of personal identification (Morrow, J et al., 2018). The circumstances of migration often result in wakening and even loss of the personal identity. Around 1 billion people are lacking of an official proof of identity, the majority of them are refugees (Vyjayanti, D; Diofasi, A; Lu, J. 2018). Even if refugees get a shelter, they need to take back their place in society. That means getting an education, a job, access to finance, amongst others. Equally, organizations that look after refugees and work with them need to identify them. Blockchain can provide them control of their identities by creating mobile data wallets where they can store and share personal data, which can be used for their daily tasks.

On the other side, the gap between needs and funding is significantly increasing and it is widening even more with the current situation. At the closing session of ECOSOC’s 2012 High Level Panel on Accountability and Transparency, Ban Ki-moon –UN Secretary General at the time–, stated that up to 30 percent of funds allocated to humanitarian aid is lost to corruption. The particular properties of this disruptive technologies create the possibility to curb corruption by providing accountability and transparency. This leads to several humanitarian and development organizations to implement blockchain in order to combine it with funding instruments. Integrating blockchain can also help easing transactions, making them less expensive and faster, as well as ensure safety to the beneficiaries.

The properties of blockchain, which will be elaborately analyzed in the next chapter, as well as its application, go far beyond the financial sector and many other fields are benefitting from its properties: supply chain management, smart contracts, digital identity, etc. The

humanitarian sector is no exception and in fact the use of blockchain technology is gaining a strong foothold in this field.

However, blockchain is seen for many specialists as a bubble waiting to burst. In the recent years, the potential of blockchain is still being discovered (de Vrij, 2018) and starting to be applied in new, different fields.

This thesis is aimed to analyze if the use of blockchain technology in the humanitarian sector, in particular in the refugee crisis, is really that revolutionizing or is it merely hype and the benefits of its application are being overrated. Moreover, it contributes to the current state of knowledge in regards to application of disruptive technologies in the effort towards the realization of the SDGs.

## **1.2. Research design**

Framed under the UN's SDG's, this thesis is a qualitative case study aimed to contribute to the literature on innovative collaboration on humanitarian aid for refugees by using blockchain technology. The suggested framework takes into consideration blockchain-related projects that are at a relatively early stage of development. My aim is to 'moderate the hype of Blockchain' by outlining the advantages and pitfalls of the use of the technology. Moreover, due to the early stage of the use of blockchain for the humanitarian aid sector, this dissertation provides examples on what blockchain can bring to the humanitarian aid industry when the work of organizations is combined with the technology in order to help refugees. As a disclaimer, this paper is not intended to provide a detailed and technical explanation about the functioning of blockchain technology, as there are experts in the field who have excellently made such brief in their publications. By the same token, most of these authors will be duly quoted as I introduce the fundamentals of blockchain.

Finally, I wanted to state that my primary aim was to make a case study on my own by collecting and analyzing primary data. However, firstly due to the emerging and complex nature of blockchain, it was not possible for me to gain access to relevant and updated primary data in relation to this particular case. The worldwide pandemic involving Covid-19 has produced unusual circumstances that crated unease in the process of collecting data, such as the suspension of events or conferences. Moreover, the impossibility to access to certain facilities, printed materials or meetings limited my research process.

### 1.3. Questions and Sub-questions

Question 1: Can blockchain technology help to provide humanitarian aid?

Question 2: In which aspects can it help progress with the refugee crisis?

Question 2.1: How are blockchain's properties applicable to the humanitarian aid sector?

The aim of this question is to provide a basis of information for the rest of the thesis.

Question 2.2: How can it improve aid delivery?

Question 2.3: How can blockchain enabled smart-contracts help to address issues of identity? This question will be answered by reviewing case studies such as the "*Building Blocks*".

Question 3: What are the limitations?

Question 3.1: What are the limitations and pitfalls related to the technology?

The aim of all my research questions is to bridge the gap between the potential of the technology and the lack of research – contributing to literature, and debate surrounding the effectiveness of blockchain applied to humanitarian aid, specifically to manage the refugee crisis. Moreover, it will contribute to broaden the knowledge and raise awareness on the implementation of blockchain in identity management and humanitarian aid delivery.

Question 3.2: Are these programmes designed according to real refugees needs and does the implementation of blockchain really empower the recipients?

This question popped out as I was doing the literature review. It can only be answered based on results.

### 1.4. Basic concepts

**Blockchain:** A sequence of time-stamped blocks that cannot be modified. These blocks form a chain of continuously updated record of who holds what. Blockchain is generally known as the underlying technology behind Bitcoin, cryptocurrency and Ethereum.

**Sustainable Development Goals (also Global Goals):** The 17 SDG's are equally important, interdependent and interconnected. They comprise the three main elements of sustainable development (social, environmental and economic). The goals are to be achieved by 2030.

**Distributed Ledger Technology:** Blockchain is a specific type of DLT. It is a database that holds a consensus of shared and synchronized digital data across multiple sites and can be accessed by multiple people. Unlike traditional databases and opposed to centralized ledgers, distributed ledgers have no central data store.

**Ethereum:** An open-source, blockchain-based, decentralized software platform used for its own cryptocurrency. Ethereum has pioneered smart contracts.

**Smart contract:** it can be described as a software that mimics the logic of a traditional contract. It takes all the notions of a contract but is generated by an automated computer program which is written in a blockchain and it is intended to automatically execute the contract. It doesn't rely on other intermediates since all its functions are implemented by the computer itself.

**Biometrics:** In IT, "biometric authentication" is the application of mathematical techniques and automated tools as means of labeling, verifying or identifying personal identity through physical traits or characteristics, including but not limited to fingerprints, palm prints, face recognition or iris scans.

**Refugee:** According to Amnesty International, a refugee is a person who has fled their own country because they are at risk of serious human rights violations and persecution in there. The risks to their safety and life are so immense that they are left with no choice but to leave and seek safety outside of their country.

### **1.5. Justification & problem statement**

Framed within the UN's Sustainable Development Goals, as already mentioned, this thesis is aimed to connect blockchain technology to humanitarian aid projects. Due to the innovative nature of this technology, there is a very limited reflection on potentially beneficial cases of the use of blockchain technology for sustainable development and especially on humanitarian aid.

Anyone who intends to make a *donation to a humanitarian cause* will ask themselves where the donation will actually end up. Transparency and tracking funds seem to be the most important challenges when it comes to this field. Hanisha Vaswani Jagtiani, WFP WSIS Forum 2019 (Smith, A. 2018) highlighted the main flaws of money transfers:

- The pace is generally slow.
- High cost due to bank fees as a result of moving money across millions of people worldwide.
- Financial uncertainty considering the implication of unstable banks in developing countries.
- Privacy exposure: beneficiaries would be required to have a bank account, which implies providing confidential information of the user to the local bank.

- Identity concerns, verifying the beneficiary's identification.
- Compromise and settlement once the money is released (WSIS Forum, 2019).

The *lack of identity* is one of the most critical issues when it comes to providing help to refugees and displaced people. As they are forced to abandon their homes, refugees often arrive with few possessions and papers, which are nearly impossible to retrieve after leaving the country. According to a NCR research, 70% of Syrian refugees lack basic identification (Aburass, S. 2017). Without authenticated identity, it's hard to get access to basic services, or carry procedures such as bank accounts or even get a job.

Finally, even if there are some projects that have shown success such as the WFP for Syria, which will be further analyzed, there is a substantial part of further research which is needed in the field as well as a gap between the possibilities of blockchain and the lack of research about it.



## Chapter 2: Literature review

### 2.1. What is blockchain technology

As a disclaimer, to the best of the knowledge of the author of this thesis, there is no existence of a formal definition of blockchain which is generally accepted.

IBM defines blockchain as a shared, immutable ledger for recording the history of transactions. (IBM, 2018). The digital platform is “...hosted across a network of multiple participants...” (Alden, Alex; Haddad, Houman. 2017) and as stated by Clare Naden (2016) it allows to record and verify transactions ensuring transparency and security, by eliminating the necessity of middlemen and thus establishing trust (Naden, C. 2017). With this technology, the role of the intermediary is replaced by a shared authentication which provides a great level of safety, agility and traceability (Deloitte, n.d.). Put into a simpler way, a McKinsey report states: “...The blockchain is basically a distributed database. Think of a giant, global spreadsheet that runs on millions and millions of computers. It’s distributed. It’s open source, so anyone can change the underlying code, and they can see what’s going on. It’s truly peer to peer; it doesn’t require powerful intermediaries to authenticate or to settle transactions...” (Tapscott, D. 2016).

The blockchain technique was originally described and published in an academic paper back in 1991 by Stuart Haber and W. Scott Stornetta (Beyer, S. 2018). The original intention was to timestamp digital documents to unable any possibility to backdate them or to tamper with them. It went by mostly unused until it was adapted by Satoshi Nakamoto in 2009, in order to create the well-known digital cryptocurrency known as Bitcoin. Stephan Beyer (2018) also states that the best way of innovation consists on “*building on existing knowledge*” (Beyer, S. 2018).

Blockchain is known for its use in the development of cryptocurrencies such as Bitcoin, which is mostly used as a starting point due to blockchain’s first application. However, blockchain properties go beyond and the former does not capture its entire ensemble of systems. Even though its epicenter revolves around its use for digital currencies, its potential and disruptive nature have allowed blockchain to expand its uses far beyond that. Blockchain has recently become a “*trending topic*” for researchers for its revolutionizing nature.

## Figure 2 – A look at blockchain technology

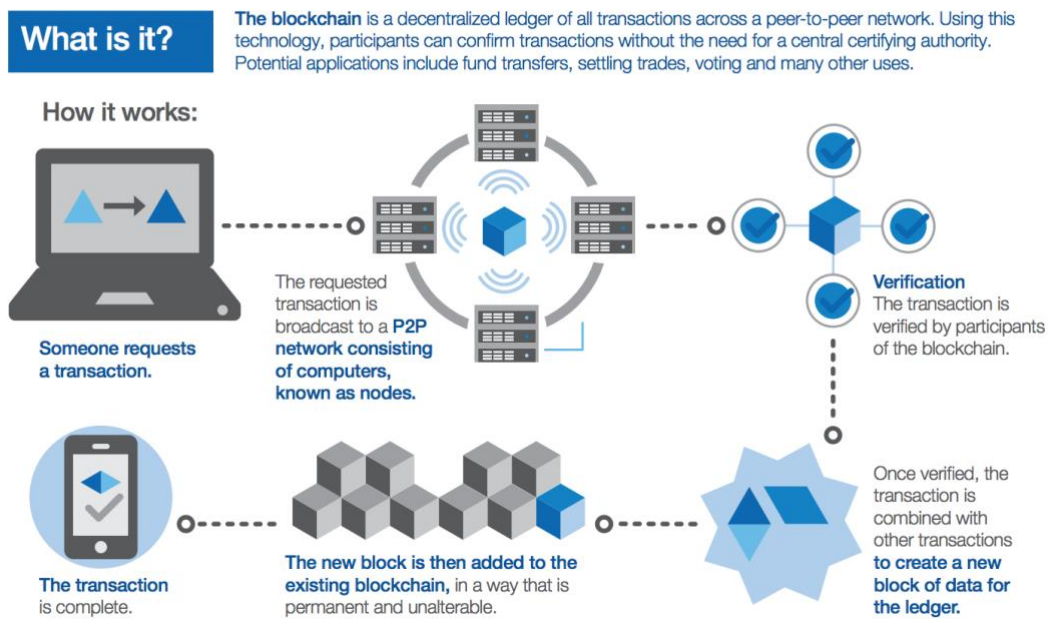


Figure 1. World Economic Forum (2018) Building Block(chain)s for a Better Planet. Fourth Industrial Revolution for the Earth Series. Retrieved at: [http://www3.weforum.org/docs/WEF\\_Building-Blockchains.pdf](http://www3.weforum.org/docs/WEF_Building-Blockchains.pdf)

In a nutshell, a blockchain is a database in the structure of a constantly expanding sequence of timestamped blocks containing stored data (Turfa, M. 2018). According to (Boisard, A. n.d.), blockchain allows information to be shared throughout all users, as well as it to being stored and exchanged securely (hence the term distributed ledger).

The blockchain is a “chain of blocks” that compile a series of transactions executed within a process, hence the name *block-chain*. Every block incorporates a determined number of transactions which are recorded within a limited duration, which is preceded by the previous block (Boisard, A. n.d.). Every transaction is subject to verification and validation by network members (or nodes) in a process known as “mining” (Adams, R; Kewell, B; Parry. 2017). Miners are users who validate the new transaction in order to record it on the blockchain. After the validation of the block, it will be time-stamped and linked to the other block chronologically (hence chain), to then become visible to every user who is on the blockchain (Boisard, A. n.d.).

Blockchains can be categorized into “permissioned” or “permissionless”, as implied by the terms itself, the first one requires prior authorization for nodes to access it, while the second one will allow anyone to participate. A “hybrid” categorization between both of them also exists, where a “private chain” is created to keep private data (Pisa & Juden, 2017). The access to the Blockchain data can also be classified into “public and private” according to Peters and Panayi (2016). In public blockchains anyone can obtain a copy and initiate transactions, while

in private blockchains permission is restricted to certain users within an organization or entity (Hreinsson, E.M., 2018). There is also a model in between that combines elements from both. The so-called consortium is “...such where a group of is a group of pre-defined nodes on the network are allowed to verify and add transactions, while the ledger can be open or restricted to some groups...” (Skudnov, R. 2018).

In Blockchain technology we can find a combination of multiple existing technologies such as cryptology, decentralized computing, distributed database systems or consensus algorithms (Riani, T. 2018). Besides cryptocurrencies, blockchain has likewise laid the foundation in the field of smart contracts (Zwitter, 2018).

In short, the three key elements of blockchain consist of:

- distributed ledger technology:
- immutable records;
- smart contracts.

Blockchain is reshaping the digital tools used to perform daily transactions at a fast pace (Zwitter, 2018) and a number of research studies prove that blockchain provides numerous opportunities in various application domains due to its innovative and diverse properties. Moreover, it does not need any third-party involvement, therefore cutting down fees or charges when doing transactions.

Blockchain has the potential to revolutionize the operating way of a broad range of industries (OECD, 2018). According to IBM (2018), blockchain can help companies across many industries by speeding processes, reducing transaction costs, freeing up capital and providing security and trust.

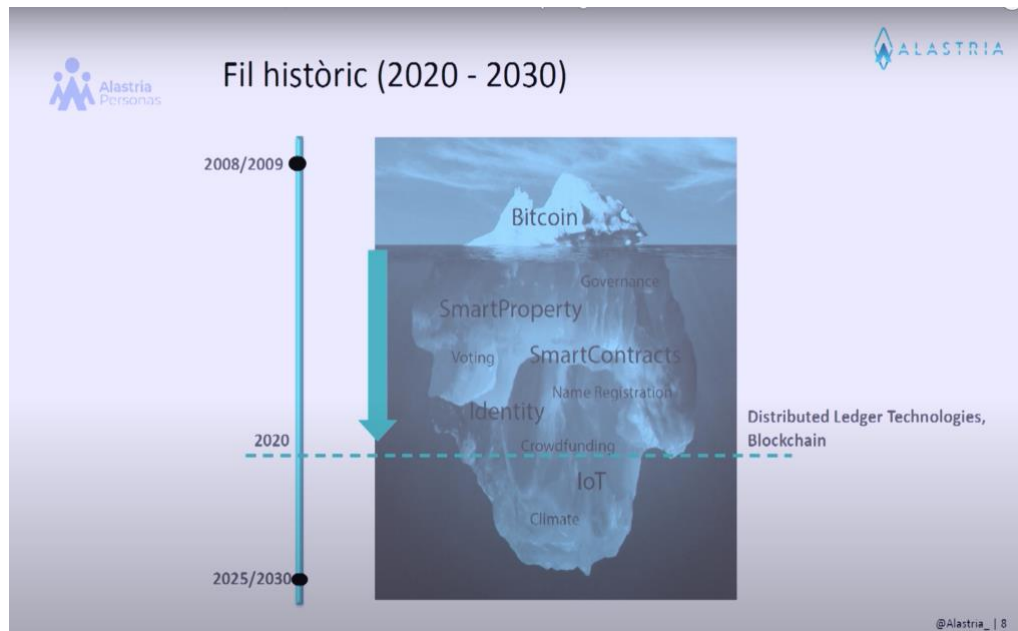


Figure 2. Guàrdia, M. (2020, September 29th) ‘Blockchain, una nova visió d’Internet per generar valor’ [Webinar] 2020 Credit Andorrà, Andorra la Vella, Andorra. Retrieved from: <https://youtu.be/RFEoSMJbq6M>

The Figure illustrates all the applications of the technology that have arisen after Bitcoin since its first creation in 2009 by Satoshi Nakamoto. Bitcoin is just the tip of the iceberg, since blockchain is known as being the underlying technology behind it, while a many more applications are laying in the deeps. A parallel can be drawn between the revolution of internet and blockchain. Back in the days, the first application of the internet was to share data between computers before it became what it is nowadays. As illustrated in Figure 2, blockchain technology was first applied as the ledger for Bitcoin, but its potential extends far beyond it. Its first uses started to be discovered in the field of financial services and it is recently starting to expand at a rapid rate.

Taking all this into account, blockchain represents a fundamental change in the way humans exchange value. Cathy Mulligan, a Research Fellow in Innovation and Entrepreneurship as well as Representative of the UN Secretary-General’s High-level Panel on Digital Cooperation published an article in 2019 *Blockchain and Sustainable Growth*, which focuses on blockchain and its potential benefits for humanity as well as their application to the 2030 Agenda Goals, which will be quoted several times hereafter. According to Mulligan, blockchain technology redefines trust, transparency and inclusion across the world (Mulligan, C. 2019). In a context where our society is being re-defined by a new series of technologies, blockchain is amidst “*the latest waves of digitalization*” (Mulligan, C. 2019). She also compares the phenomenon of blockchain technology to the Industrial Revolution in terms of being a response to the main challenges relate to each era. Therefore, just as the internet

transformed the way we share information, blockchain has the potential to transform the way we exchange value. What is more, blockchain augurs a new performance in regards of the internet: *It moves from an internet of information to an internet of value* (Swan, M. 2015).

## 2.2. Blockchain properties

In order to understand what blockchain can bring to humanitarian aid, it is necessary to dissect its most important particular properties.

- **Decentralization:** eliminates the need for centralized parties as well as intermediaries to authorize or grant permission to access it. We talk about centralization as per control of the technology as well as the way of recording and storing the information. Therefore, in centralized systems, only a group of peers can make changes, not every individual or entity can enter the network. Therefore, some peers have more authority than others (Adam Drury, 2017). What is more, everything that is centralized it is vulnerable to be hacked, plus it slows down the process. “Blockchain disperses power and authority to the masses”, that also means that any individual or entity is equally entitled and able to participate.

- **Transparency:** blockchain ensures immediate, across-the-board transparency. Every node on the network is constantly sharing information on the ledger, which creates a permanent record which is public and accessible for the rest of the nodes and therefore provides accountability of each action. It is a key feature to fighting corruption and bureaucracy obstacles.

- **Accountability:** any organization’s acknowledgment of the impact of their activities and actions. It implies the assessment of repercussions by each action, as well as the possibility to report them to the parts or stakeholders (Fraga-Lamas, P; Fernández-Caramés, T. 2020). Just as stated above, the possibility of having a permanent and public record.

- **Distributed:** As in the control of the data on the blockchain is not monitored by a single part or entity. In the case of blockchain, every member is able to access the entire database as well as its whole history (Halas, M 2018). The distributed nature of blockchain makes it highly resilient to cyber-attacks which are relative to traditional databases. If there is an attempt to hack it by an external part, everyone who is part of it will know.

- **Immutability:** Blockchain's feature of tamper-resistance is also described as "immutability", as in transactions can't be altered after being entered in the database. However, the use of these terms remains controversial, since the possibility of altering a record is not entirely removed.

- **Traceability:** it refers to identifying and tracking assets (data, materials, processes,) as well as actions. "Tamper-evidence" is also used in some cases as in revealing any interference with the contents, since the attempt of fraudulent changes on the blockchain can be detected by the other nodes (Hanson, R. T.; Reeson, A. & Staples, M. 2017).

- **Authentication:** Considering the above and due to its distributed nature, blockchain's authentication scheme is highly efficient. The entire network is tamper-proof and immutable, as well as capable to verify the integrity of its data, therefore avoiding any attempts of corruption or falsification (Aarvik, P. 2020).

The resilience of the blockchain technology due to its decentralized and distributed nature allows it to be used to address sensitive tasks.

The value of blockchain relies in its users and uses, users assign a value and transform data into information. However, as it is continuously stated throughout this project, we are currently in the context of an early phase of blockchain and there is much potential yet to be unlocked (Monrat, A; Schelén, O; Andersson, K. 2019).

### **2.3. Blockchain on humanitarian aid**

Blockchain alone does not constitute a “miracle” or a “silver bullet” to improve effectiveness in the international development industry or any other system we apply it in. However, when it is combined to the system as a whole, it can lead to a significant transformation (Ford, F. & Lobo, I. 2017).

Humanitarian supply chain can be extremely complex and as a result, the aid supply chain visibility and data is often poor (Privett, N 2014). Blockchain technology has potential to provide significant benefits to improve it. By providing a decentralized, verifiable source of data, blockchain can provide transparency and accountability to aid delivery operations. According to Stathakis (2019) we are currently in a decisive moment to reflect on blockchain technology, as institutions worldwide are contemplating the use of blockchain to ease their activities. The most frequent examples are governments that seek digital-identity solutions or international organizations striving for more transparent donation procedures (Stathakis, I. 2019).

### **The Sustainable Development Goals**

In September 2015, the 193 Member States adopted the 2030 Agenda for Sustainable Development, which set out a 15-year plan to achieve 17 so-called Sustainable Development Goals. They are “...*a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere...*” (United Nations, 2015). Therefore, the Sustainable Development Goals are a set of 17 global goals designed to be a shared “blueprint to achieve a better and more sustainable future”. The 17 Goals are interconnected and none of them is more important than the other one. Moreover, they have broken them down in order to tackle every single aspect.

The Agenda “Transforming our world: the 2030 Agenda for Sustainable Development”, states that the Agenda is “...*of the people, by the people and for the people...*” (United Nations 2015, p. 12).

#### *“Leaving no one behind”*

In pursuance to their commitment to the realization of the UN Sustainable Development Goals, Member States also acknowledge dignity as the core priority of every human right. By the same token, the SDG’s must reach every nation, as well as people from all sectors of society, reaching out first to “*those who are further behind*” (The United Nations, 2016).



Figure 3. United Nation’s SDG’s chart.

The inception of blockchain technology has brought skepticism due to the decentralized nature of it. However, many organizations are shying away from using it (ICHA, 2018) as they realize that blockchain can have a significant impact on the achievement of the Sustainable Development Goals. Many entities within the United Nations have already started working on the application of blockchain in their projects.

The UN is implementing blockchain technology in sustainable development projects, such as the platform Blockchain 4 the SDG’s, which provides a space for discussion, sharing knowledge and ideas about the uses of blockchain technology to the benefit of the SDG’s. In fact, the UN suggests that blockchain will be leading in cash transfers at the World Food Programme in the future (WFP Innovation Acceleration, 2017a). This is a resolute step, especially considering the fact that, according to Ross (2011) the UN is considered to be the “*center of the international aid architecture*” (Ross, 2011, p.1). UNICEF also sees the potential uses for blockchain technology and highlights 3 main aspects: leveraging financing models in order to improve the process of resource distribution; improving internal processes by providing more transparency and increasing efficiency; encouraging the creation of open-source digital public goods (UNICEF, n.d.).

*“Trust is the key”*

According to the 2019 Eldeman Trust Barometer (Edelman, 2019), which surveyed more than 33,000 people across 27 markets, only 56 percent of people globally trust Non-Governmental Organizations.

The humanitarian aid sector has raised serious concerns in regards to trust and confidence in charities due to a lack of transparency in spending as well as various scandals around the world. In addition to this, the high administration costs and the high cost of transferring funds



throughout the world have also been an important cause in the decreased level of engagement in charities. Time is also an important aspect: traditional banking systems charge high fees to transfer funds, especially across borders, but also these transactions can take weeks, even during a crisis response.

What all of this illustrates is that building transparency essential for nonprofits, and blockchain technology can play a central role in this process.

### **Generating ID's**

The Sustainable Development Goal Target 16.9 ("*Legal identity for all, including birth registration, by 2030*") acknowledges the importance for the world's most vulnerable population.

As mentioned before, an estimation of one billion people worldwide is facing the challenges derived from not being able to prove their identity. That results in difficulties accessing fundamental services, such as access to education, receive healthcare or participate in the institutions at a national and international level. It also prevents individuals of being able to have access to important economic opportunities, such as getting employment, registering a business or simply opening a bank account. Finally, the lack of identity also causes individuals to be more exposed to risks of exploitation such as labor exploitation, sexual exploitation or human trafficking.

The lack of identity not only does concern individual rights, but it is also a major obstacle for countries to deliver their assistance and services efficiently (Vyjayanti, D; Diofasi, A; Lu, J. 2018). The lack of having an identity is a direct threat to human dignity in many ways, and the increased waves of migration due to increased instability of states is causing more individuals to find themselves in this situation, which is especially the case of refugees and asylum seekers.

Another aspect in which Blockchain technology is uniquely useful is digital identity. Biometric systems – register refugees and maintain those records in a database and issue refugee ID cards

The problem with centralized databases is the possibility of the data being tampered with and hacked, which presents a serious risk. A recent study in 2019 reveals that personally identifiable information comprises 97% of all breaches in 2018, which makes it the most targeted data for breaches (ForgeRock, 2019).

An UNHCR report states that “...*a new wave of technological development might be opening up an unexpected perspective through which improve this situation...*”. Its strong encryption and decentralized nature provide an ideal environment for setting up a system of digital proofs of identity.

As further stated in the same report, Blockchain takes the form of a digital public ledger, which is exclusively known and accessible for all the users connected. These digital identities will allow users to conduct transactions themselves, since users have their personal information stored in a way that they control who else can see it. That means that other organizations can access the person’s ID for purposes of authentication and not for tracking them or accessing their data (Roberts, J. 2017). Moreover, blockchain also adds another benefit in favor of refugees: it allows them to own their own records and share them with third parties in need for instant verification (Smolenski, N. 2018).

Therefore, blockchain technology has the potential to provide new solutions for people unable to prove their identity. This distributed ledger system would be accessible to refugees anytime and anywhere. Actually, among the 2.7 billion people who don’t own a bank account, 60% are in fact mobile phone owners. This lays the foundations for blockchain-based mobile identification solutions, which would address the specific needs of these users in a more efficient manner (ConsesnSys, n.d.).

### **Improving aid delivery**

According to UNHCR, there are around 26 million refugees who need daily support from NGOs and international organizations. 20.4 million refugees are under UNHCR’s mandate and 5.6 million Palestine refugees under UNRWA’s mandate (UNHCR 2020). As mentioned before, humanitarian organizations themselves face challenges with effectively distributing aid.

Donation management and cash distribution carry an inherent risk of malpractice and fraud. In its 2017 report, Human Rights Watch warns regarding the lack of transparency in donor funding (Rau, S. 2017). Thus, the humanitarian aid sector is facing serious concerns in regards to trust and confidence and it is due to two key issues: 1) transparency in donations; and 2) the costs associated to those.

According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) Crowdfunding for Emergencies Think Brief, in order to increase trust in projects and

ensure continued donor engagement, it is essential to increase “*transparency, accountability and reporting among donors*”. (United Nations OCHA, 2015).

Blockchain has the potential to transform aid delivery in many aspects, as well as revolutionizing the relationship between donors and charities. Firstly, the features of this technology have the capability to eliminate corruption by ensuring transparency and accountability (Zwitter, A. 2018). Zwitter states in the report that with blockchain technology every transaction is public as well as traceable by every node in the Blockchain. In short, the technology is a game changer for both transparency and accountability in the field of aid delivery. The process of a donation goes beyond a simple sequence of flows from the donor to the recipient. Due to the fact that blockchain does not need a third parties during the process, the chances of committing fraud decrease. Blockchain can help track and verify where donations are going, therefore giving donors the needed transparency.

Similarly, blockchain makes it easier to transfer funds globally, speeding the process and reducing the fees, which is a major advantage for international nonprofits. More and more charities are interested in the use of blockchain due to significant cost reductions on their transactions.

In addition to this, the fact that blockchain system allows peer-to-peer transactions without the need of any third party or central authority, efficiency is likely to be increased by eliminating participants to an (already complex) chain (Kuijpers, R. 2018). This also reduces the transaction costs and contributes into keeping the privacy of the data.

## **Chapter 3: Case study**

This chapter outlines the results from the literature review and includes the discussion based on an in-depth description of the most relevant projects carried by relevant UN agencies in collaboration with the private sector. As it was outlined in the literature review, blockchain's potentiality in the humanitarian aid sector is starting to be explored. Blockchain has the potential to transform humanitarian assistance within the refugee crisis in two main aspects: improving aid delivery and managing identification. This case study is aimed to contribute as an example on what the use blockchain can bring to the global refugee crisis for both refugees and host countries when multiple international organizations and the private sector contribute together to implement this disruptive technology to aid people in need. Despite the early stage of these projects, it is already possible to assess the way blockchain can change aid delivery at a smaller scale.

### **3.1. Methodology**

The use of blockchain in UN-led projects aimed to address the refugee crisis will be examined through a case study. This paper establishes research methods based on the existing research on blockchain and its use cases. The analysis tools were therefore generally based on related literature research, case studies, and punctual participation in discussions with blockchain experts.

My choice for using secondary data was aimed at examining more perspectives to previous studies. The purpose of this method is to contribute to scientific knowledge and look for an alternate perspective based on existing data. A secondary data-based analysis can significantly contribute to research by providing new knowledge, according to (Heaton, 2008, Johnston, 2012; Smith, 2008). Moreover, using secondary data is also an advantage in terms of time and cost-effectiveness. As mentioned before, literature and data sources for this thesis were narrow, and according to Johnston (2014), the use of existing data provides a more feasible option for researchers who are in a situation of having limited time and resources (Johnston, M. 2014).

However, using secondary data also has its disadvantages, and for me it brought some difficulty to identify secondary data that is valid for use. Without having developed surveys or conducted research on primary sources, I could not have total control over how the secondary data was gathered.

For this reason, it is important to have multiple sources in order to ensure reliability in findings. Hence, having more than one source arriving at the same conclusion for comparison or otherwise providing option for contrast (Johnston, M.P 2014)

In regards to the data collection, the research is mainly based on qualitative data. My primary sources were case studies and thesis based on blockchain projects applied to humanitarian aid delivery to refugees. My secondary sources are official UN reports and articles; official statements from organizations, Permanent Missions; press releases, conferences, interviews, etc. Most of my resources rely on secondary data, it consists of information already processed by other parties such as journalists, scientists, professors, organizations etc. However, I also included primary data, which consists of official reports and documents from the United Nations and its agencies, as well as statements.

In order to support my research, I took part in online conferences and discussions with blockchain experts. I did that by signing up for online webinars such as Blockchain Summits and conferences.

Moreover, I drew from my own experience with knowledge I gained while interning for the Permanent Mission of Andorra, where I gained knowledge of multilateral development and humanitarian affairs. Most this experience is based on the UN side events which provided valuable knowledge related to blockchain and the UN Sustainable Development Goals.

It is important to mention the difficulty to access quantitative data in this field of research. Due to the new nature of blockchain, there is a limited quantity of research of the technology for humanitarian aid purposes. In fact, one of my major challenge is linking the concept of blockchain to humanitarian aid.

In order to illustrate how I proceeded during the elaboration of this thesis in a transparent manner, I add a Figure of the scoping study framework by Arksey and O'Malley (2005) which illustrates in the most precisely manner the framework of my research steps.

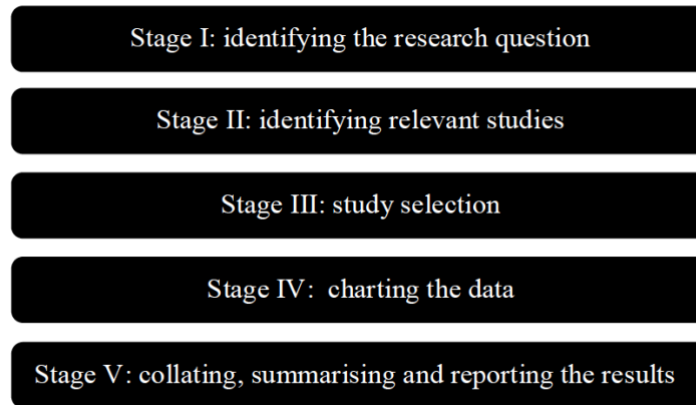


Figure 4. Illustration of Scoping Study Framework. (Arksey&O'Malley, 2005)

A scoping study provided a comprehensive overview of the topic and its state of research, as well an exploration of all the possible applications of blockchain technology in the field. Therefore, the paper start with an introductory chapter defining the concept of blockchain technology and its properties. After setting the overview of the topic, the next step was to develop the research questions in order to establish the purpose of the study (Stage I). In order to support the research and for the empirical analysis, the case study is conducted on the use of blockchain in several projects related to aid delivery to refugees (Stage II). Once I identified the relevant literature, I established the criteria in order to include/exclude them in my paper (Stage III). My first criteria was to include studies based on projects carried out by the UN or its relevant agencies. After spending a great amount of time reviewing literature, I decided to only include case studies concerning blockchain technology on projects related to *refugees and displaced persons*. At the initial phase, I had selected studies focused on humanitarian aid in general, such as disaster relief or other vulnerable groups. I ended up excluding those since I wanted to narrow down and only focus on case studies applied to refugees and displaced persons. The most relevant data was classified and organized into a chart according to the key issues I wanted to analyze, in order to give me a more visual and detailed overview of all the information extracted from the case studies (Stage IV). For the last step (Stage V), according to the chartered data, I analyzed the successes and lessons learnt. Eventually, this thesis outlines a discussion that also focuses on the critiques to the technology and its implementation for the humanitarian field.

To conclude the methodology chapter, it is worth to highlight the fact that in general, when it comes to literature on blockchain technology, I found that the majority of the studies is

devoted to the technology itself, while it is still hard to find articles on its application for humanitarian development.

### **3.2. Description of the projects**

#### **3.2.1. WFP Syrian refugees in Jordan “Building Blocks”**

The United Nations World Food Programme has the mission to fight hunger worldwide. The WFP helps communities rebuild their livelihoods by providing food assistance where it is most urgently needed, “*often in conflict, post-conflict or disaster situations*” (WFP, Emergency Relief, n.d.). The WFP has been providing assistance for more than 50 years and it is said to be “*arguably the most successful and politically legitimate*” amongst the United Nations’ agencies (Ross, 2011, p. 1).

After observing the issues related to financial instability and risk in the field of humanitarian aid delivery, the WFP acknowledged the necessity to implement a neutral platform (Université de Genève, 2020). In 2016, an Innovation Acceleration was hosted by the WFP. One of the participants, Houman Haddad, current head of emerging technologies at WFP, presented his idea of implementing blockchain to improve efficiency and decrease administrative costs related to cash-based transfers within the WFP. After successfully completing the bootcamp, the WFP travelled to Pakistan to test the so-called Building Blocks program and it was tested with 100 people for the first pilot. They transferred money via blockchain with the aim of proving blockchain’s effectiveness for the disbursement of financial support. The pilot succeeded, so it was decided to move to Jordan and use it at a bigger scale.

It was scheduled in Jordan with 10,000 recipients this time. The “subjects” were all people in need of financial support and food (del Castillo, M. 2017). That second pilot was located in the Azraq refugee camp in Jordan and it integrated an iris-scanning technology already employed by the WFP. This system relies on biometric registration data from the UNHCR and uses the biometric technology for authentication purposes (WFP, 2017).

The Building Blocks programme is considered one of the largest-ever implementations of the Ethereum blockchain for charitable purposes. Building Blocks runs on a custom built blockchain and eliminates any possibility of fraud, restriction or third- party interference (de Vrij, 2018). Based on the Ethereum protocol, the programme runs on a private permissioned blockchain, where WFP stores a full record of every transaction and has control over who is accessing the network. In this way, transparency and security is ensured, while providing Syrian refugees greater privacy, as their personal data is not shared with any external part.

It consists of issuing cryptocurrency-based vouchers for refugees which can be redeemed in participating markets. Refugees are able to purchase food or goods from supermarkets within the refugee camp by using their eye scan to substitute the use of cash, e-cards or vouchers.

The Building Block project integrates blockchain into the WFP's biometric authentication technology. This allows Syrian refugees to cash in their vouchers at the counter of the supermarket simply by staring into a retina scanner (the so-called EyePay), instead of using the traditional paying methods such as credit card or cash. The cashiers are therefore equipped with iris scanners that identify and confirm the identity of the user. The data is verified with multiple UN databases and the transactions are recorded on the Building Blocks, a private Ethereum-based blockchain (Juskalian, R. 2018). In fact, the way refugees and retailers operate and interact remains exactly the same, the blockchain only replaces the functions of financial services companies.

The application of blockchain removes the need for WFP to create a local bank account, since the funds can be directly transferred to the refugees' account, in which they have access to thanks to the biometric verification system. Otherwise, for traditional cash-based transfers, the WFP would be required to open local bank accounts in order to be able to distribute the money to the refugees (Zambrano, R.; Young, A.; Verhulst, S. 2018).

In short, the risks are minimized due to:

1. Middlemen are cut out: the blockchain eliminates the intervention of central authorities (banks) in order to facilitate transactions;
2. Recipients –since it is a one-time payment to the shops– don't need to advance any money.

The WFP eliminated 98% of fees related to banking and saved up to \$150,000, as stated by Bernhard Kowatsch, who is the WFP innovation lab's chief (Zambrano, R.; Young, A.; Verhulst, S. 2018). Due to the proven success, the WFP is looking to expand its Ethereum-based blockchain.

WFP invites other UN agencies and entities to cooperate on a neutral blockchain network in order to improve the efficiency of their projects, as well as further empowering the people their users. Their main focus remains on exploring and testing the implementation of blockchain in the fields of digital identity administration and aid delivery chain (Zambrano, R.; Young, A.; Verhulst, S. 2018).



### **3.2.1.1. Cox Bazaar**

The project in Cox Bazaar is part of the Building Blocks project that WFP is spearheading. Building Blocks consists on the aforementioned permissioned blockchain which is integrated with the UNHCR's authentication technology. This system allows the WFP to ensure a meaningful assistance while guaranteeing the anonymity of the users, says Pierre Guillaume Wielzynski, digital transformation services chief in the Technology division (WFP, 2016).

Over 500,000 of the 855,000 Rohingya refugees in Cox's Bazar were assisted by blockchain technology as of September 2019 and the WFP announced its plans to extend its use to all of them over the next 18 months (World Food Programme, 2016). A report issued by the WFP in August 2020 stated the Building Blocks blockchain technology reached over 400,000 refugees, which represents a total of 47% of the refugees (World Food Programme, 2020).

WFP uses the Building Blocks technology to leverage this disruptive technology in order to efficiently provide help to those in need. In the context of COVID-19, in order to avoid dealing with potentially contagious devices, a digital QR code is issued to allow users to be identified.

Users have an account they can use at outlets in the camp and every transaction is sent to local retailers who are contracted to run those outlets (World Food Programme, 2016). Moreover, a history of all the transactions is recorded in real-time on the blockchain, which allows organizations to keep a track of each user and ensure they are receiving the assistance they need.

In order to fulfil the aim of preserving anonymity, every user is identified with an encrypted ID that distinguish them from each other without revealing their true identity.

### **3.2.2. Aid:Tech – TraceDonate**

AID:Tech claims to be the first company worldwide that achieved to successfully distribute international humanitarian aid to Syrian Refugees in Lebanon through the implementation of blockchain technology in December 2015 (Ma, G 2016). In collaboration with the Irish Red Cross (IRC), the International Federation of the Red Cross and Red Crescent (IFRC) and the Lebanese Red Cross they piloted a Blockchain project in the city of Tripoli located in the North of Lebanon (IFRC, 2017). The project was aimed to provide digital identities to 100 Syrian refugee families in order for them to use an intelligent voucher to purchase. The pilot project

was aimed at testing blockchain “in the most demanding conditions possible” (IFRC, 2017) with the focal point on Syrian refugees located in Jordanian camps.

In this project, a survey was conducted by six local Lebanese volunteers who were academics and offered their services. The survey took place in Tripoli, Aker Refugee Camp and Beirut over a period of five days and was aimed to both displaced Syrians and local people from Tripoli (IFRC, 2017).

Thanks to the collaboration of all the involved parties, the pilot was considered a success: the displaced families were able to easily purchase goods and services and the IRC was able to track the whole process in real time. 10,000 USD were donated to the 100 participant Syrian refugee families. There were 500 electronic vouchers and they all were redeemed at those local supermarkets. Moreover, the test intentionally included 20 fraud vouchers and all of them failed at Point-of-Sale. The solution was also simple to implement: “it took only 10 minutes to train cashers to understand it” (IFRC, 2017).

AID:Tech’s services are aimed to help clients and partners to tackle some of the world’s major social issues, along with the targets set by the UN’s SDG’s.

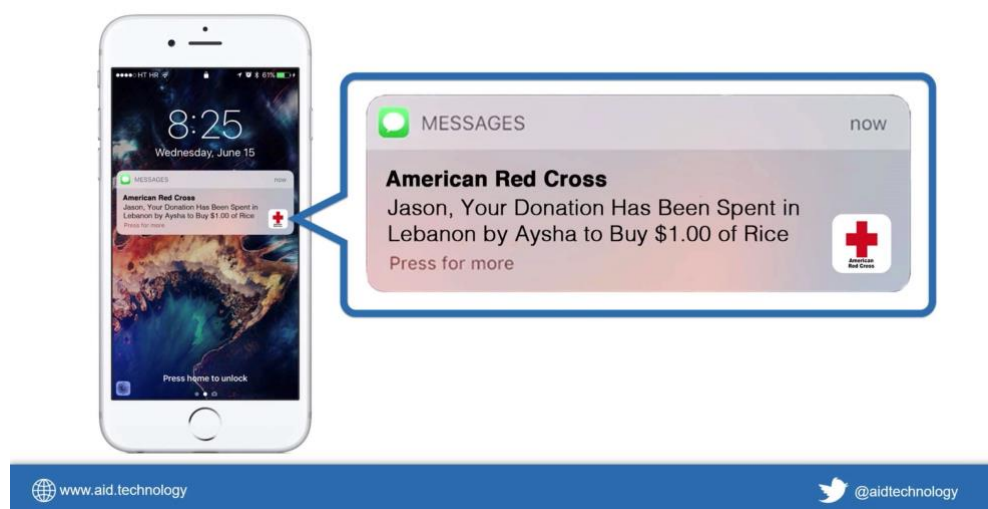


Figure 6. Example of an SMS with information of the donation process. [Screenshot] Niall Dennehy (2018) Helping Refugees with Blockchain: TEDxTrinityCollegeDublin [Video] Youtube. Retrieved from: [https://www.youtube.com/watch?v=pLzLdk\\_HE9I&t=70s](https://www.youtube.com/watch?v=pLzLdk_HE9I&t=70s)

### 3.2.3. Kenya – IFRC

KRCS partnered with the IFRC in May 2018 to conduct a Blockchain Open-Loop Cash Transfer pilot project located in Isolo County, Kenya with the purpose of exploring the potential of Blockchain Technology for transparency and accountability.

This project was rather a pioneer in the humanitarian sector (ICHA, Kenya Red Cross, 2018), considering the fact that, until then, blockchain had principally been used for payment

mechanisms such as e-vouchers. In this specific project, the technology was applied to “...make cash transfer programming (CTP) more effective by promoting timely delivery of aid and strengthen transparency and accountability to beneficiaries and donors...” (ICHA, 2018).

It is worth highlighting that cash transfer programming has been used by KRCS for around 7 years as part of its emergency response. It has handled different processes such as banks, mobile money or vendors. The first two methods were preferred as they significantly reduce the risk of theft, diversion of funds and fraud.

The integrated system was integrated as follows: a mobile money network (Safaricom) and an internal electronic funds transfer system (Craft Silicon). Red Rose provided the humanitarian data management platform as well as the opensource blockchain where all the transactions were recorded (IFRC, 2018).

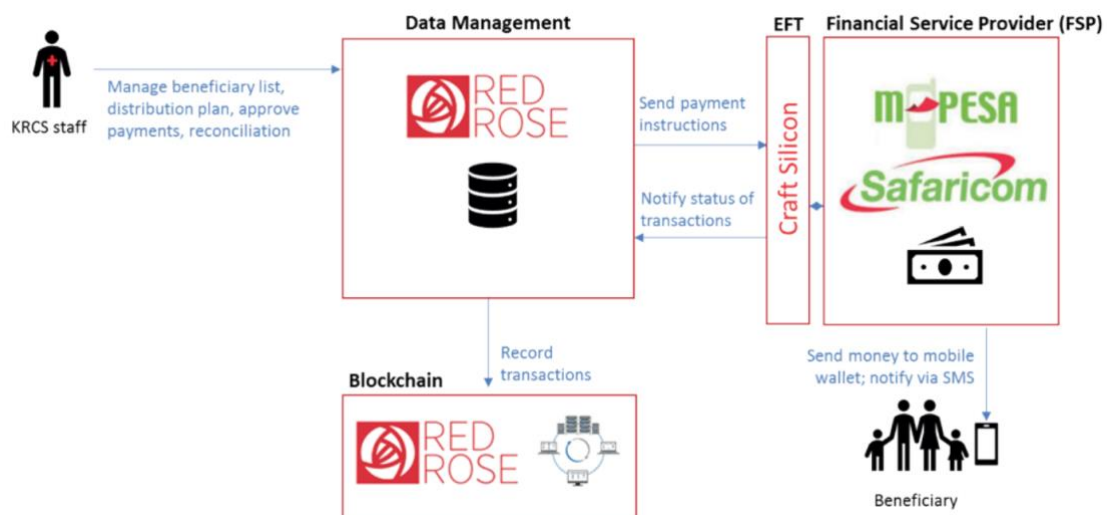


Figure 7. System and process between the integrated systems in this pilot, IFRC (2018) “*Learning Review. Blockchain Open Loop Cash Transfer Pilot Project*” p.4.

The system used to authorize payments to the recipients implied a process aimed to ensure segregation of duties is established between the requester and the finance manager who was in charge to authorize the transaction. As displayed on Figure 7, once the finance manager gave approval, cash was disbursed to beneficiaries through Safaricom M-Pesa. Once the payment request was received by Safaricom, the cash disbursement was executed to the mobile wallets of the recipients and a record of the transaction was registered on the RedRose database and blockchain (IFRC, 2018). The blockchain technology provided an additional record and level of assurance.

In short, transparency and accountability is ensured thanks to the participation of four nodes on the blockchain which enables the transactions to be visible by KRCS, IFRC and RedRose. In order to ensure data protection during the implementation of the pilot, a very limited amount of information and no personal data were recorded on the blockchain (IFRC, 2018).

Another key aspect to this pilot's success was that the data collection tool was working offline, so data was collected offline and uploaded at the moment that connectivity was available. According to the IFRC report, electric power in Isolo County was limited and with frequent outages, while Internet connection was only possible through Safaricom hotspots (IFRC, 2018).

#### ***3.2.4. MONI Finland***

Moni is a Helsinki-based fintech startup that partnered with the Finnish Immigration Services to offer a blockchain solution for asylum seekers to address challenges related to identification. The project uses Ethereum to maintain a record of every financial transaction made with the card into this public database which is maintained by a decentralized global network of servers. The Immigration Service keeps the track of the transactions without the need for a bank to intervene in the process.

The project started back in 2015 as a pilot project in partnership with the Finish Immigration Service Migri. The aim was offering refugees a prepaid Mastercard running on blockchain and linked to their digital identity (Rayner, T. 2018). For the pilot, which started in November 2015, MONI issued 10,000 cards and accounts to asylum seekers (Apolitical, 2017). The article also states that lacking of official identity and ability to open a bank account were the biggest obstacles to integration. Generally, after a period of six months, asylum seekers are given permission to work, however there is a significant amount of paperwork required and individuals without bank accounts often struggle with this step.

The most innovative aspect of this project is the fact that it integrates financial resources and identification together. The card enables all types of transactions, from receiving salary to paying bills, sending money or even applying for credit through the mobile phone. Another groundbreaking aspect is the use of public blockchains for transferring value in a way that to the users seems like using a traditional debit card.

Explained in short, MONI provides the users with a customizable mobile payment account and a prepaid Mastercard. The account is linked to the individual identified by the Finnish

Immigration Services using their asylum seeker ID, which is tied to a biometric police record. It acts like any normal bank account with the exception of some limitations. Hence, it allows payments or salary but it cannot be used to send money abroad (Apolitical, 2017). In regards to security, the users remotely lock their card in the event it gets stolen. The aim is for refugees to carry around the minimum amount of cash.

MONI's service helps removing a major barrier to gaining employment, which is typically due to their lack of identity. It also benefits the Government in the sense that it insures that, once they get employment, refugees receive their salaries through the card, therefore paying taxes like any other citizen and contributing to the economy. In this way, MONI's project promotes financial inclusion and steps up integration.

In regards to the future, MONI is developing a model for automated tax collection through smart contract, which is intended to be offered to self-employed refugees and entrepreneurs. The aim is to reduce tax collection costs for the government, as well as ease the proceedings for entrepreneurial refugees (Apolitical 2017). What is more, MONI's scheme could benefit other countries Thanks to the EU's E-Money Directive, it could be used across the continent to help to bring migrants into the financial system.

### **3.2.5. ID2020**

ID 2020 Alliance is public-private partnership between NGOs, such as the UNHCR, private sector companies such as Microsoft and Accenture, as well as foundations such as the Rockefeller Foundation (OECD, 2018), among other members. The purpose is to use blockchain technology to provide a digital identity to the 1.1 billion people who are lacking of it. With blockchain amongst the most innovative solutions, this alliance examines innovative ideas to generating a digital identity (ID2020, 2017). The main objective of the ID2020 alliance is to empower its users by allowing them accessing their own digital identity and therefore regaining their dignity.

Microsoft and Accenture have joined forces to create a tool that combines blockchain together with biometric systems such as fingerprint or iris scan in order to create a permanent identity. More specifically, the biometric system is designed by Accenture and it is built on infrastructure using "Microsoft Azure" cloud computing. The Accenture report also states that by 2017 the number of refugees enrolled already exceeded 1.3 million. They added that the hope for 2020 is to have more than 7 million refugees enrolled (Accenture, 2017).

As stated in the OECD report *Embracing Innovation in Government* (2018) the most predominant objective is that the identities are managed by the users themselves so they have direct control of the platform, especially concerning who can access their data as well as if it is shared (OECD, 2018).

The ID2020 Alliance has set forth 3 targets:

1. Finance projects to implement digital identity solutions in order to accelerate and simplify access to digital identity for those in need.
2. Design an identity scheme that is trustworthy and decentralized, as well as create a healthy market and simplifying interoperability.
3. Create a neutral governance structure with a diverse ecosystem, organizing meetings and discussions, thus enabling multi-stakeholder collaboration (ID2020, 2017).

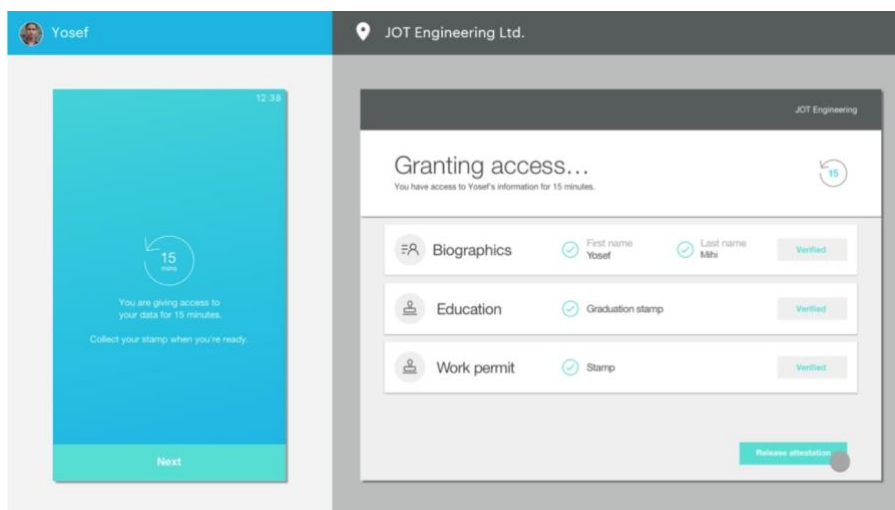


Figure 5. ID2020 illustration that shows how the system looks on the phone of a user. Roberts, J. (2017) Microsoft and Accenture Unveil Global ID System for Refugees.

### 3.3. Results & Discussion

This research provides a mixed report on whether blockchain improves humanitarian aid outcomes at different stages of the delivery of aid to refugees. While the research identifies some important blockchain initiatives to help refugees, there is a lack of publicly accessible statistics and updated data, which would be necessary for a more precise comparative analysis and verification of the impact.

This analysis only covers part of what the technology offers for the humanitarian aid sector in terms of donation processes and ID management. There are more processes that can be improved by using blockchain technology, for instance:

- Supply chain.
- Potential use of cryptocurrencies
- Volunteer data management
- Smart contracts (*secure forecast-based financing arrangements*)

I cannot affirm that blockchain technology absolutely improves the development practice of aid delivery to refugees. However, I can confirm that applying blockchain technology adds an acceptable degree of efficiency in improving and facing major challenges. The research supports the statement that technology is a force for change and has the potential to revolutionize the global aid industry, based on the review of the projects. With the correct application, blockchain technology provides significant leverage for the improvement of aid delivery.

As stated above, my analysis is limited by availability of data, which still remains a challenge in monitoring blockchain projects in the humanitarian field. Moreover, there is also limited literature available on this field, due to the fact that blockchain is rather a new phenomenon per se.

Due to the early stage of the use of blockchain, as well as the fact that almost all of the projects are at a pilot stage, major uncertainties and ambiguities still prevail. On the other side, I reiterate there is much potential yet to be discovered and unlocked.

### **3.4. Successes & Lessons Learnt**

Blockchain is a powerful tool to accomplish SDG 16.9 “*Provide legal identity for all*” by enabling identity generation for refugees. Moreover, the lack of identity poses a major threat to human dignity. Through their identity, refugees can access basic services and receive the same level of benefits just as any other citizen without the risk of personal information getting exposed. Finally, refugees are able to choose and manage what are the first necessity products they need at any time, since they are able to purchase the goods by themselves through their vouchers (Building Blocks) or digital cards (MONI).

Blockchain also guarantees success in terms of improving aid delivery. In terms of management of funds, the projects demonstrate how the implementation of the technology certainly proves to be effective in reducing transaction and operational in three of the core aspects:

1. Elimination of third parties and middlemen by using blockchain and immutable databases

2. Saving on costs and fees related to transaction costs
3. Ensuring transparency by monitoring the usage of funds

(ICHA Kenya 2018) has proved the evidence that blockchain offers a way to improve transparency and accountability due to its unalterable distributed ledger. By integrating the system with mobile money network and a data management platform, the solution enables more efficient and timely disbursement of cash, at the same time that it ensures controls and improves the quality of service.

Blockchain technology shows its capacity to revolutionize the humanitarian aid sector by tracking the information flow and saving in costs. What is more, blockchain can provide an ameliorated record of where humanitarian aid is directed to, as well tackle with the problem of corruption by providing aid transparency. Another aspect worth highlighting is that adding transparency also helps identifying how many refugees are in the camp and assessing their needs in order to act accordingly.

All the projects prove that partnerships are the key to successful outcomes. Collaborative work with relevant partners from both the private and public sector are essential in order to efficiently implement such projects.

We have also seen that these partnerships enable the integration of different technologies.

In regards to the technology itself it is important to highlight 3 major aspects we have seen in the description of the projects.

- a. It is important to prioritize a technology that is easy to integrate rather than one that is costly and difficult to change.
- b. Combining blockchain with data management platforms and biometric systems proves to be successful.
- c. A robust data management system

As shown in the Building Blocks project, in order to empower refugees, it is essential to assess their needs and involve them in the process, designing the aid with input from them. It is important to differ from aid models that came before in order to overcome barriers (Taljouk, R.; Garbett, A.; Montague, K. 2019). As stated in the WFP Building Blocks, one of the major difficulties is identifying every individual and their needs and then communicate back to the donors and therefore, the needs of refugees were met in the maximum effective and efficient way.

Before heading to the conclusions chapter and as a final remark of the case study section, I want to reiterate on the need of further research on the impact of blockchain on humanitarian aid should be conducted and experimentation with future application.



## Chapter 4: Conclusion

### 4.1. Limitations and risks

As it has been outlined previously, blockchain is in a context of an *early stage* and its use in the humanitarian aid industry is still being discovered. Therefore, the majority of projects that are being conducted by international organizations are pilots and the information is rather limited.

The *complexity* of blockchain technology is another significant limitation to its implementation, as it is not yet widely understood. The way informed consent can be obtained from beneficiaries still remains unclear even for professionals in the information technology field (IFRC, 2018). There is a significant gap that needs to be resolved between the potential of the technology use and the lacking of ability to effectively set up solutions and lack of strategic planning to maintain them over the long run.

Blockchain technology itself is *no silver bullet alone* for humanitarian aid. If there are issues related to underlying development, such as information which is non-reliable, the use of this technology cannot be of any help whatsoever. In this sense, blockchain is not different from other systems or databases. Moreover, the characteristics of each area and each disaster or crisis are unique. They each introduce new requirements and demands, whether blockchain technology presents equal number of effective solutions in all areas and crises still remains unknown.

There are major *privacy and data protection issues* remaining unclear. Due to its permanent feature, every record is stored forever, which doesn't sit well for those concerned about their privacy. Uncertainty still remains in regards to the way beneficiaries allow informed consent, especially for projects that involve a complex data structure (ICHA; Kenya Red Cross, 2018). Moreover, blockchain is a public platform, established with the aim of creating transparency, therefore it is crucial to ensure that personal data remains secure.

In order to address concerns such as the aforementioned privacy issues, it becomes clear that one of the major limitations is the *absence of a legislative framework*. Providing a legal framework is therefore crucial in order prior to the implementation of blockchain in the field of development and humanitarianism, as well as in any other sector. It is essential for decision makers to have complete understanding of blockchain before taking any decision in regards to whether it is convenient or not. It is necessary to ensure that Blockchain complies with international humanitarian law and human rights law. What is more, humanitarian principles

of “*humanity, impartiality, neutrality, and independence*” are amongst the fundamental aspects to observe when it comes to any solution related to technology (Zwitter, 2018).

In terms of *infrastructure*, a major issue remains in areas of crisis. Blockchain technology is internet based and therefore needs *connectivity* and access to digital tools. For any blockchain based project to be possible, there is the need to have electricity and connectivity in crisis areas. According to the World Bank Data of 2018, only around 47% of the population worldwide has access to internet (The World Bank Data, 2018). What is more, there are some governments that do not support full access to internet. By the same token, the lack of *infostructure* in developing countries is another remaining issue and it refers to the organizational structure supporting an information system. These imply major restrictions for the implementation of blockchain, since it means that the specific policies and regulations required to secure transactions are not in place.

Another remaining issue is the lack of *speed*, even though it is proven to accelerate the transaction processes, blockchain is not yet ready to be used at a global scale (de Vrij, 2018). Especially permissionless blockchains cannot validate transactions fast enough. This issue hampers blockchain to be implemented at a larger scale. However, it is worth to highlight again that blockchain does significantly add speed especially in the last part of the supply chain, since recipients are relieved from bureaucratic processes (de Vrij, 2018). A great example of this is the case of vouchers on the Building Blocks or the debit cards in the MONI project.

These initiatives are led by tech-corporations together with UN agencies and/or humanitarian NGOs and governments, so they rather offer have a *top-down* approach and might not always be accepted by all refugees. Therefore, the need to share, communicate and listen to the real needs and desires of the refugees are a key aspect in order to ensure they are empowered and they really get a solution to their problems.

Finally, there are *environmental concerns*: blockchain is resource- intensive by nature. The inherent need to verify the transactions ('mining') demands for energy-intensive number crunching by a number of servers.

#### **4.2. Future of blockchain in humanitarian aid**

It is still too soon to assess to which extent blockchain can improve the entire humanitarian aid industry. However, it is interesting to see how the technology is starting to change the way international aid organizations provide help to those in need.

One of blockchain's features that could be further explored would be smart contracts. As mentioned, smart contracts can carry out specific functions automatically based on predefined conditions. They could be a great tool for the creation of work permits for refugees. Smart contracts would facilitate procedures between employers or businesses and even set up real-time tax payments when they receive income.

I reiterate there is a prominent necessity of further research in the field. Recommendations for further research should indeed include:

- Analyzing the possibility to implement blockchain on a global scale.
- Do the benefits outweigh the disadvantages and costs linked to blockchain?
- Do its features comply with international humanitarian law and humanitarian principles?

There are other technologies that can provide assistance in the humanitarian field such as biometrical solutions, 3D printing and drones for delivery of aid. For example, technologies such as 3D printing and drones have also been used specially to deliver supplies in the most remote areas (James et al., 2016). Nevertheless, in most cases the use of these technologies still remains in either a pilot or aspirational stage (Culbertson, S; Dimarogonas, J; Costello, K; Lanna, S. 2019). The WFP is also interested in exploring beyond money transfers and scaling up in the implementation of blockchain in the fields of humanitarian supply chain and digital identification.

There many other examples of applications of blockchain with great potential to help refugees. The UNICEF Program *Game Chaingers*, which is recruiting gamers to use the processing power of their computers for "mining" the currency in favor to Syrian children. Gamers download the so-called Claymore programme, which uses the graphics card of the PC to for the mining process while the computer is on but not in use. The mined currency is sent to UNICEF's e-wallet to then be sent to the beneficiaries. Even though the scope and duration of such project were rather small, the project exemplifies the inclusive feature of blockchain. Inclusivity can easily be reached with blockchain, as it can involve any member that does not necessarily need to be active in the field of humanitarian work or engaged in any charitable work whatsoever.

Blockchain has also proved to have potential in successful programmes in order to address other important Sustainable Development Goals, such as Gender Equality & Women Empowerment (SDG 5). UN Women, the UN organ dedicated to this field, hosted a 4-day blockchain simulation lab in 2018. The lab addressed humanitarian scenarios around identity and it was aimed to create a first step by merging the pursuit of achieving SDG 5 with other

intersecting SDG's, such as ending poverty and hunger (SDG 1 and 2 respectively). From this workshop, it became clear the need for humanitarian aid organizations to embrace new technologies in order to increase their efficiency and ensure that *no one is left behind* (ICHA, 2018).

Gear, R. (2018) states how the blockchain market at the moment seems to have the typical “*characteristics of a bubble*” (Gear, R. 2018). We are still in the early stages of the application of blockchain technology. In order to make the best out of this powerful tool and transitioning to a future with the imminent presence of blockchain, the more people transition into it, the more useful and fair its use will be.

The 2030 UN Agenda for Sustainable Development provides an ideal opportunity to create value. Innovators who are applying this technology to address the toughest challenges nowadays are “disrupting many long-established institutions, gatekeepers and middleman of centralized economies” (PA Consulting, n.d.).

To conclude this section and before jumping on the last remarks I would like to cite a quote on the same article PA Consulting (n.d.): “*Blockchain's fundamentals of openness, algorithmic consensus, and shared distributed record-keeping represent a technological genie that's now out of the bottle*” (PA Consulting, n.d.).

#### **4.5. Last Remarks & Recommendations**

*“The real value of the blockchain it is not the technology per se”* (Unknown)

There are still plenty of problems to solve as well as opportunities to seize. A report from the UNHCR (Lee, M. 2020) states that research on blockchain in displacement context is still “vastly underdeveloped” and its main reason is the novelty and uniqueness of the technology as well as the early stage of most of its projects.

Research should take a leading role in regards to the research of blockchain's potential for this particular sector. More projects case studies are needed in order to assess whether blockchain is a game changer or it is merely hype. As seen in the discussion part, it has been proven that blockchain can increase effectiveness and efficiency at a lower cost. Therefore, it would be interesting to explore its application at a bigger scale.

As it is mentioned in the limitations sector, issues related to humanitarian aid are a result from factors such as political conflicts or climate change and therefore they highly rely on economic, social and political solutions and action. These are questions that cannot be resolved

by technology alone. Blockchain can be a valuable tool, but it is not sufficient by itself, it will not change underlying fundamental causes such as the way of doing politics nor will it drive a sociocultural change.

While there is no quick fix or magic formula to such complex issue as the refugee crisis, according to Toni Caradonna, Chief Innovation Manager at the Porini Foundation, “...Blockchain for Good offers great potential, but cannot be viewed in isolation as a silver bullet for all the world’s pressing issues. However, there are some aspects where blockchain can help to make a difference...” (Allen, M. 2018). Even though blockchain can cut middlemen and provide transparency and efficiency, “...We still need cooperation from legislators. Blockchain alone cannot solve the problem...” (Allen, M. 2018). A significant amount of private-public partnerships is required to successfully implement these new technologies. It is essential to reach out to policymakers, humanitarian partners, etc. in order to spread awareness on how to apply blockchain. New policies have to be developed at both state and international level to allow for innovation while ensuring responsible use of the technology and providing a guidance on its uses. This would incorporate a wide range of measures, from ensuring the safeguard of privacy rights, ensure accountability and combat any perceived potential harm.

Education plays a crucial role to everything mentioned above. UNHCR (together with other relevant agencies, private companies, donors, etc.) should help providing or at least facilitating solutions to the necessity of refugees and displaced people for financial access and digital identities. By the same token, fund for effective educational technology in refugee settings is a fundamental part (Culbertson, S; Dimarogonas, J; Costello, K; Lanna, S., 2019).

Finally, I want to add a call on multilateralism, since disruptive technologies are a key aspect that need a multilateral approach. Coming back to (Mulligan, 2019), anyone who has applied blockchain has come to the conclusion that it implements a specific level of cooperation: it requires partnerships as well as taking the discussions in regards to the concepts of *transparency* and *inclusion* into a whole new level.

Creating a multilateral consensus approach is essential to address the emerging technologies, as well as ensuring that all the relevant parts have a clear understanding of the new technology and its implications. Therefore, among a series of initiatives to address the potential of these technologies, the Secretary-General’s Strategy on New Technologies was established in 2018 (United Nations, 2018). The strategy defines principles and commitments for the use of the new technologies with the aim to accelerate the achievement of the 2030 Agenda Goals and accelerate development progress that truly *leaves no one behind*.

The list of blockchain's applications is growing, and it will eventually be handed to an increasing part of the population. With its use a wide range new solutions will appear, but also new risks and challenges will come along. *"Governments should define clear guidelines to prevent misuse, but without stopping the innovation"* (Permanent Mission of Liechtenstein, 2019).

Taking all this into account, blockchain can evolve beyond its present phase of hype in order to become a reference of application in the field of humanitarian aid as well as the United Nations Sustainable Development Goals, which provides a unique opportunity to create value in a responsible and sustainable way.

*"Everything will be all right - you know when? When people, just people, stop thinking of the United Nations as a weird Picasso abstraction and see it as a drawing they made themselves"* (Dag Hammarskjöld).

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## Annexes

### Annex A

Classification	Case Name	Areas	Characteristics	Performance & Progress
Aid delivery and Digital Identity Management	<i>WFP Building Blocks</i>	Refugee Camp	<p>Organization(s): WFP            Year launched: 2016            Countries: Pakistan, Jordan            Users: 100,000 refugees</p> <p>WFP issued cryptocurrency-based vouchers for Syrian refugees that could be redeemed in participating markets. These vouchers were redeemed through the blockchain technology through an eye-scanning hardware that verified the user's identity. Building Blocks is one of the largest-ever implementations of Ethereum blockchain for a charitable purpose.</p>	The WFP eliminated 98% of fees related to banking and saved up to \$150,000. After a successful pilot, the project went to a scale-up phase and WFP is currently expanding its Ethereum-based blockchain.
Aid delivery and Digital Identity Management	<i>WFP (Cox's Bazar)</i>	Refugee camp	In this specific project, the technology was applied to make cash transfers more effective by promoting timely delivery of aid and strengthen transparency and accountability to beneficiaries and donors.	In this programme, WFP could monitor the assistance instantly and therefore diagnose and fix problems straight away on the spot.
Digital Identity Management	<i>AID:Tech</i>	Refugee Camp	<p>Organization(s): IFRC, AID:Tech, Irish Red Cross and Lebanese Red Cross            Year launched: 2015            Countries: Lebanon            Users: 100 Syrian refugee families, 500 vouchers redeemed</p> <p>Their objective was to field test their technology with Syrian refugees and in the most demanding conditions possible. The main objectives were to ensure that refugees preserved their dignity and humanity.</p>	Considered the first organization worldwide that managed to provide international aid to Syrian Refugees in Lebanon through the implementation of Blockchain technology with an effective and successful outcome.
Aid delivery and Digital Identity Management	<i>MONI</i>	Host country	<p>Organization(s): Finnish Immigrations Services, MONI            Year launched: 2015            Countries: Finland            Users: 10,000 users as of April 2017</p> <p>MONI has developed a prepaid card which is linked to a unique digital identity stored on a blockchain. The aim is to address challenges</p>	The MONI project achieved to integrate financial resources and identification together. The scheme used by MONI could benefit other places across Europe, due to the EU E-Money Directive.

			of identity papers and bureaucracy which impose a barrier to the refugee's integration.	
Aid delivery	<i>Kenya (Dadaab) –BanQu</i>	Refugee camp	<p>Organization(s): Kenya Red Cross Society; the International Centre for Humanitarian Affairs (ICHA) and the Information Communication and Technology (ICT)</p> <p>Year launched: 2018</p> <p>Countries: Kenya</p> <p>Users: 2100</p> <p>Cash Transfer pilot project in Kenya. aimed to explore the potential of Blockchain Technology's in regards to transparency and accountability, which a fundamental aspect to the humanitarian aid industry.</p>	Collaboration with private sector partners was fundamentally important to the pilot project's success (access to specific technology and know-how).
Digital Identity Management	<i>ID2020</i>	Global scale	<p>Organization(s): UN, UNDP, private companies (Microsoft, PWC, Cisco, Accenture and Deloitte)</p> <p>Year launched: 2016 presentation of the initiative at the ID2020 summit</p> <p>Countries: Worldwide</p> <p>Users: -</p> <p>Rather than putting a solution to the table, the ID2020 alliance presented an initiative to develop technology to address the issue of lack of documentation by securing elements of identity on a digital platform.</p>	It remains a pilot project with the purpose of incorporating blockchain into a biometric system used by the UNHCR to facilitate transactions such as cash transfers, food, etc.