

Governing Blocks: Building Interagency Consensus to Coordinate Humanitarian Aid

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<https://doi.org/10.38126/JSPG160201>

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Keywords: World Food Programme; Jordan; Syrian refugees; inequality; sustainability; blockchain; coordination; governance; humanitarian aid

Executive Summary: The conflict in Syria has led to one of the biggest refugee crises in history. An estimated 660,000 Syrian refugees have moved to neighbouring Jordan, many of whom are highly vulnerable to monetary poverty and food shortages. To reduce the daily inequalities faced by Syrian refugees, humanitarian agencies are progressively shifting to programmes that encourage financial inclusion and self-reliance. Operating since 2016, Building Blocks, a cash-based assistance programme created by the United Nations World Food Programme (WFP), uses blockchain technology rather than traditional financial service providers to supply monetary assistance for food purchases by Syrian refugees in Jordan. Beneficiaries have their identities confirmed through iris scanning when purchasing goods at supermarkets within the camps. Following authentication, monetary assistance is provided to complete the transaction. This system benefits over 100,000 Syrian refugees registered on the UNHCR's PRIMES database and WFP has plans to scale up the programme to include more beneficiaries.

This technology assessment focuses on understanding the governance of blockchain technology in Building Blocks (if any), and on finding opportunities for WFP operating partner agencies consisting of UNHCR, UNICEF, UN Women, Oxfam and Mercy Corps, to coordinate with and join the programme. Scaling up Building Blocks will benefit refugees and displaced people by giving these individuals a semblance of normalcy in a situation of vulnerability and crises. We advise WFP to collaborate with its partners to form a blockchain humanitarian consortia governing Building Blocks to avoid duplicating efforts and to achieve their shared objectives of delivering humanitarian aid in a sustainable manner. Other recommendations include to have UNOCHA and UNHCR as data aggregator and coordinator, respectively, to grant joint access to PRIMES for non-UN operating partners, to coordinate efforts with UNHCR's Common Cash Facility programme, to consider renewable energy sources and to build local technical capacity for women in refugee camps. The involvement of operating partners in governing technology used in such processes will ensure equity of aid delivery, resulting in a broader governance, thus reducing inequality.

I. Introduction

Building Blocks (BB) functions as an accounting system, delivering cash assistance for Syrian refugees in the Azraq and Zaatari camps in Jordan. Blockchain technology helps the process of securing the financial transaction histories and identities of beneficiaries who receive aid. This information was previously entrusted to financial service providers (FSPs) and is now held solely by WFP in respect to BB beneficiaries.

This research revolves on the following problems: How will Building Blocks evolve and impact the governance of blockchain as operational partners gradually join the programme? How can WFP make Building Blocks an interoperable cash-based transfer (CBT) system? As Building Blocks will be scaled up to reach more beneficiaries, there will also be opportunity to accommodate other agencies' CBTs to make the programme sustainable and resilient.

The WFP-UN Women partnership, an example of collaboration for delivering aid using Building Blocks, is used as the foundational case study to address the research question and inequalities faced by Syrian refugees. This technology assessment then explores the facets of data management and other CBT systems currently operating in Jordan such as the UNHCR's Common Cash Facility (CCF). An analysis of the institutional constraints and opportunities for CBT use by potential operating partners (OPs), and a risk assessment from their perspectives is then conducted.

The publication concludes by providing WFP with a series of recommendations that emphasise interagency coordination to address existing and emerging inequalities arising from the application of disruptive technologies when delivering humanitarian food aid through sustainable technological intervention.

II. Background information

i. World Food Programme: Zero Hunger

The United Nations World Food Programme (WFP) delivers food assistance in emergencies and crisis to 86.7 million people annually in 83 countries (WFP 2018a), working with communities to improve nutrition and build resilience. However, more than 800 million people still experience hunger in 2019 (WFP 2019a).

Achieving Zero Hunger—part of the Sustainable Development Goals (SDGs)—constitutes the WFP's top priority together with improved food security, better nutrition and promoting sustainable agriculture.

ii. Sustainable Development Goals

Sustainable development is the overarching paradigm of the United Nations (UN) to meet the needs of the present without compromising the ability of future generations to meet their own. SDGs are defined as “a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity” (UNDP 2019). These Goals have well-known challenges, such as slower economic growth, various unfavourable demographics, and widespread epidemics (UNDESA 2013).

UN agencies like the WFP are using the SDGs as a common narrative for their respective roadmaps. To provide food assistance and tackle the underlying causes of hunger, the WFP values partnerships between governments, the private sector, civil societies, and non-governmental organisations (NGOs). SDG 17, “Partnerships for the Goals”, is a clear reminder that cooperation is key to fulfilling the SDGs. In that spirit, the WFP works across the SDG spectrum.

Humanitarian crises constitute natural disasters, man-made disasters or complex emergencies and may result in short-term or long-term damage. As crises evolve and more humanitarian aid is needed, there needs to be a distinction between what humanitarian aid agencies can achieve in the present and how this differs from long-term objectives, as the provision of short-term humanitarian aid can conflict with the long-term objectives of international development. However, organisations can share the same vision by co-adopting SDGs.

The World Bank states that “addressing humanitarian crisis is not only a prerequisite of sustainable development but also a necessity” (Georgieva and Brende 2015). Due to the enormity and complexities of crises, innovation is crucial to humanitarian aid and international development. To meet the SDGs, the international community must encourage innovation and “close collaboration between humanitarian and development agencies and international partners in order to transform a humanitarian crisis into a development opportunity for all” (Verme, Gigliarano, Wieser, Hedlund, Petzoldt and Santacroce 2016).

The WFP is committed to making effective use of existing opportunities from the collaboration of humanitarian and development actors to transform lives around the world (WFP 2018b). Building Blocks serves as a platform for coordination and helps address inequalities, enabling those affected by humanitarian crises to prosper.

iii. Jordan: a general exposition

The Syrian conflict has caused a tremendous and ongoing impact both in the country and throughout the Middle East since 2011. With international

organisations unable to effectively provide aid in Syria due to severe restrictions, “most international agencies focus attention and resources on the continuing flows of Syrian refugees” fleeing for their lives by crossing borders into neighbouring countries (Sa’Da 2017, 372-386).

As a result of its geographical location, Jordan hosts 660,000 Syrian refugees, the second-highest share of Syrian refugees in the world after Turkey (Altun 2019). Approximately 48% of Syrian refugees in Jordan are children, and 4% are elderly (UNHCR 2019a). An estimated 83.6% of the refugees live in urban areas while the remaining 16.4% are in refugee camps. The main camps are the Zaatari (76,753 refugees) and Azraq camps (39,923 refugees). The Jordanian government has been supported by a collaborative effort from multiple donor communities, UN agencies, international and national NGOs, and host communities.

A joint study by the World Bank Group and UNHCR demonstrates that the majority of Syrian refugees living in Jordan are classified as poor (Verme et al. 2016). To combat inequalities, policies and initiatives must be developed to enable refugees’ self-reliance, to facilitate access to the labour market, and to foster economic inclusion. Close collaboration and interagency coordination are essential to ensure that assistance to refugees is provided in accordance with international humanitarian standards and protection principles.

iv. From governance to technology governance

This research focuses on the governance of technology and the current challenges faced by humanitarian agencies such as WFP, who seek to maximise efforts and assist vulnerable communities by strengthening collaboration and coordination with other humanitarian actors on the ground.

Each attempt to define governance by scholars and academics has been subject to extensive analyses and explanations originating from different philosophies and cultures. Governance is therefore a dynamic concept and can be subject to various conceptualisations. In recent years, governance has gained popularity in management sciences and in academic public policy discourses thanks to its multivalence or its ability to connect with many other arguments and theoretical concepts (Asaduzzaman

and Virtanen 2016). Mark Bevir, Professor of Political Science at University of California, Berkeley, separates governance from government. The so-called processes of governing are made by one organised social actor and applied onto another part of an organised society. Governance is attached to the themes of governing, rule, authority, dominance, order, and power in this definition (Bevir 2012).

Francis Fukuyama, Senior Fellow at the Freeman Spogli Institute for International Studies at Stanford University, suggests a multi-dimensional framework to evaluate the quality of governance: procedural measures, capacity measures, output measures and measures of bureaucratic autonomy (Fukuyama 2013). Procedural measures referenced by Fukuyama take root from Weber’s characterisation of bureaucracy (Weber 1978), as the administrative system governing any large institution, whether publicly or privately owned, designed to ensure long-term efficiency and economic effectiveness (Weber 1905). Government and public administration are examples of bureaucracy.

Coordination is the organisation of different entities to enable them to work together effectively. Humanitarian aid organisations need to work together, as no single entity has sufficient capacity to deliver assistance for all beneficiary needs, and communication is an essential means to achieve this. Coordination, often related with communication, is a known challenge faced by bureaucracies. Coordination is usually achieved with some kind of communication or some kind of information exchange, with or without the intervention of information and communication technologies (ICTs).

When introducing the application of technology into this discussion, it is important to differentiate between the management and the governance of technology. The management of technology consists of theories and disciplines allowing organisations to manage their technological fundamentals and create competitive advantage. The governance of technology, or technology governance, is a public policy concept based on the notion of innovation and techno-economic paradigm shifts (Evangelista 2015).

Technology governance has a wider “scope” and global social impacts than the management of

technology. Discussions on governance and technology should be encouraged due to the exponential growth, application, and omnipresence of ICTs in recent years.

Disruptive technologies have transformed the way in which humanitarian agencies operate, from traditional means to generating ICT-based innovative solutions for complex problems. Clayton Christensen originally stated disruptive technology as being capable of “shaking an entire industry” to create something new and as a result, adheres to the values of innovation (Christensen 1997). He also states that disruptive technologies lack refinement at implementation, or can be relatively unknown or misunderstood, and their practical application in a specific context, requires study to gain a deeper insight or resulting externalities.

Blockchain technology is disruptive since it has significantly changed WFP’s cash assistance programmes. WFP’s Building Blocks (BB) is a blockchain-based programme providing monetary assistance to hundreds of thousands of Syrian refugees located in Jordanian refugee camps. By providing beneficiaries choice and autonomy over their food purchases, this programme can help reduce inequalities faced by refugees. More information on Building Blocks will be provided throughout this technology assessment.

Establishing interagency governance of Building Blocks can result in further cooperation between humanitarian agencies through consensus, to achieve effective coordination of humanitarian aid in the region.

III. Disruptive coordination: blockchain

Each aid agency has different funding mechanisms, hierarchies, values, and goals (Tierney 1985, 77-84). These institutional differences lead to a complex network that may impact the flow of resources and in some instances, the delivery of humanitarian aid (Moore et al. 2003; Kuner et al 2017). These are a challenge in Jordan where at least 1,167 partners are operating (Jordan Humanitarian Fund 2018).

i. Coordination through data management

Data management is an administrative process that includes acquiring, validating, storing, protecting,

and processing required data to ensure the accessibility, reliability, and timeliness of the data for its users. An effective data management system in humanitarian operations leads to useful coordination and decision-making, thus improving equity in the delivery of aid. Donors also benefit if this is performed with transparency (Altay and Labonte 2014, 50-72).

Building Blocks is an ICT system which can facilitate interagency coordination, although this will be explained in further sections. Care needs to be taken when designing an inter-organisational ICT system in humanitarian contexts, as it needs to be relevant for users and ensure the outcome of shared objectives. Extra precautions need to be taken when handling personal data, as well as considerations of when and where it is collected and shared to enable delivery of assistance. The tendency of each humanitarian agency to collect personal data has associated risks of data breaches and leaks despite clear guidance from UN agencies and OP organisational data protection principles.

Personal data is defined as information relating to an identified or identifiable natural person (United Nations 2018). The National Institute of Standards and Technology defines personal identifiable information (PII), collected by many agencies to conduct humanitarian aid operations, as “any information about an individual maintained by an agency, including (1) any information that can be used to distinguish or trace an individual’s identity, such as name, social security number, date and place of birth, mother’s maiden name, or biometric records; and (2) any other information that is linked or linkable to an individual, such as medical, educational, financial, and employment information” (NIST 2016).

Biometrics fall into PII, being increasingly used by humanitarian aid agencies to identify refugees and people who are displaced. Biometrics include, but are not limited to, photographs, fingerprints, facial or iris images that can be used to identify an individual (UNHCR 2015). The UN Development Group has guidelines for the overseeing of sensitive data (UNDP 2017). Personal data, sensitive data, and PII are often used interchangeably.

ii. Protecting personal data

Data needs to be handled responsibly to protect those in vulnerable situations from further harm. When used in a trusted manner, personal data allows humanitarian agencies to initiate an effective response to emergency events and create targeted relief strategies. Official guidelines are produced by organisations to address different governmental mandates and organisational agendas, which are divided into those used by UN bodies and non-UN bodies, such as Mercy Corps and Oxfam (2018). Humanitarian organisations need to comply with data protection principles and specific legal requirements where applicable, whilst performing mandated tasks. Technology allows these objectives to be achieved in a transparent and accountable manner. Although still in early developments, blockchain technology addresses challenges related to data coordination and aid distribution, of which, Building Blocks is an example.

iii. Blockchain

Blockchain and distributed ledger technology (DLT) are often confused and used interchangeably (de Kruijff and Weigand 2017). Blockchain is only one of the possible data structures for creating a distributed ledger on a network, while DLT is often used generically for such protocols. In this research, 'blockchain' is used as a generic term to gather all approaches related to any distributed ledger with any consensus mechanism.

Blockchain technology is a combination of cryptography, smart contracts, and distributed ledger design. Blockchain constitutes a decentralised peer-to-peer network of transaction confirmations and ownership transfers, without a central authority or intermediary (OECD 2018). It also creates an immutable chain of transaction records, providing transparency and accountability, regarded as one of blockchain's most appealing aspects (Zheng et al 2017; Kshetri 2017). Smart contracts enable automatic execution of an agreement between users when certain conditions are met (Cuccuru 2017).

Careful consideration is needed when building a blockchain platform. A "trilemma" arises, which, in this case, is choosing two options from those of decentralisation, security, and performance. The choice of which of these three features to prioritise

depends on the context in which the blockchain will be applied. Humanitarian contexts in which blockchain applications have been tried including cash-based aid, digital identification, forecast-based financing and tracking supply chains (Zwitter and Boisse-Despiaux 2018, 1-7).

IV. The impact of technologies on inequality

Coordination connects governance, technology, and administration to achieve the provision of equality in the delivery of services. In this research, coordination can be between four types of actors: public international organisations (e.g. UN), international non-profit (e.g. International Community of the Red Cross), host country governments, and host country non-profit organisations (Nolte et al. 2012). Coordination needs to be strategic to lessen duplication of efforts, and to provide effective and efficient delivery of humanitarian aid.

Four factors affect communication and coordination between agencies in times of disaster (Miliband and Gurumurthy 2015): (1) a predisposition to work with others actors; (2) incentives such as knowledge sharing, which can be top down, bottom-up (answering to the needs of beneficiaries) or horizontal (fragmentation of monopolies); (3) leadership to facilitate coordination and (4) equality. By coordinating on transport, procurement, security, etc., larger OPs, with established communications, can save costs. Consequently, smaller agencies can be left behind. Large NGOs can undermine local capacity, government and civil society organisations when responding to crises (Nightingale 2012).

Local actors already present prior to any conflict arising, are likely to stay on the ground after larger NGOs' interventions. WFP therefore needs to actively engage with these agents for mutual benefits, notably facilitating skills transfer, ensuring that there are coordination processes in place for when conflict eases and refugees are empowered to provide for themselves, move to new countries, or return to their home countries. Local actors are more likely to have local institutional knowledge and can advise large organisations to better direct their aid; however, this depends on dialogue between the two. If humanitarian agencies coordinate effectively with smaller agencies, delivery of aid can be accelerated

and those providing knowledge can redirect policy development.

The UN describes two types of inequality affecting humanitarian work (Daar et al. 2018; UNDESA 2015). Firstly, inequality of outcomes, which refers to the disparity in wealth and the distribution of economic variables in individuals, groups, and countries, impacting living standards and wealth. Secondly, inequality of opportunity, which refers to being able to choose a life outcome, without those outcomes being affected by circumstances at the onset, such as wealth, health, gender etc. In the case of BB, financial aid is delivered through the medium of local supermarkets using cash-based finance, and so beneficiaries have the ability to choose their purchases impacting inequality of outcomes.

CBTs can provide a family with a stable income and thus children are more likely to be sent to school instead of having to work to contribute to family finances (Miliband and Gurusurthy 2015). CBTs such as BB can address the issue of both inequalities of outcomes and inequality of opportunity, by allowing beneficiaries choice over their purchases and distributing funds equally and equitably.

More actors and improved coordination mean that agencies will have the power to hold governments and regimes to account in conflict situations. As OPs are under financial constraint, this leads to a dual problem. Technology is useful in managing food aid remotely and can be used to implement innovative solutions to crises and cost savings; however, technology also requires initial and additional investment.

By coordinating on transportation, CBTs and so on, there will be overlapping of skills and so there is a likelihood of job losses, as processes are streamlined to economise donor funding; therefore, a higher level of skills will be needed. Further inequality will be created by an imbalance of earning opportunities, as well as widening the divide for those with higher levels of education compared with those less educated.

Inequality caused by the application of technology has been likened to techno-colonialism, whereby aid agencies gather sensitive data from beneficiaries

(gender, race etc.) and test new technology and scaling up of business models on vulnerable individuals, to create value out of their now immutable data. This benefits private companies, donors, and stakeholders, and is used to justify the renewal of agency funding and relevance of aid projects (Madianou 2019). Large, open, crowdsourced datasets (gathered through social media, specific applications, and government records during crises), and dataflows are often unavailable to the beneficiaries who are mostly excluded from the processing and interpretation of their data. As such, these data originators are unable to directly influence how they reap the benefits from their data exchange, which can lead to inequality of outcomes, hampering coordination (Mulder et al. 2016).

In Jordan, much of the data used in camps is gathered by UNHCR, however it is not clear which applications are used to generate this data. Contributing to datasets requires a degree of digital literacy, and thus datasets may not be reflective of the non-digitally literate. There may be bias towards male-oriented data as women, girls, the less educated and the elderly, whom are more likely to have lower levels of digital literacy can be excluded (Thylin and Novelo Duarte 2019). This can lead to inequality in delivery of humanitarian aid from OPs.

V. Cash-based transfers (CBT): a humanitarian aid of interest

i. What constitutes a CBT?

WFP defines a CBT as a “provision of monetary assistance in the form of physical cash targeted towards the most food-insecure and vulnerable communities, enabling access to food directly through cooperating partners, or service providers in areas with accessible markets and functioning cash infrastructure; two key preconditions for this transfer modality” (WFP 2016). CBTs are increasingly applied in humanitarian settings to support affected populations, providing assistance for recovering livelihoods, or providing purchasing power and stimulating demand (Doocy and Tappis 2016).

CBTs can be unconditional or conditional. An unconditional CBT is a direct grant with no conditions or work requirements, used by beneficiaries to meet

basic needs or for investment in livelihoods. A conditional CBT requires beneficiaries to meet certain requirements before the transfer is fulfilled, such as employment, creation of community assets, enrolment of children in schools or participation in vaccination programs.

CBTs have various modalities with specific advantages to meet a specific need or range of needs. For instance, cash provides beneficiaries convenience, choice and flexibility when purchasing goods. Alternately, vouchers (including smartcards or tokens) can only be used at selected retailers and/or be used to purchase particular items.

ii. Building Blocks: a blockchain accounting system

Blockchain technology forms the underlying accounting system of cash-based assistance in BB, which was co-developed by Datarella and Parity Technologies Ltd in 2016 using Ethereum. Following a proof of concept conducted in Pakistan in January 2017 confirming blockchain's feasibility to authenticate and register CBT transactions, WFP conducted a large-scale pilot in the Azraq camp (WFP 2018b). Over 100,000 Syrian refugees in both Azraq and Zaatari camps have since benefitted.

How does Building Blocks work?

WFP allocates a set entitlement (approximately USD \$30) to accounts or virtual wallets associated with the biometric identities of refugees pre-registered by UNHCR's Population Registration and Identity Management Eco-System or PRIMES (blockchain4aid 2018). When refugees purchase goods at selected retailers, their irises are scanned upon payment. Then IrisGuard scanners – another PRIMES biometric tool powered by a technical protocol known as EyeCloud – process the identification and authentication of the customer (UNHCR 2019b). Meanwhile, WFP reimburses the concerned retailer with the same amount of money spent by the beneficiary, but via third-party FSPs. BB procures a full record of all transactions made by registered Syrian refugees in known retailers to the WFP. As BB runs on a private, permissioned blockchain, it has a Proof of Authority (PoA) consensus algorithm, which allows multiple transactions to be approved simultaneously (Angelis et al 2017).

How does Building Blocks differ from other CBTs in Jordan?

BB operates on a private, permissioned blockchain system, where only WFP possess transaction records, which strengthens security and privacy for Syrian beneficiaries. BB differs from other CBTs in the region by removing the need for FSPs to identify, register and authenticate transactions. By removing FSPs, WFP has significantly reduced time need to process transactions and transaction fees by 98%. Surplus funds can therefore be redistributed for other purposes (WFP 2019b).

Current progress and future expectations

Under WFP's sole governance, the total number of transfers has increased from 2.1 million in 2017, surpassing values of USD \$1.4 billion to over 36 million transactions in 2018 (Fast and Coppi 2019). WFP hopes to eventually reach all Syrian refugees located in Jordanian camps, but no clear target has been given for 2019.

Building Blocks has led to a partnership between WFP and UN Women, to enhance harmonisation between humanitarian agencies. This collaboration, by sharing knowledge and technologies has far-reaching benefits and is a core objective of WFP's investment in piloting and using blockchain technology (Thylin and Novelo Duarte 2019).

VI. Methodology

This publication originated as part of a group dissertation submitted in August 2019 and should be read as a stand-alone paper. WFP requested our investigation on the administrative governance of BB as the programme was set to include more beneficiaries. We were tasked to encourage the participation of operational partners (OPs) such as Oxfam, Mercy Corps, UNICEF and UNHCR in BB, thus avoiding duplication of efforts in the region. Our recommendations at the time were focused with the issues of inequality and sustainability.

We conducted a backcasting approach as a scenario planning tool to understand how a scaled up future BB could develop. Backcasting provided a structured approach to consider the robustness and trade-offs to address our research problem.

We chose to address the risk and data security components of governance to make BB a credible and transparent solution, further encouraging the participation of other agencies to deliver humanitarian aid for refugees. We considered credibility as “trust in an organisation as perceived from an external perspective” (Jamal and Bakar 2017). Transparency was understood as the disclosure of information, allowing an organisation’s actions to be observed, which if performed effectively, could lead to the solving of that organisation’s problem (Albu and Flyverbom 2019). Our literature review allowed us to gain knowledge of WFP, BB and OPs. Our aim was to understand the function of these organisations and programme to discover whether they had existing CBT programmes, and whether blockchain was part of their systems. This led to deeper understanding of the issues at hand, highlighting the importance of coordination and governance in transactions linked to blockchain. As we were examining recent technologies, much of the data gathered pertaining to blockchain was not much older than 2015. With regards to understanding the basics of coordination and cooperation, some data was older, yet much cited.

OPs and WFP have the shared objective of delivering humanitarian aid. As our investigation required the participation of human actors to share data (through the means of technology), govern the technology and initiate relationships with partner organisations, a qualitative approach was preferred to research the problem due to the complexities of the issues at hand. Aside from financial reports and UNHCR’s Operational Portal Refugee Situations giving statistics on Syrian refugees in Jordan. Our research led to the finding of an academic paper recently published by UNW in July 2019, focussing on interagency coordination between WFP and UNW through BB.

A case study allowed us to obtain a deeper understanding of the problem at hand: the collaboration and multidisciplinary coordination between UNW and WFP, each with their own mandates, yet shared objectives on delivering CBT for refugees and displaced people through BB. Applying a real case as opposed to a theoretical case allowed us to determine the reasons for the participation in Building Blocks and scope how to generalise this

collaboration. Although a single case study has limitations for generalisation, we understood that combined with our literature review, further research, and interviews with other OP representatives, we could build on this use case to understand the opportunities and constraints for other OPs to participate in BB. We mapped our research problem to explain how to achieve our objective in Figure 1.

Following ethics approval, each potential interviewee was chosen on the criteria of their current and possible involvement with BB, or their expertise with technologies impacting humanitarian aid. We developed a semi-structured questionnaire to gain more understanding and OP insight on how BB could be scaled up through expert opinions on risk and data governance. Each consenting participant was sent a variant of the questionnaire depending on their background, whether they were part of WFP, a partner organisation or an expert in their field of operation.

Scaling up BB requires consensus and OP cooperation. Semi-structured interviews were chosen as these allowed topics arising from the questionnaire to be explored further in a secure environment. In total, eight interviews were performed with representatives from Mercy Corps, UNOCHA, Datarella, Oxfam, WFP and Instituto de Empresa. With participant consent, interviews were audio and video recorded. The Team avoided asking leading questions during interviews to avoid bias.

The collected and transcribed data was categorised into sections addressing the research questions. OP modes of data collection/storing/sharing were tabulated, and constraints/benefits addressed in OP participation of BB. A table format permitted to determine what would deter or facilitate interagency collaboration and governance of BB.

From this point, we made recommendations for the coordination needed to scale up BB, and the governance of data needed to make BB a model that OPs would want to participate in. This is the first type of research of its kind, whereas the published case study example of UNW and WFP’s collaboration in Jordan has been used to understand how governance

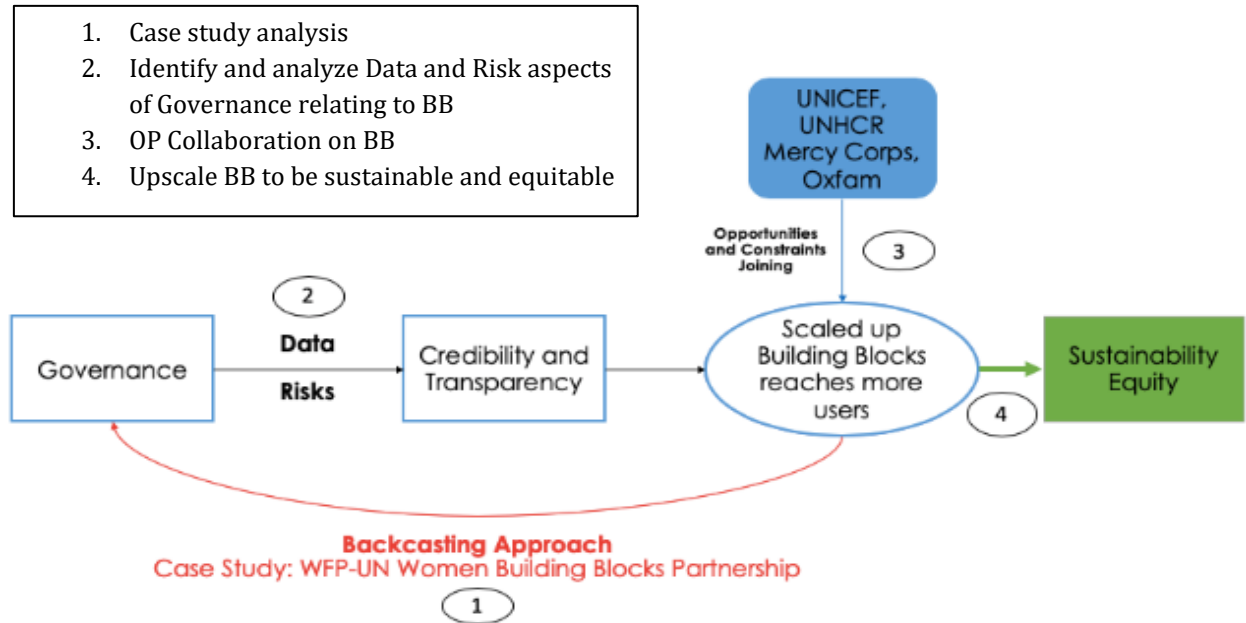


Figure 1: Backcasting approach, research questions, and desired orientations

of blockchain within BB could be improved and then potentially generalised to other OPs.

The authors of the UNW case study (UNWCS) were contacted but declined to participate in our research, with the reasoning that all that the authors had to share relating to BB was contained within their published paper. Hence, relevant data extracted from the UNWCS was detailed into the results table to represent UNW views. This caused some limitation in the understanding of the specific collaboration process between WFP and UNW. A response was eventually received by a UNW representative, which has been incorporated into Figures 2 and 3.

Our research was limited by interviewee sample size and the non-responsiveness of some interviewees, such as UNICEF and UNHCR representatives. As a result, our research on collaboration together with interview responses provided further insight into the coordination process and governance of risk and data. Replies were received from all other targeted WFP OP representatives providing a strong base for our research results. We suggest that further research should be carried out as a result of our study with a larger sample size of representatives to be selected, including technical experts and those directly involved in the delivery of humanitarian aid.

We understand that there may be potential for bias from our respective participants, particularly as some questions were related to the interviewee’s respective organisations/specialties. We also understand that interviewee views were not representative of their organisations. In our analysis, we used participant responses to contribute to the research, as opposed to a sole basis on which to base recommendations.

VII. Case study: the WFP-UN Women Building Blocks partnership

Following a two-year exploration on blockchain technology, UN Women partnered with WFP by linking the UNW’s Cash for Work Programme with WFP’s Building Blocks blockchain platform. The Cash for Work Programme, a conditional CBT granting Syrian female refugees monthly cash income, operates through various employment schemes within refugee camps.

Cash can be withdrawn at beneficiary convenience from supermarkets located within the camps (WFP 2018c). UNW and WFP no longer require FSPs as intermediaries to manage each of the individual wallets registered on Building Blocks. Transactions are identified by an iris scan at the retailer and then authenticated by UNHCR’s biometric identity ecosystem. Each beneficiary has a virtual wallet created on the blockchain and a virtual bank account

identity. FSPs are needed only to reimburse supermarkets participating in the programme, which significantly lowers transaction costs (Thylin and Novelo Duarte 2019).

Despite being a private, permissioned blockchain, BB has network capacities similar to a public network. This allows multiple use cases rather than being a database or an accounting system benefitting only one agency. As UNW has a partial control over BB's independent nodes, both parties can validate each other's cash transactions via their own blockchain nodes allowing increased trust and security in the system. UN Women's involvement is thus beneficial for WFP.

UNW has benefited from WFP's experience as early adopters of blockchain in humanitarian settings and by reducing transaction costs through BB. This case study identifies that female refugees or women who are displaced, often have lower digital literacy than men, lacking access to technology and connectivity. The UNWCS shows that women become more economically empowered with the use of blockchain technology.

Building Blocks is presented as the first interagency project of its kind. Firstly, as both agencies are seen as governing BB, the WFP-UN Women partnership represents a significant step towards blockchain adoption in humanitarian settings. Secondly, BB is perceived to endorse the need for transparency and efficiency, encouraging coordination and avoiding duplication of efforts. Thirdly, BB can inspire other humanitarian agencies to join efforts in innovative matters by appearing more decentralised through partnering with UNW. Fourth, blockchain is perceived here as an innovative, sustainable, and scalable technology to be harnessed for both humanitarian and development purposes and have capacity for unifying other CBTs operated by WFP partners in Jordan. Ultimately, this case study illustrated how two organisations with differing mandates collaborate and coordinate efforts to work together.

VIII. Analysis and discussion

For the purpose of making the collected information relevant to the challenges created as a result of scaling up Building Blocks, and encouraging the

participation of operating partners, this section has been divided into the following four parts: Data Management; Cash-Based Transfer Systems; Opportunities and Constraints for CBT Use and for Joining BB; and Risk Assessment.

i. Data management

Data management in this research has been analysed for the purpose of making BB more secure, sustainable, and transparent. Organisations represented by ExTech, RDatarella, UNOCHA_1 and UNOCHA_2 (See Interviewee Codes for reference) have not been analysed as they do not provide humanitarian aid. UNOCHA collects secondary data in the context of coordination, such as response information and situation assessment to coordinate humanitarian affairs. It does not collect PII.

Data collection and origin

The origin and the method of data collection determine how this data will be applied. UNHCR is mandated as the focal point of registration for refugees (UNHCR 2018a). Based on the interview results, WFP and UN Women rely on UNHCR's PRIMES for the purpose of their CBT processes. This is in the contrast to Mercy Corps and Oxfam who rely on their country offices for refugee registration, and so personal data collection.

Processing sensitive data is unavoidable in humanitarian operations; however, where agencies collect PII independently, a duplication of efforts, in addition to the risks for data inaccuracy, are more likely. WFP mentions WFP collect PII in the form of gender and age, as do RMC and ROxfam. Such data can be used to effectively aid OPs design effective responses to assist those affected by crises (Mazurana, Benelli and Walker 2013). As BB does not require PII input, we assume this category of data might likely be used in SCOPE, which is mentioned in the risk assessment section (WFP 2014). Risks arising from sensitive data collection could be lowered if all non-UN agencies, such as Oxfam and Mercy Corps were able to access the PRIMES database. Using PRIMES as a sole point of reference for refugee data would avoid having multiple storage points for such data, thus limiting the potential for data theft.

Data storage

Data storage and safeguarding PII are essential for humanitarian action and coordination. OP representatives stated their respective organisations store data physically, avoiding cloud services where possible, for instance, on encrypted Microsoft Excel sheets. RMC also states that PII, data storage should be “off-chain” or separate from the blockchain itself, where sensitive data stored cannot be transferred along with the movement of blocks.

There is a risk that ineffective cyber awareness procedures in an organisation increase potential for cyber-attacks which is heightened in open/non-permissioned networks. Both physical and digital storage have their respective advantages and disadvantages. Risks of data misuse resulting from Internet connections are lessened when physical (localised) means are used but are still present should hardware storage fail to function.

Physical (localised) storage relies on trust, and so can imply individual/organisational responsibility for the safe use of data. If data is passed through the Internet and stored on a cloud, there is lesser individual ownership, and those with cloud access will have greater autonomy over the data, leading to potential misuse. Conversely, storing data in a remote location makes it easier to access data from any device via the Internet.

Considering transaction records are hashed and sensitive data is anonymised in BB, using blockchain technology can be perceived as safe. RDatarella mentions that participating institutions can validate each other’s transactions despite having individual databases and data storage systems. The means of storing the transaction history or “blocks” is unknown in the case of BB.

Data sharing

Agencies interviewed share the consensus of not sharing PII data on cloud services. RWFP mentions that, in some cases, WFP securely shares PII through Secure File Transfer Protocol (SFTP). To complement this, ExTech advises that data be transferred through internet protocols such as Secure Socket Layer (SSL) and public key infrastructure, ensuring that only intended recipients can access sensitive data.

The UNHCR Data Protection Policy states that UNHCR may need to share personal data with ‘implementing partners’ and/or third parties based on agreements to function effectively in pursuit of their ‘protection and solutions’ mandate (UNHCR 2015). While data sharing between UNHCR and operational partners might not be relevant with the current BB model, not sharing data could decrease operating partners’ trust of the system, impacting BB’s scaling up process. In the case of Jordan, it is unknown how UNHCR and NGOs share data, but according to RMC, the UN does not share sensitive data with external agencies.

Data protection

Safeguarding stored data should be well conducted to protect PII. The level of protection for sensitive data depends on the objectives of each OP; RWFP says that UNHCR is well recognised for implementing rigorous data protection for beneficiaries

OPs serve as trusted nodes and are responsible for executing protocols, thus more participants in a system will alter the governance of the blockchain (Buterin 2015). Each OP represented abides by different official data protection guidelines, although these protocols are generally reflective of those stemming from the UN. Should partner agencies join BB, discrepancies in protecting sensitive data as a result of the different data protection procedures implemented by each OP should not hamper this collaboration. To facilitate the coordination of operating partners inside the system a unified agreement of data protocols will be required.

Effective data coordination can be used to achieve OP objectives by creating transparency between participants in a blockchain-based CBT. In the event OPs join BB, governance could be further strengthened by means of a consortia model providing OPs with partial control of BB. This will be discussed in the next sections.

ii. CBT systems

UNHCR has a CBT known as the Common Cash Facility (CCF). Participating UN agencies and NGOs with the UNHCR and FSPs deliver 90% of the cash provided to 592,000 refugees living outside of camps in Jordan (UNHCR 2017). At present UNICEF and Mercy Corps are part of the CCF. In this CBT ‘similar’ to Building Blocks, following iris scanning (through IrisGuard technology), refugees withdraw cash via

ATM, which authenticates the beneficiaries by linking to PRIMES through EyeCloud. The EyeCloud platform removes the need for beneficiaries to register with the bank, connecting the ATM network directly with the UNHCR beneficiary database (UNHCR and CaLP 2017).

Collaboration and coordination are effective means to improve resource utilization and integration, save costs, and avoid overlap in delivering humanitarian aid. UNW have cooperated with WFP in BB whilst Oxfam is conducting its own cash assistance in Jordan without joining CCF or BB. Both WFP through BB and UNHCR through CCF have expressed enthusiastic views on expanding cooperation.

How the Common Cash Facility differs from Building Blocks

Unlike Building Blocks, UNHCR's CCF relies on FSPs to process transactions made by refugees, to provide institutional independence and transparency for participating OPs.

CCF currently partners with the Cairo Amman Bank (CAB), adopting a tiered fee schedule. CAB charges a transfer fee equivalent to a percentage of the cash transfer amount, ranging from 2.5 to 5% (UNHCR and CaLP 2017). With more partners, transfer fees will decrease as the total transfer amount increases. Reducing transfer fees is a main motivation for growing CCF partnerships, providing value for money to maximise the impact of donor funds. In 2017, transfer fees were reduced to 1.67% for all CCF participating agencies.

CCF has agreed on standards and principles to further develop a governance framework with FSPs. Each agency joining the CCF has an individual direct account with CAB, and the bank is reimbursed depending on the services provided. Each CCF participating agency is subject to the same terms and conditions, meaning smaller agencies have equal footing with larger member organisations to access financial services and benefit from the security provided by IrisGuard (UNHCR 2018b). However, as UNHCR holds much of the power with regards to negotiating new financial contracts, CCF members may be perceived to have less agency and decision-making powers, therefore relying heavily on UNHCR to deliver financial assistance. To summarise, OP

cooperation with FSPs requires a robust regulatory system to control cost resources and increase transparency and credibility.

An opportunity for merging the Common Cash Facility with Building Blocks

UNHCR's CCF and WFP's BB have shared objectives and different targets depending on their location in relation to refugee camps. CCF targets refugees located outside refugee camps whereas WFP focuses on Syrian refugees in specific refugee camps (Action Against Hunger and UNHCR 2017). Within CCF, UNICEF targets the most vulnerable children, while Mercy Corps assists women affected by gender-based violence (UNHCR and CaLP 2017). Similarly, UN Women uses BB to deliver female-oriented assistance. Although Mercy Corps and UNW's targets overlap, there is some difference due to their operational scope. As a result, the impact of CBTs among these operating partners is not duplicated.

Should the CCF merge with the blockchain-based BB, there is an opportunity for UNHCR to experience cost savings and have greater oversight over the delivery of humanitarian aid whilst reducing duplication of efforts by partner agencies.

Suggested governance of CBTs in Building Blocks

The CCF has nine members and a regularly revised managerial system to maintain governance resilience. The CCF makes use of the UNHCR's Vulnerability Assessment Framework which has specific pre-agreed socio-economic indicators between agencies, that further improves the effectiveness of cash assistance (Action Against Hunger and UNHCR 2017). The CCF is not blockchain-based and its governance model has no platform manager unlike BB, the latter for which the WFP is at present the sole platform manager.

The 2017 UNHCR and CaLP 'Review of the Common Cash Facility Approach in Jordan' states that well-structured interagency governance should have "clear mechanisms for engagement with partner humanitarian agencies and financial service providers". Firstly, the oversight of member funding and payments made by members make FSPs essential for good coordination. UNHCR and World Relief Germany co-chair a Steering Committee providing oversight and facilitating collaboration.

Secondly, the Review states the need to inform members and non-members about the objectives and boundaries of how the CCF coordinates efforts. The incorporation of these elements should be considered by WFP to efficiently govern and coordinate CBTs, whilst keeping operating partners informed of BB objectives and the benefits of joining (KPMG 2019).

iii. Institutional opportunities and constraints for CBT use

This section is divided into financial, economic, technical, socio-political, legal and humanitarian opportunities and constraints for operational partner participation in CBTs and use of blockchain technology. Figure 2 represents categories that interviewee responses fall into; whereas Figure 3 illustrates the opportunities and constraints stated by OPs for joining Building Blocks.

Financial

OPs supplying aid directly to refugees and people

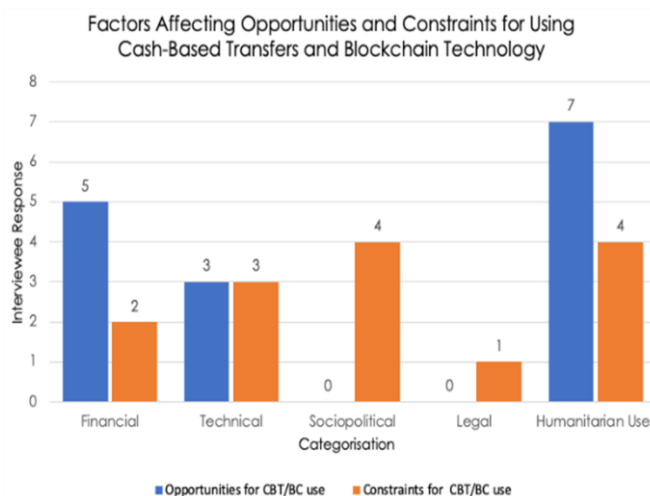


Figure 2: Opportunities and constraints for CBT and blockchain use

who are displaced utilise CBT systems in various forms. The UNW case study (UNWCS), and representatives from Oxfam (ROxfam) and Datarella (RDatarella) agree the presence of such systems are of benefit through reduced costs for OPs, as does our representative for WFP (RWFP), who states reduced cost as an opportunity for joining BB.

CBT systems lead to cost savings, reduction in monetary poverty and increases in food expenditure

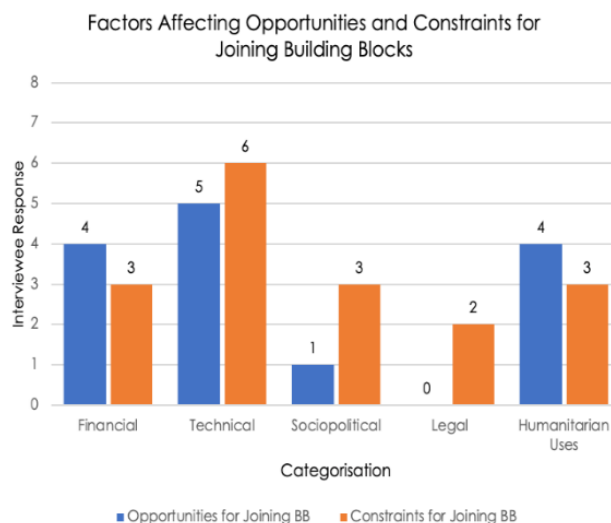


Figure 3: Factors, Opportunities and Constraints for joining Building Blocks

(Digital Humanitarian Network 2017; Bastagli et al. 2016). UNWCS infers to monetary poverty by stating that gender-based financial disparity, whereby women are less likely to have bank accounts for managing their finances, increases during conflict. An income through CBTs can empower women to access safer ways of making a living and offer a means to remove themselves from situations where physical violence is a threat. They are consequently less likely to engage in ‘relationships that are transactional’ in nature (Bastagli et al. 2016).

CBT systems impact local economies by encouraging local businesses to innovate and address the needs of (new) users, thus benefiting these economies further from locally spent currency (WFP 2018b).

Transactions processed through CBT systems are immediately visible and this real-time tracking is beneficial according to a representative from OCHA (OCHA_2). A representative interviewed for Mercy Corps (RMC) supports this view, stating that although donors might prefer tried technologies, watching cash flow in real time, and visualising the outcomes of their donations, can encourage new donors and OPs to be involved in such systems. Transparency may also be applied to track equality in delivery of financial aid whilst making it easier to trace those who might be left behind in receipt of aid and identify reasons for inequality in delivery or receipt.

Cost can be a deterrent for participation in BB. RMC is concerned that costs of CBT implementation will exceed those of fees saved by removing FSPs. RWFP somewhat agrees by stating that each OP will need to financially invest to have individual contracts with the BB service provider in addition to in-house training for CBT system maintenance. A solution to initial outlay concerns is suggested by OCHA_1 in the form of possible financial incentives for OPs to join BB.

Although costly, humanitarian operations can benefit from CBTs, more so if such projects are large in scale. OPs can benefit through reduced transaction fees, demonstrated by the application of CBTs for Syrian refugees in Jordan and the participation of UNW in BB (Jiwani 2019). However, savings are also dependent on the number of beneficiaries in a system, confirming the view of RMC that there needs to be a sufficient user base to make savings. WFP has reduced fees payable to FSPs by over 80%. Such savings can then be invested to achieve WFP's operational objectives (WFP 2018b).

Future plans aim to integrate BB with ATMs, mobile money and other monetary modalities (WFP 2018b). It is vital that these future cash systems address local and cultural needs are gender inclusive and provide equality in delivery. Such actions will make BB more relevant to refugees and displaced people, endowing them with control over monetary assets received and give those in vulnerable situations a semblance of normality. As FWFP indicates, further research is needed to mitigate the potential risks for the misdirection of funds that new systems might create.

Technical

CBTs provide security and transparency for users and OPs through (multiple) smart contracts, permitting control over data. RWFP says that CBTs are a secure, legitimate process by feature of their transparency, this, together with the feature of immutability is echoed by UNWCS as an opportunity to use CBTs. The ease of linking an OP's technical system with that of BB makes BB an attractive proposition. Most APIs can bridge connections between existing OP wallet systems and BB. Such systems are easily scaled up as PoA verification and permissions are possible in a very short time.

RMC and ExTech find the ease with which blockchain systems can be efficiently linked, an attractive reason to participate in BB. Demonstrating this, UNW has linked their own system infrastructure to that of BB and can validate WFP transfers, therefore creating transparency in this collaboration. CBT technical infrastructure, although simple to implement, requires participatory costs such as resources and capacity for system maintenance and updating. Once implemented, these CBT systems can be used to build technical capacity. This is of particular importance in regard to women and girls, whom UNWCS identify to be disadvantaged both financially and digitally. Looking to the future, the team and technical staff behind BB can be used to develop local technical capacity through training women and girls, improving their digital literacy.

WFP uses encrypted data from UNHCR's PRIMES, following which transactions are passed through BB as hash data. ROxfam states that there are opportunities to reverse engineer this hash data, which could unveil the identification of recipients, placing their safety at risk, with potentially catastrophic consequences. In reassurance, RWFP states that robust testing has been carried out on Building Blocks by WFP, as well as by UNW prior to their partnership in the programme.

The private, permissioned nature of BB is a barrier for OP participation and is of concern to each OP representative interviewed. ExTech is of the opinion that an open source BB, which is presently not an option, would attract more players into the system, and in the view of ROxfam this would increase transparency. The UNW participation model has overcome this concern by having their own node in the system, which has distributed some power away from WFP, removing the sole agency of WFP. Should other OPs collaborate in BB by each owning individual nodes, further transparency could be created. Long-term, wider collaboration also adds to the sustainability of the BB model through broader organisational input.

Socio-political

CBT implementation leads to better access to health services and dietary diversity, which can be interpreted as extending the lifespan of refugees, allowing healthy individuals to work, and enabling

them to better care for their families, and contribute on the long term to the local economy.

Studies show that CBTs increase the amount of cash available to a family, leading to a reduction in child labour, higher school attendance, and in some studies an improvement in cognitive development, more so for girls (Bastagli et al. 2016). Long term these girls will then have capacity to enter further education.

Gender inclusion is important when planning and designing technology, especially as new technology can have unforeseen negative externalities. After an application is developed, there is no space for modification due to the nature of smart contracts and blockchain making transactions immutable. As information produced by a CBT is only as good as the input, the active inclusion of women at all stages of development of a technological application, as advised by the UNWCS, will make systems more relevant for use by women and mainstream gender equality in humanitarian aid systems.

Private, permissioned networks can be perceived as less trustworthy as they exclude non-participants from being party to viewing or validating transactions. The issue of trust has been raised by both OCHA₁ and ExTech. As WFP has PoA in BB, there is the possibility that WFP may prioritise their own mandates, leading to OP dilution of power. Addressing these concerns, a third party to authorise transactions could be used, as can the creation of a consortia to oversee processes and generate trust.

UNWCS and ExTech have shared concerns over the energy intensiveness of CBT processes. Greater dataflows require more CPU power, having financial impact through higher energy bills. The sustainability of energy sources supplying technical procedures needs consideration. Some countries have heavier reliance on fossil fuels to generate energy where renewable energy is not a feasible prospect due to institutional infrastructure restraints. CPU intensity has implications as not all OPs will have the capacity for resources (financial or human) to invest in higher level technical infrastructure, potentially leading to ostracization of smaller players from participation in BB. Energy intensiveness and pollution caused by generating energy through fossil fuels affects achievement of SDG 7, the goal for affordable and

clean energy. To address the need for clean energy, UNHCR, together with the Jordanian and German governments, has reduced carbon dioxide emissions, saving \$5.5 million in energy costs per year at the Zaatari camp by building the largest solar plant to exist in a refugee camp thus far (Jiwani 2019). It is not clear how much of this energy is accessible to/used by OPs or vendors supplying CBTs to beneficiaries.

Legal

At present, there appears to be no direct legislation governing blockchain in Jordan (O'Neal 2019). No legal related opportunities to join BB arise during interviews; however, there are concerns regarding the lack of legal frameworks to regulate new digital technologies. Jordan is presently using biometrics such as fingerprints and iris scans recorded on smart cards for citizen identification, and so these are culturally accepted on a local level, possibly facilitating the acceptance of such identification processes by refugees settling in the country (Privacy International 2019).

All WFP OPs have the shared goal of delivering humanitarian aid, but not all countries in which these agencies operate have mandates regarding digital 'do no harm'. This has accountability implications in the event of misuse or abuse of data passing through blockchain-based systems. The concerns regarding data have been discussed in the above sections. Consent, however, can be a more complex issue and we touch upon it briefly here.

Although OPs have beneficiary consent procedures in place, at present many countries including Jordan, lack consumer protection equivalent to the European Union General Data Protection Regulation, the latter being regarded as protecting end users of digital technologies (GSMA 2019). In addition, some beneficiaries receiving aid, may not have the education levels or technical understanding to interpret the consequences of their data usage, a digital divide that the UNWCS says is widened regarding female users. A report published by Privacy International and the International Red Cross in 2018, calls for the protection of data that is being generated, shared and used by the humanitarian aid community (Privacy International and ICRC 2018). A 'Do no harm' approach, an essential component of humanitarian aid organisations, has not as yet been

mandated into the use of digital technologies. UNWCS also mentions this lack of digital ‘do no harm’ and human rights by design. The implementation of a digital ‘do no harm’ strategy at the design and concept stage of delivering humanitarian aid will create further safeguards for beneficiaries.

Humanitarian

The positive effects of CBTs in a humanitarian context is echoed by all OP representatives interviewed. CBTs can allow dignity, equity, and a semblance of normality for those in receipt of humanitarian aid. CBTs permit traceability of information flows, efficiency, and security, immensely valuable when delivering aid (Digital Humanitarian Network 2017). As UNWCS mentions however, there is lack of research on blockchain-based technology in humanitarian settings. An opportunity gained through participation in BB would be the avoidance of duplication of humanitarian efforts and enhanced security as FSPs would no longer need to receive beneficiary data. The latter can be protective, as it reduces the number of parties receiving PII, hence lessening opportunity for data mismanagement. Conversely, there is concern that if WFP holds all financial data, beneficiaries become more vulnerable. This is discussed later.

Conflict disrupts normality, affecting the means by which beneficiaries receive assistance. Conflict has particular impact on critical infrastructure and the UNWCS mentions that CBTs may be difficult to set up in areas of disruption. In the case of Jordan, the technological infrastructure for CBTs exists, which is not the case for Cox’s Bazaar, Bangladesh, where energy access/supply and technical capacity can impede delivery of cash assistance through blockchain-based CBTs. Culturally and in the humanitarian community, new technology can be perceived as risky due to the potential for data mismanagement. CBTs are a recent development and not as yet a proven technology. The issue then surfaces of resilience and WFP’s commitment to BB.

Digital technologies evolve rapidly and there is possibility that CBT processes may not be sustainable as newer technology overtakes the current. The BB Ethereum-based platform, although evolving since its introduction, is thus also a concern. As WFP has invested in BB financially, technically and in the

application of human resources, the resilience of BB is not of immediate concern. CBT use leads to cost savings, assisting a larger user base at a faster pace than a traditional supply chain would allow. The consensus is that as this technology is relatively new, further research needs to be undertaken to develop new ways that are context dependent for host countries to adopt disruptive digital technologies, and make this technology further applicable for alternate uses, such as information management. Digital inclusion to lessen inequalities and strengthen resilience is needed at the planning stage, additional to a ‘do no digital harm’ strategy at the outset when conceptualising and designing the technology (Thylin and Novelo Duarte 2019).

iv. Risk Assessment

Figure 4 displays risks interpreted from an operational partner’s perspective when collaborating with WFP on the Building Blocks programme in Jordan.

Low risks

Risks mentioned by FWFP and UNWCS are of minor consequence to Building Blocks and have relatively low probabilities of occurrence, as both WFP and UNW are already participants in the programme. We advise the WFP Blockchain Steering Committee (BSC) not to prioritise these low risks.

Medium Risks

We understand that these risks are somewhat more likely to occur and have slightly more serious consequences.

“Hash data is reverse engineered”: Although unlikely due to BB’s encryption methods, the severity of this risk would be catastrophic and constitute a major threat to the blockchain, which would place beneficiaries at risk of harm.

“PII data leaks”: Data leaks involving PII constitute a serious concern. Successful cyberattacks would require administrative privileges prior to the data encryption made by hardware security modules (Boireau 2016). An external hacking would require very high CPU power and as PRIMES is the primary holder of beneficiary data; a potential hacking would therefore appear more likely to be internally from

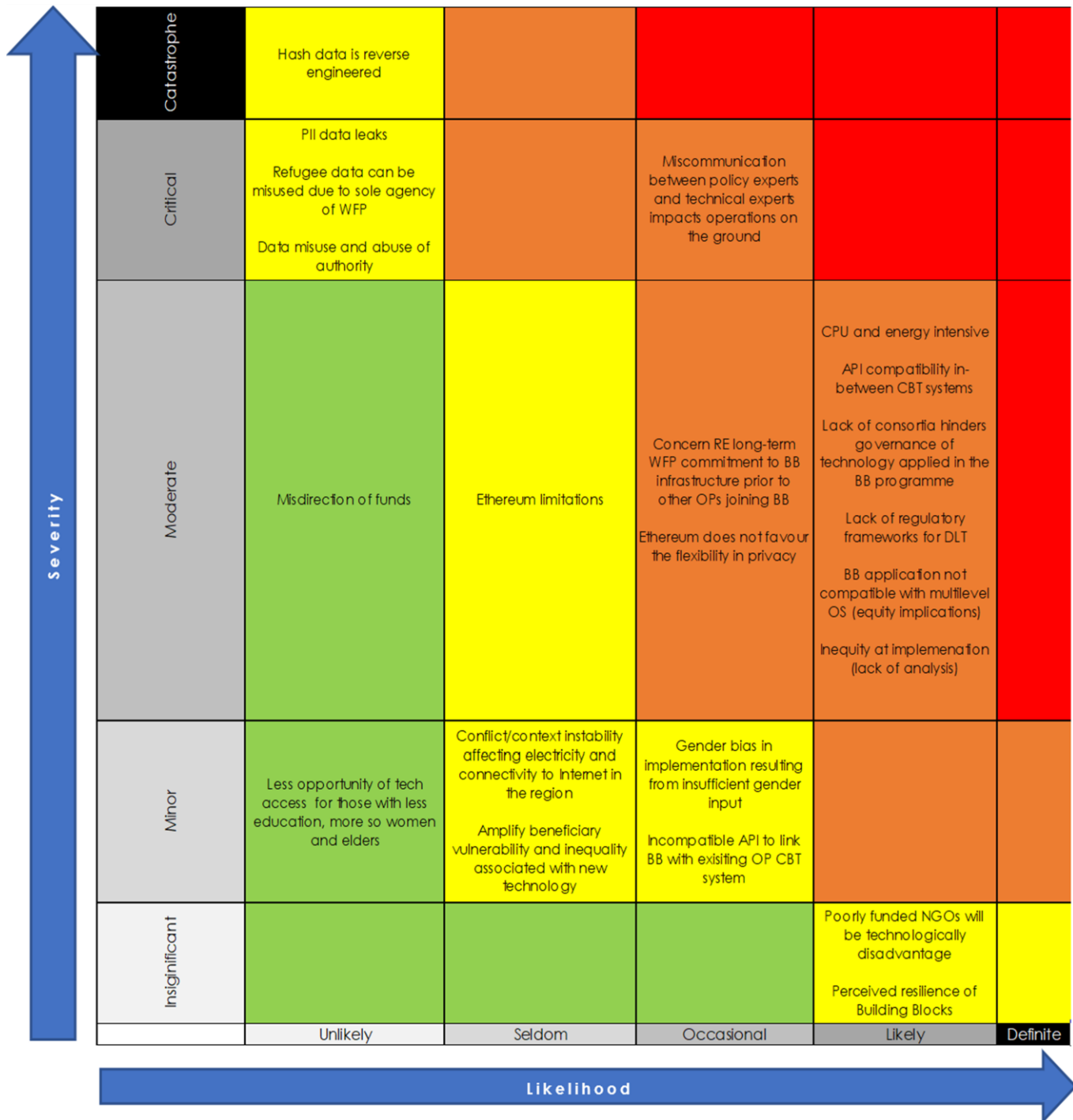


Figure 4: Risk assessment matrix

UNHCR rather than externally. As beneficiaries cannot control data that OPs hold, this PII data leak would impact inequalities of opportunity, removing choice over how refugee data is used.

“Refugee data can be misused due to sole agency of WFP”: At present, Building Blocks operates on a private, permissioned blockchain and those external to BB do not have oversight of transactions. The distribution of authority remains problematic as long as WFP possess a majority of nodes. We do not have

any information detailing how nodes would be shared with a PoA held by WFP, should an OP join BB. WFP and eventual operating partners might face criticisms over the custody of beneficiary data on BB as a private network unless these issues are cleared in advance of partnership. This risk questions the credibility of WFP. WFP has previously been criticised over poor beneficiary data handling with SCOPE (Parker 2018).

“Perceived sustainability of Building Blocks”: Building Blocks is context dependent. The WFP Blockchain Steering Committee might want to investigate the sustainability of Building Blocks should it be implemented in other geographical contexts, for instance in a country hosting a large number of refugees (e.g. Turkey, Lebanon, etc.). This assessment understands that the WFP BSC would have carried out internal risk assessments prior to projecting the future scaling up of BB. We are aware of previous consultations between the Steering Committee and KPMG considering potential risks of blockchain application for humanitarian use (KPMG 2019). It is advised that the WFP BSC investigates the risks mentioned in this section.

High risks

High risks have more serious consequences due to a high probability for occurrence. The WFP Blockchain Steering Committee is therefore advised to further discuss the following prioritised risks and devise mitigation plans at the soonest.

“Lack of consortia impedes governance of technology applied in the BB programme”: It is clear that the governance of blockchain needs a broader outlook. We do not have information as to how partnerships would be conducted and agency distributed in the interests of others, should an OP join BB. WFP would still be in a position to assert sole influence over BB towards WFP objectives (e.g. supply chain and identity management). Without clear discussion surrounding collaboration, it might be difficult for OPs to achieve their respective organisational objectives.

Literature describes some confusion between blockchain consortium and blockchain consortia. The former term indicates a type of blockchain that is neither public or private, and which allows OP

mandates to be implemented. Blockchain consortia refers to a way of managing a current blockchain, where OPs would collaborate more efficiently (Deloitte University Press 2017). A blockchain consortia can be used to influence governments in implementing regulation of blockchain technology which can be used to reduce inequalities in the delivery of aid.

Lack of regulatory frameworks for DLTs”: Blockchain is a nascent technology which has rapidly evolved. It is clear that creating an adapted and flexible framework will be challenging. At the time of writing, Jordan does not have a regulatory framework for blockchain, and little willingness to explore blockchain is shown at state level (O’Neal 2019). Despite this, Building Blocks still operates. As a result, the lack of regulation should not have a detrimental impact on BB and on the likelihood of OPs partnering with WFP on this matter. If BB is implemented in a context possessing blockchain regulation, it would be perceived as more trustworthy and credible. There is potential to trial the applications of blockchain in sandboxes to further investigate good and agile governance.

Very high risks

Due to the narrative of our risk assessment, no very high risks have been identified. Although joining Building Blocks is associated with risks, through effective communication, collaboration and research, WFP can create a more transparent and sustainable model for OPs to participate in.

IX. Concluding remarks and recommendations

Building Blocks can be viewed as an effective way to achieve the “Zero Hunger” SDG by 2030. BB is a beneficial innovation as it bypasses financial service providers and can save funds to be redistributed. WFP envisions BB to handle hundreds of thousands of beneficiaries, and millions of transactions across refugee camps in the future. This can be an invitation to collaborate with other humanitarian agencies to coordinate aid. A blockchain humanitarian consortia would facilitate interagency consensus, which if formed, could constitute a feasible governance model for Building Blocks and prospective blockchain applications for humanitarian aid. The following recommendations have been tailored to orientations of scalability, sustainability, and equity. These reflect

the research, analysis and learning outcomes of this publication.

Championing a blockchain humanitarian consortia: The WFP Blockchain Steering Committee is advised to invite competent authorities from other operating partners to join the Committee board. As WFP has no evident future plans to shift the programme to a non-permissioned network, an objective of this Committee should be to form a blockchain humanitarian consortia to govern and manage Building Blocks. Such governance championed by WFP, would unify action on and commitment to BB use cases, strengthening the sustainability of the programme. A dialogue with the International Organisation for Standardisation Technical Committee 307 (OECD 2018 and ISO 2018) would add credibility, further incentivising OPs to join.

UNOCHA and UNHCR respectively as data aggregator and coordinator within Building Blocks: Using UNHCR and UNOCHA to coordinate and oversee Building Blocks as a result of their expertise and capacities in registering beneficiaries and coordinating operating partners. This will create transparency, trust and credibility in the system handling large amounts of data by WFP; which could incentivise potential OPs to join Building Blocks on a long-term basis as they would become authority nodes on the blockchain. Such collaboration and coordination between OPs will have greater potential to lessen inequalities in the receipt and delivery of aid.

Clear communication in promoting Building Blocks: WFP is encouraged to have better and clear communication with partners. We advise WFP to publish audits and evaluations specific to Building Blocks. Operating partners have expressed concern that WFP is not publicly making its intentions clear of what is expected from potential OPs in Building Blocks, nor has WFP clearly stated gains through this collaboration. Through clear and open communication, operating partners will be aware of the steps WFP has taken to generate trust in Building Blocks. We advise that WFP offer smaller agencies the opportunity to participate in BB. Wider participation will improve the equality in receipt of humanitarian aid for beneficiaries.

WFP grants joint access for non-UN agencies to PRIMES when joining Building Blocks: We advise that OPs external to the UN can access UNHCR's PRIMES. This can help mitigate duplication of efforts and safeguard refugee data, because multiple storage points mean multiple locations for possible data breaches. This collaboration can also improve efficiency when delivering humanitarian aid.

Building Blocks can coordinate with UNHCR's Common Cash Facility: Should the CCF merge with the blockchain-based BB, there is an opportunity for UNHCR to save costs and have greater oversight over the delivery of humanitarian aid, whilst reducing duplication of efforts by partner agencies.

In this occurrence, the CCF would deliver cash assistance outside refugee camps, whilst Building Blocks would address the needs of beneficiaries inside camps. This would safeguard beneficiary data by removing the need for multiple records. It is also important that smaller agencies delivering aid are not marginalised in access to CCF and Building Blocks. It is advised that agencies coordinate with local actors on the ground and take advice from those who have been in place prior to the conflict and have greater understanding of the local ecosystem. Should UNOCHA join this collaboration, the latter can add its coordination expertise of humanitarian affairs to make this process more efficient.

Considering renewable energy sources to address and regulate power consumption as BB is scaling up: Creating more nodes when operational partners join will distribute trust in a scaled-up Building Blocks. Although not a present concern, blockchain can be energy intensive and may require high amounts of CPU power. As more operational partners participate however, a higher number of nodes will lead to higher energy usage to process CBTs. Effective energy consumption strategies can lessen the carbon footprint of the programme, making it more sustainable.

The use of BB to build local technical capacity for women and girls in camps: UNWCS suggests lower levels of digital literacy for women and girls, which are further exacerbated in situations of conflict (Thylin and Novelo Duarte 2019). Digital literacy can be improved by partnering with UNICEF and UNHCR

to provide IT education for refugees attending schools in camps. Building digital literacy will equip younger people with IT knowledge. These skills will provide a better way to make a living, thus contribute to the local economy, which lessens inequality of

outcomes. Additionally, those providing training can inform employer agencies of local conditions. Such dialogue can guide policy outcomes that lead to equality and sustainability of aid delivery.

Appendix A: List of Abbreviations

Abbreviation	Full name	Definition
API	Application Programming Interface	Set of routines, protocols and tools which specify how software components should interact
BB	Building Blocks	WFP initiative delivering access to nutritious food for Syrian refugees in Jordan by using a blockchain-based system to deliver monetary assistance
CBT	Cash-Based Transfer	Assistance to beneficiaries in the form of cash payments, bank transfers or mobile money
CCF	Common Cash Facility	Cash assistance platform operated by UNHCR and partnered agencies that allows a FSP to authenticate refugees located outside camps through ATMs on PRIMES
FSP	Financial Service Provider	Business offering financial advice and/or intermediary services (e.g. banks)
GBV	Gender-Based Violence	Violence directed against a person because of their gender
ICT	Information Communication Technology	Technology that provides access to information through telecommunications
NGO	Non-Governmental Organisation	Any non-profit, voluntary citizens' group which is organised on a local, national or international level
OP	Operating Partner	This term refers to specific agencies analysed in this research: Oxfam, Mercy Corps, UNICEF, UNHCR and UNOCHA
PoA	Proof of Authority	Consensus algorithm specific to private blockchains, where validating nodes are arbitrarily selected as trustworthy entities

PII	Personal Identifiable Information	Information which can be used to distinguish or trace the identity of an individual and any other information that can be linked to an individual
PRIMES	Population Registration and Identity Management Eco System	UNHCR eco-system that safeguards refugees' identities and that is supported by custom-made tools for registration and identification
SDGs	Sustainable Development Goals	A collection of 17 Global Goals by the United Nations defining a universal development framework
WFP	United Nations World Food Programme	Food aid arm of the United Nations and one of the world's largest humanitarian agencies
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs	UN agency responsible for bringing together humanitarian actors to ensure a coherent response to emergencies
UNHCR	United Nations High Commissioner for Refugees	UN agency responsible for protecting refugees, forcibly displaced communities and stateless people
UNICEF	United Nations International Children Emergency Fund	UN agency protecting the rights of children seeking safe shelter, nutrition, and protection
UNW	United Nations Women	UN agency working for gender equality and the empowerment of women

Appendix B: Interviewee and Case Study Reference Codes

CODE	REFERENCE
UNWCS	UN Women Case Study
FWFP	Former executive from WFP
RWFP	Representative from WFP
OCHA_1	Representative from UNOCHA (1)
OCHA_2	Representative from UNOCHA (2)
ROXFAM	Representative from Oxfam
RMC	Representative from Mercy Corps
EXTECH	Digital Transformation Expert
RDATARELLA	Representative from Datarella

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Acknowledgements

We would like to thank University College London, Department of Science, Technology, Engineering, and Public Policy (UCL STEaPP) for their encouragement during the course of the MPA and this project. We would like to thank Thariq Aziz and Jingru Hang for their contribution to the original dissertation project.

Disclaimer

This technology assessment co-authored by Farah Awan and Soheib Nunhuck in October 2019 is based on an original group dissertation project. The original research was completed Farah Awan, Thariq Aziz, Jingru Hang and Soheib Nunhuck in August 2019 to complete their Master of Public Administration degree. All reasonable precautions have been taken to verify the reliability of the material in this publication. The information contained herein does not necessarily represent the views of University College London and the Department of Science, Technology, Engineering and Public Policy. The mention of specific organisations or certain projects does not imply that they are endorsed or recommended by the Authors in preference to others of a similar nature that are not mentioned.