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Solving Humanitarian Aid Inefficiencies with Blockchain Technology

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With this paper, we provide an analysis of the potential of the blockchain technology to overcome inefficiencies that currently negatively impact international humanitarian aid systems. The end objective is to provide NGO organizations, public institutions, and private organizations with solid insights on the perspective of scaling humanitarian aid impacts with the help of the blockchain technology.

International humanitarian aid in the world

"We are witnessing the highest level of human suffering since the Second World War", said the former United Nations Secretary-General Ban Ki-moon at the 2016 World Humanitarian Summit. In 2018, the United Nations announced that 131.7 million people required humanitarian assistance in 42 countries and that the financial aid needed to help these people is estimated at \$21.9 billion (United Nations Office for the Coordination of Humanitarian Affairs, 2019). Defined as "*the impartial, independent and neutral provision of aid to those in immediate danger*" (Rysaback-Smith, 2015), humanitarian aid is of key importance because global humanitarian crises are increasing in number and intensity as more people are being displaced by conflicts, natural disasters, climate change, food insecurity or gender inequalities (United

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Nations Office for the Coordination of Humanitarian Affairs, 2019). Also, humanitarian crises are becoming longer, with an average of 9 years (United Nations Office for the Coordination of Humanitarian Affairs, 2019).

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Every year, the Development Initiatives publishes its annual *Global Humanitarian Assistance Report*, which presents a comprehensive assessment of the complex and evolving humanitarian and crisis financing landscape. In 2018 international humanitarian aid maintained a five-year trend of growth (see Figure 1); reaching a peak of US\$28.9 billion (+1% compared to 2017) (Urquhar, 2019). Since 2014, international humanitarian aid is estimated to have grown by 30%, from US\$22.2 billion to US\$28.9 billion (Urquhar, 2019).

Figure 1

International humanitarian assistance, 2014–2018



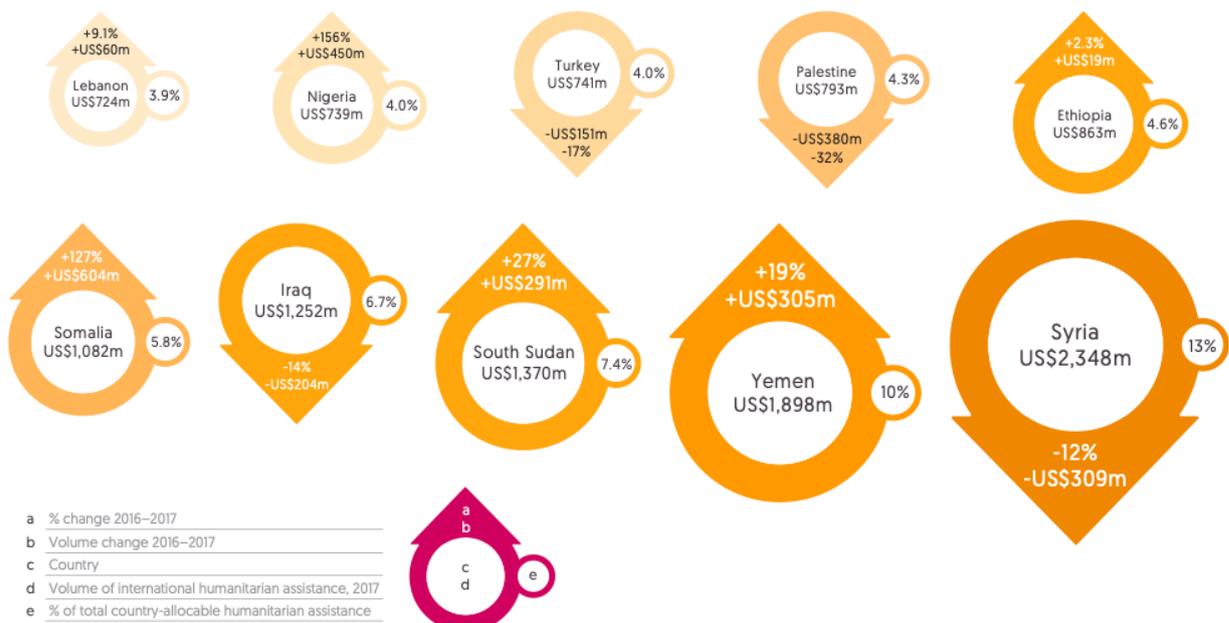
Source: Urquhar, 2019.

Recipients. As of 2017, the ten largest recipient countries received a total of 63% of all humanitarian allocation aid, with only three countries, Syria,

Yemen, and South Sudan, accounting for 30% of total country-allocable assistance (Urquhar, 2019). Considering the assistance allocated to the 10 largest recipients, 59% went to the Middle East and North of Sahara countries, and 34% to sub-Saharan Africa countries (Development Initiatives, 2019). Figure 2 details the ten largest recipients of international humanitarian assistance in 2017.

Figure 2

Ten largest recipients of international humanitarian assistance, 2017

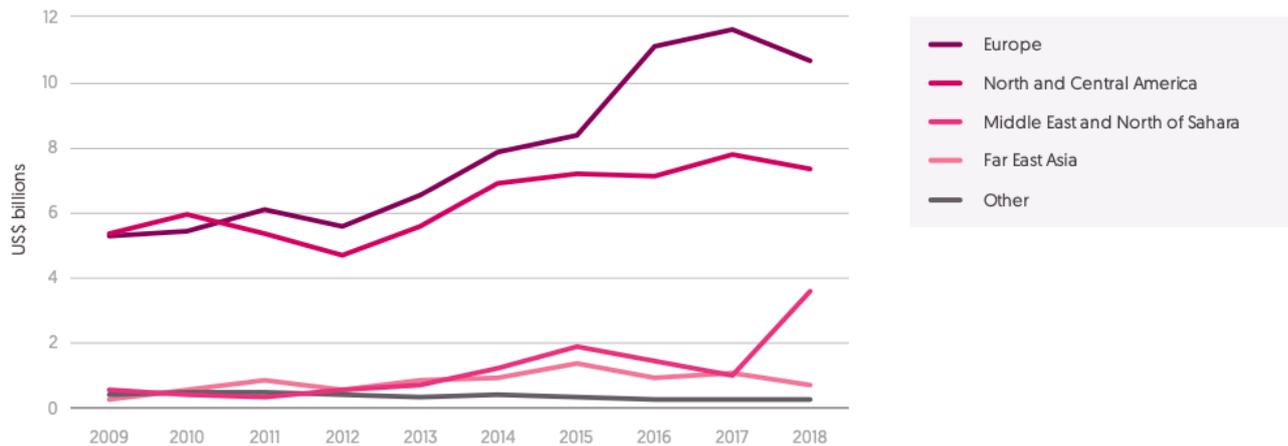


Source: Urquhar, 2019.

Donators. On the other hand, European and North American countries are the main donators (see Figure 3), even if the volume of international humanitarian aid provided by these governments fell, respectively, by US\$1.1 billion and US\$400 million in 2018 from 2017 level (Urquhar, 2019). The most substantial change in 2018 is the significant increase in the volume of international humanitarian aid provided by countries in the Middle East and North of Sahara, with increasing assistance of respectively US\$1.7 billion and US\$806 million from the United Arab Emirates and Saudi Arabia (Urquhar, 2019). In total, the 20 largest donors provided 97% of all international humanitarian aid in 2018 (Urquhar, 2019).

Figure 3

International humanitarian assistance from governments by donor region, 2009–2018

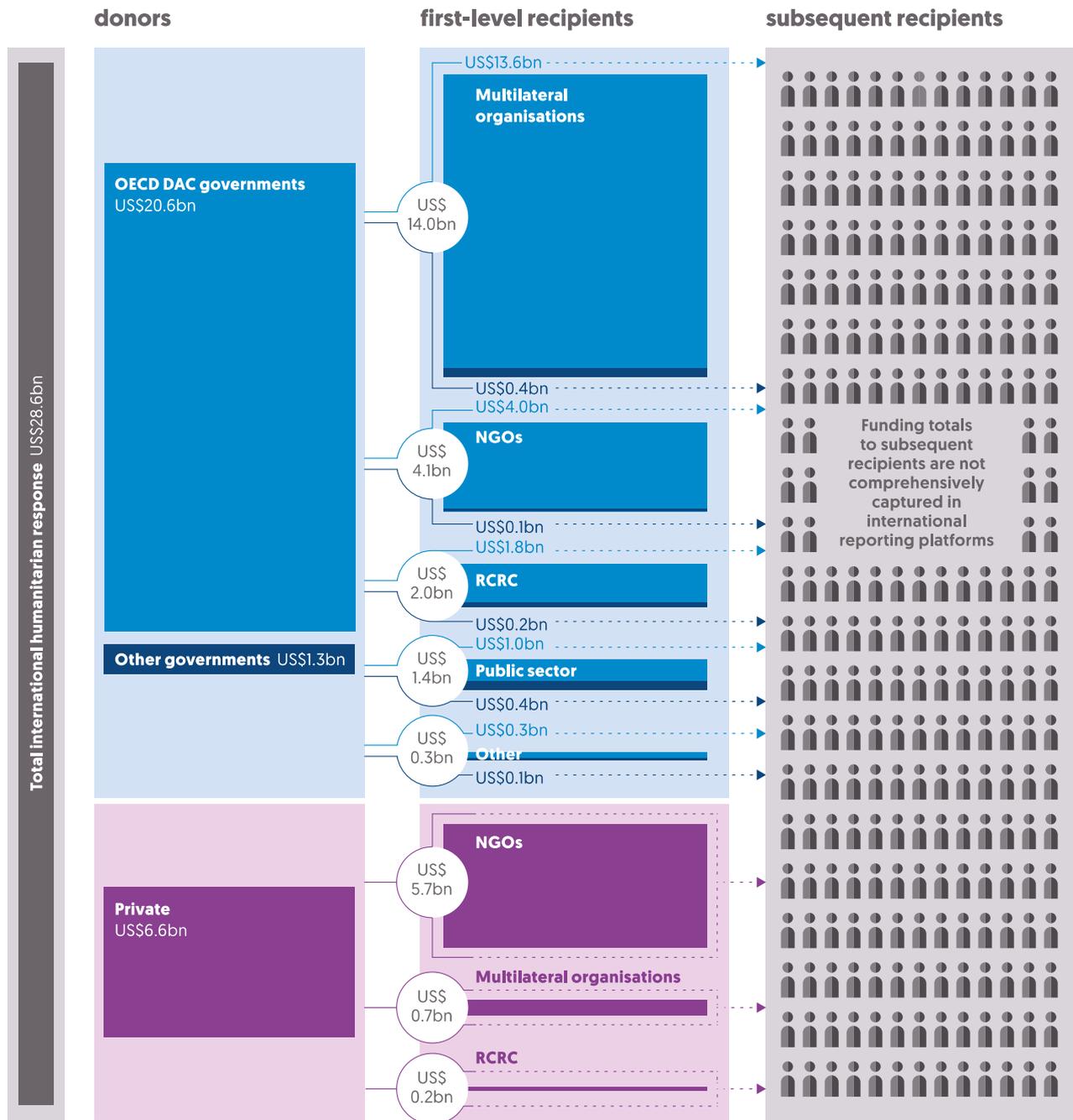


Source: Urquhar, 2019.

Funding channels. The humanitarian aid system is built around several channels (see Figure 4). Today, governments are the greatest contributors to humanitarian aid. Theoretically, governments willing to participate in the humanitarian aid sector have the choice between two types of funding channels: bilateral and multilateral channels. The bilateral channel implies a direct relationship between the donor and the receiving countries. The multilateral channel implies an indirect relation between the donor country and the recipient. First, the donor provides funds to an international financial institution that conducts its activities in favor of aid development (i.e., The World Bank). This institution then reallocates the funding to the receiving country in a second step. However, in practice, funding for humanitarian aid is channeled from initial donors through several organizations to eventually get to the crisis location (Urquhar, 2019). In other words, funding is often going through several levels of intermediary recipients before reaching the final recipient – people in need. Governments are not the only donors to humanitarian organizations; private funds often contribute significantly to the funding of humanitarian aid (Urquhar, 2019). Private funding comprises donations from companies, individuals, or foundations and is essentially transferred through NGOs, both at international and national level.

Figure 4

Funding channels of international humanitarian assistance, 2017



Source: Urquhar, 2019.

Humanitarian aid ineffectiveness. Most of the time, international aid is needed as crises facing countries often do not have the political and/or financial capacity to effectively implement public aid policies. Due to the growing

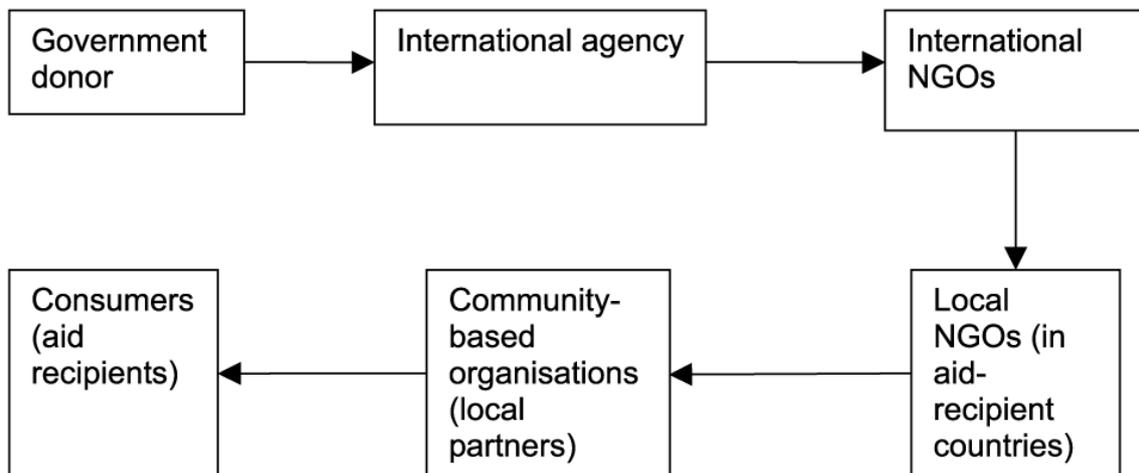
critical humanitarian situations throughout the world, international aid is suffering from a high level of pressure and does not manage to efficiently alleviate human suffering, reduce risk, and vulnerability worldwide. Although the amount of money allocated to humanitarian aid is growing over the years, the need for humanitarian assistance is not decreasing. We can, therefore, name this phenomenon as humanitarian aid ineffectiveness. The OECD has defined humanitarian effectiveness as "*the extent to which the activity achieves its purpose, or whether this can be expected to happen based on the outputs*" (Scott, 2014). With the established system, we are witnessing a profound lack of effectiveness as, even if the humanitarian aid system possesses all the relevant assets for successfully delivering their commitments, end-results are neither consistent nor optimal (Scott, 2014).

Inefficiencies in international humanitarian aid systems

The humanitarian aid supply chain is depicted as being the main cause that leads to aid inefficiency. The supply chain can be defined as a broad term referring to the connections between supplier and end-consumer. In the humanitarian aid sector, the supply chain is composed of the following activities: "*preparedness, planning, procurement, transport, warehousing, tracking and tracing, and customs clearance*" (Thomas and Kopczak, 2005). The efficient conduct of these operations is getting more and more complex as the sector suffers from a multiplicity of objectives associated with an increased number of stakeholders involved (Tatham and Houghton, 2011). The complexity of the humanitarian aid supply chain is displayed in Figure 5.

Figure 5

A typical humanitarian supply chain



Source: Oloruntoba and Gray, 2006.

Lack of transparency. In 2018, it was found that only 3.1% of global humanitarian aid delivery was channeled either directly to a local or national NGO, or through only one intermediary (Urquhar, 2019). Therefore, in almost every aid delivery channel, the high number of intermediaries makes it complex to trace the funding, which prevents transparency. Indeed, the current lack of transparency in the humanitarian aid supply chain does not allow stakeholders to access data. This state of affairs prevents potential bottleneck identifications, on both the national and international levels, and does not encourage development actors to feel accountable. As a humanitarian aid operation is considered to be 80% logistics, it thereby appears clearly that increasing transparency and effectiveness in aid delivery must go through a supply chain management reform (Wassenhove, 2006). Good, accurate, and comprehensive data is essential as it allows aid organizations to know where and how to target their aid thanks to better coordination, better analysis, and better evaluation (Ingram, 2018). It also responds to the demand for greater transparency expressed by worldwide stakeholders (IATI, 2019). Furthermore, aid organizations have started to switch from in-kind aid to cash transfer as it allows recipients to allocate the funds to what is needed. However, it is often unclear for donors how their money will be managed, and how to assess the effective amount distributed to recipients. Therefore, this lack of transparency leads to donors' mistrust, which does not encourage donations

in a context where billions of dollars are needed to be invested in aid delivery (de Vrij, 2018). A survey conducted by Fidelity Charitable found that 41% of donors said that increased knowledge or transparency of NGO activities has had an impact on their approach to giving (Fidelity Charitable, 2016). Donors are thereby becoming more results and impact-focused and, consequently, they clearly express their need to have transparent information (Galen et al., 2018).

Lack of coordination. Another significant issue that negatively impacts aid delivery efficiency is the lack of coordination between the increasing number of actors involved in the humanitarian sector. Indeed, the flow of donations from different sources (national and international) is not always useful, timely, or appropriate and with minimal waste of resources (Costa et al., 2012). In 2010, more than 45 countries and 21 multilateral organizations were providing official development assistance, often to the same populations. This situation favors redundancy, policy incoherence, inefficient use of resources, and unnecessary administrative burdens on host countries (Lawson, 2013). The coordination challenge becomes even harder when it comes to in-kind donations as the global lack of overview makes it extremely difficult to know how much has already been received, to whom, and when (de Vrij, 2018). In their research, Gutting & Steinwand (2015) claim that donor fragmentation has negative implications for the efficacy of aid as it leads to a greater lack of predictability and lack of coordination (Gutting and Steinwand, 2015). As an example, a survey conducted by the World Bank in 2000 suggested that half of the senior bureaucrats' time in African countries is taken up by dealing with requirements of the aid system and visiting bilateral and multilateral delegations (Gelb and Sundberg, 2006). It is therefore not surprising that government members in developing countries such as Tanzania and Mozambique have implemented "quiet time" in which international aid delegations are not welcomed so they can focus on domestic issues (Pisa and Juden, 2017).

Fraud & corruption. *"Last year, corruption prevented 30 percent of all development assistance from reaching its final destination. This translates into bridges, hospitals, and schools that were never built, and people living without the benefit of these services. This is a failure of accountability and*

transparency. We cannot let it persist." Those were the words of the former UN Secretary-General Ban Ki-moon in 2012 (United Nations, 2012). However, Pisa and Juden (2017) underline that, due to the poor monitoring of the flows of money, the high number of intermediaries, as well as the difficulty to measure corruption, the true amount of aid lost to corruption is not known. To support this view, in 2012, the World Bank has tried to measure the amount of money lost to corruption in the humanitarian sector. The study found that, between 2007 and 2012, 54 projects were accounted for fraud, worth a total of US\$245.1 million (Alexander and Fletcher, 2012), which is significantly lower compared to Ban Ki-moon claims. However, this study was based on data from completed cases of fraud and corruption that led to sanctions. Consequently, there are no clear studies demonstrating the scale of fraud and corruption in the humanitarian sector and, even if the amount lost might be significant, it is not possible to confirm Ban Ki-moon claims. The fact is that, regardless of the trustworthiness of the fraud and corruption data, millions, maybe even billions, of dollars are lost each year and this trend may become more prominent in the coming years as interventions in highly unstable corrupted countries are increasing (Pisa and Juden, 2017).

Transaction costs. Lack of cooperation and donors' fragmentations are leading to a significant issue: high transaction costs. As each donor and aid organizations have their own programs, interests, priorities, concepts, conditions, administrative structures and procedures, each task (i.e., analysis, negotiations or progress reports), has to be completed several times (Ashoff, 2004). As a result, these inefficiencies tend to lead to increased transaction costs, which reduce the flow of money donated to vulnerable populations (de Vrij, 2018). As an example, according to a study conducted by Stanford University, aid organizations may lose from 3% up to 10% of the funds in transaction fees and inefficiencies (Galen et al., 2018). However, only a few numbers of study have been conducted to measure the amount of money lost to transaction costs, yet even if this topic raises many international debates.

Lack of speed. Taking into consideration the importance of the challenges at stake when deploying a humanitarian aid plan in response to a disaster situation, speed appears as a central element. Indeed, speed in humanitarian assistance is not only essential to help the people affected, but it is also

important to prevent more deaths or suffering from occurring. It is accepted that the humanitarian aid sector is often subject to an unpredictable environment (Oloruntoba and Gray, 2006). However, despite this difficulty, the current international aid infrastructure, which involves many intermediaries, is partly responsible for the current lack of speed in terms of response to humanitarian disasters. A general agreement exists among stakeholders that the established humanitarian assistance system is not able to provide a rapid response to emergencies (Gulrajani and Honig, 2016). This situation needs to change in order to increase global efficiency and improve humanitarian impacts (de Vrij, 2018).

Surplus and shortage. Studies also highlight the fact that humanitarian aid inefficiency is reinforced by the inadequacy between supply and needs of the affected populations. Indeed, donors and intermediaries have often difficulties to effectively identify the needs of the populations, and it is not uncommon that international supplies have no real need in the field (Fessler, 2013). Some estimations claim that approximately 60% of in-kind donations are not used and that often recipients even sell the non-used in-kind aid to buy the goods and services needed (Fessler, 2013). International humanitarian aid actors are emphasizing the potential of cash transfer instead of in-kind donations as the funds allocated can more easily be allocated to real needs of affected populations. Studies found that 18% more people could be helped at no extra costs if they received cash instead of food (Margolies and Hoddinott, 2015). However, as previously mentioned, donors are often reluctant to send cash to humanitarian organizations due to the lack of trust regarding the effective allocation of these funds to the affected populations (de Vrij, 2018).

Competition within the sector. Finally, one last factor that contributes to the lack of efficiency of aid delivery is the competitive environment in which NGOs are operating. In addition to not evolving a cooperative environment, NGOs are competing against each other for "*public recognition, quality personnel and most importantly, for public monies (government contracts or grants) and private venture capital as well as donations from individuals, religious institutions, corporations or foundations*" (Dichter, 2019). Consequently, humanitarian organizations have incentives to, first, under-

emphasize project failures and second, invest a large amount of money in fundraising rather than in project implementation (Cooley and Ron, 2002).

The Start Network. In 2010, the Start Network, a group of humanitarian civil society organizations, was created in response to the structural inefficiency of the current global humanitarian aid sector. The coalition is composed of 42 leading humanitarian organizations such as Action Against Hunger, International Rescue Committee, Oxfam, and World Vision to improve their ability to collectively and effectively respond to humanitarian crises. According to Start Network, the humanitarian aid sector suffers from systemic problems which include *"slow and reactive funding, centralized decision-making, and an aversion to change means that people affected by crises around the world, do not receive the best help fast enough, and needless suffering results"* (Start Network, 2019). The coalition thereby claims that the humanitarian system must radically change to accelerate crisis response. A similar assessment was made in Istanbul in May 2016, at the World Humanitarian Summit, where 9,000 representatives from a wide variety of stakeholders (180 governments, NGOs, private sectors, civil society, worldwide institutions, affected populations) have agreed on the elaboration of 3,700 commitments to change the functioning of the humanitarian aid sector radically. Taking into account the current state of affairs of the humanitarian aid sectors and the issues and challenges associated, the Start Network coalition, through their various initiatives, aims to implement change in three ways

1. Diversification by shifting humanitarian financing from a reactive to a proactive model.
2. Decentralization by creating a more balanced system that allows decision-making and leadership to take place at the frontline.
3. Collaboration by enabling collective innovation and mutual aid between agencies to solve humanitarian issues locally and globally.

The coalition has started to explore a potential solution; blockchain technology, as a tool to help to increase humanitarian aid efficiency. In July 2017, Start Network has announced the formalization of a partnership with the

blockchain start-up *Disberse*, with the intent to increase the overall efficiency of aid delivery throughout the world (Pisa and Juden, 2017).

Perspectives of the blockchain technology for more efficient international humanitarian aid systems.

"In humanitarian response, blockchain has the potential to be used for information management, coordination of aid delivery, management of crowdfunding, tracking supply chain, cash-transfer programming and boosting humanitarian financing", said Riani for the Humanitarian Advisory Group (2018) (Riani, 2018). In theory, the blockchain technology has the needed characteristics to effectively tackle the structural efficiency issue faced by the humanitarian aid sector.

Traceability and transparency. First of all, resolving the lack of transparency issues appears to be one of the main challenges to ensure better aid effectiveness (de Vrij, 2018). The blockchain attributes allow funds from private donors, governments, or NGOs to be traced through every step of the supply chain and to register every action taken by each intermediary (Galen et al., 2018). Therefore, a blockchain-based humanitarian aid system ensures that resources are effectively provided to the affected populations as first intended. Besides, to better promote donors' trust, the use of smart contracts in the system can allow stakeholders to determine a set of conditions that must be achieved and verified before funds are allocated (Galen et al., 2018). This way, donors can access data, trace the allowance of their donations, and the results reached on the fields. It allows better transparency and the possibility to measure impacts, to identify bottlenecks and humanitarian projects that are the most effective, and to make development actors feel accountable (Galen et al., 2018). It is believed that improved transparency will result in an increased amount of donations in the future (GSM Association, 2017).

Increased coordination. At the same time, serious improvements could be achieved regarding coordination between stakeholders in the humanitarian sector. Lack of coordination is the main reason which triggered the

creation of the Star Network in the first place. The blockchain has brought the promise to revolutionize the aid sector by enabling coordination among multiple donors, governments, and aid agencies (Pisa and Juden, 2017). The blockchain can offer a unique platform that gathers all stakeholders, and allows global coordination. In the first place, it could help to prevent administrative redundancy and duplication of effort by donors, aid organizations, and local governments. Second, it could also allow policy harmonization by revealing to all the stakeholders which organization is helping a given population, with which resources. This would promote minimal waste of resources and more efficient interventions. Finally, blockchain can help governments and NGOs to better plan for aid delivery budgets and places of interventions. More efficient coordination allowed by the blockchain may resolve the surplus and shortage issue significantly, as population needs would be identified more easily.

Reduced costs. Transactions costs could also be significantly reduced in a humanitarian aid system operated on a blockchain. By reducing the multiplicity and diversity of stakeholders as well as harmonizing coordination and procedures, transaction costs may drastically decrease (Ashoff, 2004). As an example, improvements could be achieved in terms of reduced transaction costs resulting from cash donations (Galen et al., 2018). In the cross-border money transfers market, multiple financial intermediaries are involved, which increases transaction costs. The UN World Food Programme (WFP) has successfully implemented the blockchain technology in a pilot project which had the objective to provide cash distribution for over 10,000 Syrian refugees in Jordan. By bypassing traditional financial intermediaries, the use of blockchain has provided the organization a 98% saving on costs of money transfer, which, if scaled-up to the entire organization, would result in tens of millions in savings (Paynter, 2017). This additional cash aid could be thereby allocated to affected populations and increase impact.

Diversification of funding sources. Blockchains, and cryptocurrencies associated therewith, may provide the humanitarian aid sector with new sources of fundraising. In a context where cash transfer is proven to be a more efficient tool for alleviating poverty than in-kind transfers (Blattman et al., 2017), blockchain could be used as a crowdfunding tool to raise cash-based

donations in cryptocurrencies. Over the last years, more and more NGOs accept cryptocurrency donations, and blockchain-based platforms that enable donors to make cryptocurrency donations (Galen et al., 2018). As an example, the well-known Fidelity Charitable has announced to have received ten times more cryptocurrency donations in 2018 than in 2017, reaching nearly \$70 million (Fidelity Charitable, 2018).

Fraud reduction. Once blocks are validated and added to the blockchain, it becomes impossible to either remove or change the content of these blocks. Therefore, the storage of data on a blockchain will make the data tamper-proof, which offers a way to reduce fraud and to avoid financial aid getting lost to corrupt governments (de Vrij, 2018). Blockchain may then allow reluctant donors and humanitarian agencies to feel safe in terms of providing cash donations to any developing countries or affected populations.

To sum up, the infrastructure of the blockchain technology allows for key benefits of verifiability, security, and transparency while allowing reduction of costs and time through disintermediation and smart contracts, monitoring and tracking impact and reduction of fraud and corruption. A blockchain-based humanitarian aid system would provide accountability for recipient's organizations and governments, cooperation between stakeholders, and will promote new sources of revenue and fundraising thanks to cash-based donations through cryptocurrencies. To date, several blockchain initiatives have emerged around two main models (Pisa and Juden, 2017): the first model intends to provide a shared platform for stakeholders on which data about the funding and metrics are displayed; the second model intends to provide additional cash-based donations through a blockchain in the form of tokenized cash or vouchers (credits that must be spent on specific goods and services from certain vendors).

What prevents blockchain-based applications from scaling efficiency in international humanitarian aid systems?

Structural reluctance. In the first place, the implementation of the blockchain technology into the humanitarian aid system might be challenged by the inherent nature of development organizations, NGOs, and governments to be risk-averse and slow to innovate (Pisa and Juden, 2017). Indeed, even if successful large-scale pilot projects would emerge, these organizations often face budget constraints, infrastructure complexities, and governance and regulatory challenges that might restrict them from large-scale blockchain implementation into their core functioning system (Galen et al., 2018). These constraints have a great impact since *"these organizations act as stewards of other people's, and country's resources and the services they provide can mean the difference between life and death for beneficiaries"* (Pisa and Juden, 2017). Therefore, tech communities have to effectively prove to these organizations and governments that blockchain technology provides the humanitarian aid system with significant advantages over the current approaches.

Lack of willingness. Also, it has to be noticed that, even if blockchain-based humanitarian aid systems are implemented, the extent to which cooperation and data sharing will be improved solely depends on political willingness. As an example, in 2008, the International Aid Transparency Initiative (IATI), composed of 500 aid organizations, was created to increase transparency by publishing and sharing data (IATI, 2019). However, in 2015, the IATI admitted that this initiative had little to no practical impact on the lives of development beneficiaries, and critics have claimed that data collected is often too low quality, not useful, not impact-centered, and published too infrequently (Castell, 2015). This example shows that, despite promising commitments and initiatives, the real impact will be highly dependent on the stakeholders' willingness to improve the state of affairs. Additionally, as previously stated, the humanitarian aid sector is highly competitive, and the main underlying objective of these organizations is to attract funding and increase their public recognition. Therefore, as transparency and data sharing may potentially pose reputational risks to humanitarian agencies, using blockchain

technology may not be in their best interest. Hence, there is a lack of willingness from humanitarian actors to use blockchain-based applications in their operations (Dichter, 2019).

Data privacy. Moreover, blockchain implementation in the humanitarian aid sector may imply data privacy challenges that are not negligible, taking into account the high vulnerability of affected populations, often due to political persecution. A system based on the blockchain technology must bear an infrastructure that ensures the great caring of storing and sharing sensitive personal information (Pisa and Juden, 2017). This potential issue is currently being studied by blockchain start-ups and needs to be explicitly resolved to convince aid providers to pay attention to the blockchain solution proposals.

Regulatory challenges. Compliance with international humanitarian law, human rights law, and country-specific laws must be entirely considered when designing a potential blockchain-based humanitarian aid system. Also, the use of cryptocurrency is not legal in every country (Riani, 2018) and a technological solution such as blockchain must not hamper the humanitarian principles of humanity, impartiality, neutrality, and independence (Zwitter and Boisse-Despiaux, 2018).

Examples of blockchain-based initiatives

Disberse. Disberse is a fund management platform built upon the objective to increase transparency, efficiency, and effectiveness in the humanitarian aid sector. They are using a permissioned blockchain that allows stakeholders (donors, governments, NGOs) to keep track of their funds across the whole supply chain, ensuring that cash-based resources are reaching the affected populations. The functioning of Disberse is pretty straightforward. In the first place, Disberse clearly states with the stakeholders the objectives of the project and defines the budget. The stakeholders comprise government departments, NGO offices in both the donor and project country, local delivery partners, and the individuals or group receiving the benefit at the point of delivery (GSM Association, 2017). Then, stakeholders must create a personal account

on 'Disberse's platform, which will allow everyone to be able to trace the funds at any time. The donors put the money, in fiat, into the platform, which operates the swap to cryptocurrency. A digital token of the exact value put by the donor is created and is then ready to be distributed to a project or a person anywhere in the world. Contrary to the traditional aid financing process, the token is a representation of the value and its ownership is recorded throughout the supply chain. Once the token reaches the affected population, it can be exchanged for cash by a Disberse's local partner. Eventually, as the real value of the funds is exchanged only twice, the platform bypasses financial intermediaries and their associated transfer fees. Besides, to decrease transaction costs, disburse also allows donors and other stakeholders to track flows, detect bottlenecks, and access data for reporting, auditing, and compliance.

In 2017, Disberse launched its first pilot project in partnership with the charity Positive Women. The platform helped the charity to reduce their transaction costs by 2.5%. The financial aid sent by Positive Women was intended to finance educational projects in Swaziland schools. The saving allowed by the use of the Disberse platform enabled the funding of three additional students' fees for a year (Suliman, 2017). Later, as part of their partnership with Star Network, Disberse has been able to test their solution on a large scale with the charity Dorcas (James, 2018). In addition to allowing instant transfer and the ability to trace the funds, Disberse platform help Dorcas save 1.15% on their transaction costs. The cost savings were limited because of the small number of funds transferred (5,000€). As for now, Disberse is part of the UK Financial Conduct Authority (FCA) Regulatory Sandbox and is currently working on a larger project to expand its solutions worldwide and increase the amount of financial aid delivered to intended final beneficiaries.

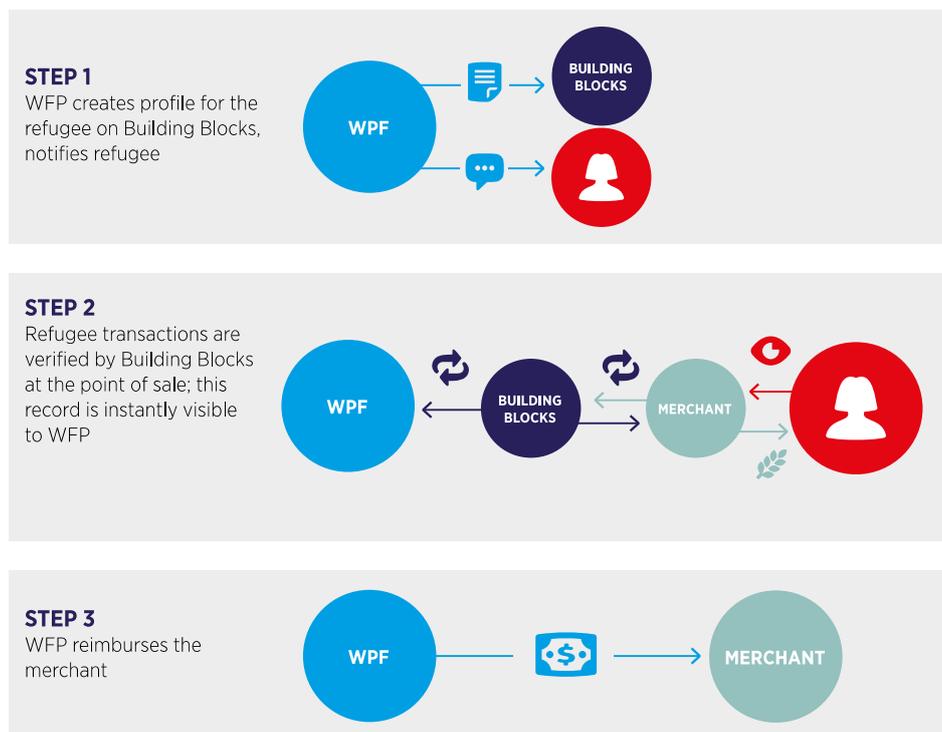
United Nations WFP. In their efforts to accelerate progress on the UN Sustainable Development Goals, the UN's World Food Programme (WFP) launched, in January 2017, a program called Building Blocks, which the objective to *"better protect beneficiary data, control financial risks, improve the cost efficiency by reducing fees to financial service providers, and set up assistance operations more rapidly in the wake of emergencies"* (ITU, 2019). After a conclusive small pilot test in Pakistan, where the WFP tested the

blockchain solution with 100 people, they chose to increase to conduct a project in Jordan. Based on the Ethereum blockchain, the program managed cash transfers to 10,000 Syrian refugees living in the Azraq camp.

As depicted in Figure 6, the WFP's Blockchain system for the cash transfer process relies on three steps. First, each refugee is provided with a unique ID number linked to the biometric data stored in UNHCR's refugee database. Then, same as a traditional purchase, refugees can use their allocated entitlement to make a purchase to an approved merchant. By simply scanning the refugee irises with the use of a connected device, merchants are able to authenticate and confirm that the beneficiary has indeed the entitlement to make the purchase. The Building Blocks system ensures that the transaction is recorded and assigned to the true beneficiary of the purchase. Eventually, WFP uses this recorded information to pay the merchants directly, using their corporate bank.

Figure 6

WFP's Blockchain system for the cash transfer process



Source: GSM Association, 2017.

In total, Building Block facilitated more than 220,000 individual transactions, representing \$1 million in food vouchers (Pisa and Juden, 2017). The transfer fees were reduced to almost zero (98% of fees saved) and, using the 'UNHCR's existing biometric authentication technology, the program recorded every transaction (World Food Programme, 2017). Today, about 100,000 refugees living in the camp can buy groceries by scanning their iris and, if all refugees in the camp can benefit of this solution (400,000 people), the WFP estimates that it will pay only \$150 in monthly financial service fees, compared to \$150,000 using the traditional financial system (Pisa and Juden, 2017). The program has, however, specified that a similar project could have been conducted without the use of the blockchain (only using a traditional IT system). Nevertheless, they added that the blockchain technology benefit will come to their full potential when cross-organizations and cross-countries projects will start to be conducted by joining databases (GSM Association, 2017).

Conclusion

Humanity is currently facing an unprecedented phenomenon of mass migration, a phenomenon that is expected to continue and further reinforce due to environmental, social, demographic, and geopolitical shifts. Humanitarian crisis often appears as a consequence of these migrations and international assistance is sometimes the last bastion to prevent dramatic events to happen. However, the current humanitarian aid system suffers from a profound lack of efficiency, which prevents international organization to have an optimal impact on the affected populations. Lack of transparency, lack of coordination, lack of speed, high transaction costs, fraud and corruption, bad resource allocations, and competition within the humanitarian sectors are all factors that make aid delivery inefficient.

However, blockchain technology seems to have the required characteristics to help the sector to change. A blockchain-based humanitarian system could theoretically ensure donations traceability, reduce the number of intermediaries, decrease transaction costs, diverse sources of fundraising, measure social impacts, coordinate aid delivery, and prevent fraud and corruption. Such a system would foster donations, determine key success factors, and

drastically increase the economic and social outcomes on the field. Furthermore, blockchain technology holds the promise to use smart contracts to automatize funding through forecast-based financing. Paired with Big Data analytics, such models could provide more efficient and less political funding instruments (Zwitter and Boisse-Despiaux, 2018).

Significant obstacles are required to be overcome before scaled adoption, but actors coming from all over the world are already working to create realistic solutions. As an example, the *Blockchain Trust Accelerator* or *Blockchain For Social Good*, a Consensys initiative, are already joining forces to create common standards and promote blockchain for social impact on the world's leaders. Coordination and the assembly and analysis of quality data may be the key to realizing blockchain promise and improving development outcomes.

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