GDN's Next Horizons Essay Contest 2014*
THE FUTURE OF DEVELOPMENT ASSISTANCE
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Winning Entry

"THE AID DOLLAR: INCREASING THE UTILITY OF THE DONATED UNIT THROUGH HIGHLY TARGETED NON-CASH CRYPTOCURRENCY AID DISTRIBUTION"

Abstract
International aid agencies and governments have long struggled with ways to both guarantee an equitable distribution of their aid funds and to ensure that these funds are being spent in a way that is consistent with the stated goals of the disbursing agency. Guaranteeing this equitability is very difficult to do in the best of circumstances but is even more challenging in an international aid market filled with fraud, corruption and inefficiencies. This paper provides detailed suggestions, with examples, for ways that some of the problems endemic to aid distribution can be solved through the use of highly-targeted injections of cryptocurrency-based aid into the international aid market, while leveraging public-private partnerships, established consumer technology, aid-entrepreneurship and crowd-sourced compliance data to ensure that donated funds arrive where they are intended. This paper seeks to offer suggestions of the ways that technology, combined with novel national and international organizations, could be leveraged to increase the efficacy of aid funds and provide a pathway to social and economic improvement, as well as to encourage long-term sustainability and stability in the markets receiving this aid.

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Keywords
AidDollar, Bitcoin, Cryptocurrency, aid-entrepreneurship, gender equality, technological innovation, Official Development Assistance, charitable donations

Literature review and acknowledgments

Due to the divergent nature of the concepts of aid, in particular, conditional cash transfers and basic income distribution, and the idea of an entirely digital medium of exchange in the form of a cryptocurrency, a comprehensive review of all literature is near impossible and beyond the scope of this paper. However, the author would like to make several recommendations to better understand the basic concepts behind cryptocurrency. *The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order* (Casey and Viga 2015) provides a detailed, if somewhat rosy, picture of a future with cryptocurrency. Dr. Jem Bendell, Professor of Sustainability Leadership and the founder of the Institute for Leadership and Sustainability (IFLAS) at the University of Cumbria, has also written extensively on the potential implications of cryptocurrency. His post, 'Crypto at the OK Corral' (Bendell 2014), provides a brief but comprehensive review of some of the potential challenges and benefits of various cryptocurrencies, specifically those based on the Bitcoin source code released by Satoshi Nakamoto[1] in 2009.

The extensive literature concerning aid, conditional cash transfers and the function of governments, central banks and NGOs, if reviewed to its fullest extent would reduce the following ideas to a mere footnote. As such, I will refer only to several texts that I found to be very helpful in the creation of this concept. They are, in no particular order, *The Tyranny of Experts: Economists, Dictators, and the Forgotten Rights of the Poor* (Easterly 2014); *The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good* (Easterly 2007); and *The Precariat: The New Dangerous Class* (Standing 2014); as well as innumerable reports, working papers, and academic journals from around the world.

I would like to thank all of those who had the time and patience to read through this humble work. In particular, I would also like to thank the Global Development Network and the Bill and Melinda Gates Foundation for their generous promotion and support.

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[1] It is not known whether Satoshi Nakamoto is a single individual or a group of people. The true identity of Satoshi Nakamoto remains a mystery to this day.

I. Introduction

Somewhere in the developing world, a unit[2] of aid changes hands. It may have come from one of the major investors in the developing world, it may have been a currency injection by the World Bank for the development of a new piece of infrastructure, or it may have been a unit sent by an international aid group for the purpose of helping the socioeconomically disadvantaged. It may or may not be possible to trace this unit back to its source, but what is certain, is that many other units, initially bound together with this first unit, never reached their goal. These lost units are a testament to the fact that millions of dollars of aid sent overseas never finds its way into the hands of those who need it most.[3] Large volumes of aid are directed throughout the developing world in the form of low-interest loans, remittances, military aid, disaster relief, in-kind construction and other forms of aid, with varying degrees of efficacy. Some existing aid programs are highly effective, while other international aid units simply never arrive where they are needed. In the worst cases, aid is diverted to bribe officials, purchase illicit arms or support global terror networks.[4] Central to this issue is the fact that much of the aid sent internationally has no traceability and can just as easily be used to purchase arms as infant formula. It is this 'fungibility' of money – the ability for aid money to be spent in ways not initially intended – that makes it both flexible and dangerous.

One potential solution to these problems, and a potential pathway to the future of aid, is the 'AidDollar', a concept designed to leverage highly-targeted and unconventional cryptocurrency-based aid injections, leveraging public-private partnerships, well-established consumer technology, aid-entrepreneurship and crowd-sourced compliance data, to ensure that the

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[2] The generic term 'unit' is used in place of a standard currency such as the 'dollar' or 'euro' because, ultimately, the aid market is global and transactions may be made in any number of units of account.

[3] While there are innumerable examples of the misspending of aid, a particularly striking example is the fact that over one third of all aid disbursed in Sierra Leone during the height of the Ebola outbreak between May and October 2014 went missing (The Audit Service Sierra Leone 2014). Some of this is, of course, is due to the 'fog of war' and the difficulty in tracking small line-item expenditures, but some of it is inevitably less innocent.

[4] An excellent and timely example of this is the theft of GBP 500,000 by the Al-Qaeda-linked militant group, Al Shabab, from an aid convoy in Somalia between November 2011 and February 2012 (Department for International Development 2013). The following year, GBP 182,000 was also stolen from a warehouse in Miami, FL, demonstrating that this is not simply a 'third world' issue.

donated units arrive at the point where they will be of most use, be it in a disaster zone in the developing world or an inner-city welfare program in a developed nation.

II. Limitations of the publication

The prime focus of this report will be the use of aid in evolving disaster areas. While the AidDollar could just as easily be used in more established aid sectors, the chief area of concern is the development of a methodology that could be easily deployed in security-sensitive zones which are frequently rife with corruption. While cash aid is primarily considered to be a fungible asset, it is beyond the scope of this report to address some of the larger macroeconomic concerns, such as nations diverting resources away from areas which have been allocated targeted aid.[5]

Additionally, this is not intended to be a comprehensive, in-depth analysis of the disbursement of conventional aid, in all its forms – such topics have been covered in depth by experts such as Guy Standing and William Easterly.[6] For the purposes of this discussion, it is assumed that while conventional aid has done much good in the past, there have also been many opportunities to do better. The AidDollar is specifically targeted at addressing certain observed weaknesses in international aid markets, but should not be taken as an indictment of all those who have dedicated their lives and resources to more conventional forms of aid.

It is also important to note that the AidDollar is not initially intended for distribution to governments or NGOs, but rather directly to the end-users. Therefore, this is not a discussion of the many types of aid that flow towards the developing world in the form of infrastructure development or other macroeconomic government-to-government transactions, but rather focuses on the individual beneficiaries. That being said, many of the same principles could be applied to large-scale projects, such as national e-procurement systems. However, this is beyond the scope of this report.

II. Current situation

Today, there are a number of different models of international aid distribution. The most popular of these is the model of government-to-government cash transfusions or Official

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[5] As a hypothetical example, a nation given targeted AidDollar injections to fund a malaria eradication campaign may, as a result, decide to reallocate national resources from healthcare to the military.

[6] Please see the brief literature review for recommendations of several titles by these authors.

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Development Assistance, which globally accounted for US$ 150.43 billion in 2013 (OECD 2014) and is the model used by the United States and other developed nations for the vast majority of their overseas aid. While this can bolster the stability of recipient governments, this form of aid distribution is at risk from corruption and is often very easily diverted – as illustrated in Vietnam (Weaver 2012) and Pakistan (Walsh 2008). Of this Official Development Assistance, a significant portion is meant for the development of governments or for some long-term plan to enhance political stability in the region. However, a portion of it, particularly in times of disaster, is given directly to governments in the hope that it will be used in a way that alleviates the suffering of a target population.

The second most common form of international aid is money collected and distributed by NGOs directly to the population of a target region; this is particularly common during times of emergency or natural disaster and is often used by organizations such as the Red Cross and Red Crescent. This form of aid, although well-intentioned, often has severe problems with reach (Markus 2014) and ensuring adequate coverage of the target populations.[7] A relevant example of this sort of targeted aid is the European Commission's support for the Rohingya refugees who have settled throughout the border regions of Thailand near Myanmar. Over the past two decades, this aid has totaled € 118.4 million and has been distributed through NGOs such as the Interchurch Organization for Development Cooperation (ICCO) and their partner, The Border Consortium (TBC), Première Urgence - Aide Médicale Internationale (PU-AMI) and Malteser International.

The least common model of international aid is direct physical assistance in the form of donated materials, food or labor. The inefficiency of this sort of direct aid is often due to the logistical challenges in moving materials from place to place, as well as the difficulty of distributing aid on the ground in an equitable manner (European Commission Humanitarian Aid and Civil Protection Department 2015).[8] However, direct aid in the form of infrastructure

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[7] As agencies that are often dedicated to helping a specific ethnic or localized population, NGOs can also inject instability into a system through their limited reach and the diversion of resources away from the wider national population. Additionally, these agencies, in their distribution of aid through traditional channels, are not responsive to, or held accountable by, market forces. This problem of 'non-verifiable quality' can result in those receiving aid disbursements being essentially locked into the supplies provided by a particular NGO operating in their local area (Werker and Ahmed 2007).

[8] The author, as well as many other aid workers around the world, has personally witnessed the inefficiencies of such a system, which often results in massive amounts of donated clothing and

construction has proved effective and is commonly used by Chinese aid to African nations (Sun 2014).[9] While most of these models of aid distribution are potentially useful for long-term development, they do not work well for short-term aid or emergency situations.

In long-term, well-established aid channels, resources tend to flow slowly, broadly and over too long a time period to be effective in disaster mitigation. However, in short-term emergency relief scenarios, the immediate exigencies do not allow for long-term, well-researched aid disbursements; getting cots on the ground and food in the stomachs of the famished takes precedence over longer-term types of assistance. It is often during this flurry of activity, as the world rallies behind a beleaguered region that aid begins to go missing. The misappropriation of funds happens, not necessarily through any intentional misallocation (though this almost certainly occurs as well), but simply through the inherent inefficiencies of the aid process. In an effort to centralize and provide some sense of order, much of this initial aid is distributed through NGOs. In the first two years following the 2010 earthquake in Haiti, over 98 per cent of all aid received was disbursed to, and through, NGOs; the same happened again in 2015 (Ramachandran and Walz 2012). While NGOs are often well-intentioned, there have been some cases of fund mismanagement on an epic scale reported in the media,[10] which leads to a long-term erosion of public faith in the aid process and, in some cases, in the causes championed by the public.[11]

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other assorted objects being delivered to an aid location only to be spread on the ground, picked through for the handful of worthy items and then left to rot.

[9] The State Council of the People's Democratic Republic of China announced that, as of 2011, they had distributed US$ 37.7 billion between 1950 and 2009. These numbers are likely to be only a percentage of the total value of disbursements through the PDRC, but it is clear that China is a significant player in some aid sectors (Brautigam 2011).

[10] The American Red Cross's failure to build 700 homes with a US$ 120 million allocation in Haiti is a perfect example. It has been widely reported that the final total number of permanent homes build was less than ten. While there may have been extenuating circumstances, the reality is that these reports are hugely damaging to the agencies involved.

[11] Equally astonishing is the alleged misallocation of over US$ 750,000 in funds donated by FIFA. The funds were intended for Haiti but were instead paid directly into the Vice President of FIFA, Jack Warner's, personal bank account (Alexander, 2015). While FIFA is not an NGO and not in the business of providing aid to beleaguered regions, the beneficiaries and 'civilian' donors often do not make a distinction between cash transfers given by an NGO and aid that has gone missing from other locations. This has the net effect of diluting the public faith in the aid process.

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Even in relatively developed nations such as Bulgaria, disaster relief is a breeding ground for unbelievable levels of corruption. Elena Nikolova of the European Bank for Reconstruction and Development and political scientist, Nikolay Marinov, of the University of Mannheim, highlight the fact that of the 67 million Euros distributed in response to the 2004-2005 flooding that devastated much of Bulgaria, up to 88 per cent of it was reported to have been misspent (Nikolova and Marinov 2015).

Though these misallocations can be seen throughout the aid ecosystem, this does not mean that conventional aid does not work – it can and, in many cases, does, especially when combined with private-sector, profit-driven efficiency. An excellent example of this is the eradication of river blindness through a partnership between Merck, the World Health Organization and medical professionals around the world – the program administered Ivermectin, nearly eliminating the disease (Sturchio 2001).

While the intentions of these NGOs and their agents on the ground are beyond the scope of this report, these organizations promote a culture of dependency that exists to this day. To date, very little of the funds disbursed to Haitian recipients was seen directly by the Haitian population. Without these direct injections of funds, the economy of Haiti continues to struggle. A better way must be found to place spending power in the hands of those that need it most, to help them lift themselves out of poverty into a brighter future.

III. The aid dollar vision: the solution to the leaky aid pipeline

While it will probably always be necessary for wealthy nations to support the governments of developing nations in order to foster economic development and increase the overall spending power of the developing world, it is also important to remember that the people who truly need support are the citizens of these nations who are most harmed when aid units miss their targets. While aid-funded megaprojects will continue to be a topic of debate for both developed and developing nations, a new type of grassroots aid must be explored to build a strong foundation for long-term sustainable development.[12] While no solution is ever perfect,

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[12] Sustainable Development, as defined in the Brundtland Report from the United Nations World Commission on Environment and Development (WCED), is: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition includes elements of economic, environmental and social community concerns to create a holistic view of sustainability. It should not be taken to mean only

the problems of corruption, subversion, reach and coverage can be ameliorated, in large part, by a redefinition of the channels and methods used to distribute cash aid internationally directly to beneficiaries.

To solve the problem of endemic corruption, it will be necessary to create a new means of exchange which cannot be as easily misappropriated as a physical currency. As we saw during the American occupation of Iraq, large volumes of cash had a habit of disappearing without trace (Pallister 2007). This new means of exchange, the AidDollar, will be pegged to the US Dollar, or any other currency deemed stable enough to hold value over a long period, and used as the primary means to distribute aid directly to the populations in regions requiring aid. Combined with further innovations, the AidDollar can largely eliminate the problems of widespread corruption and the lack of traceability in conditional cash transfer programs because the AidDollar is designed to be useless for any purpose other than that for which it is intended. Positioned halfway between a Food Voucher and a digital cryptocurrency such as Bitcoin, the AidDollar will usher in a new era of clean assistance. Each AidDollar, being unique and non-conventionally transferable, cannot be used to subvert the aid process.

To understand exactly how this would function from a technical perspective, it is important to understand the basic facts of cryptocurrency. The first cryptocurrency that gained traction, Bitcoin, is based on a distributed network of nodes which make it nearly impossible to tamper with due to its wide distribution. Each node in this entirely non-centralized network, hosts a copy of a 'distributed ledger', which is commonly referred to as the 'blockchain'. This chain is a complete record of all transactions across the entire network. Encrypted and redundant across thousands of discrete servers, it virtually[13] guarantees that all transactions within the Bitcoin network can be tracked and verified. While Bitcoins are 'mined' by individual users across the entire network, it would be entirely possible for units to be created by a centralized agency (Deloitte 2015).

One of the key benefits of this configuration is the near impossibility for injection of false transactions into the blockchain. As the blockchain exists on a large number of distributed systems, any malicious attempt to subvert the process would require at least 50 per cent of

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environmental sustainability, though that is certainly a part of the overall concept (World Commission on Environment and Development 1987).

[13] The Bitcoin technology, as it is currently applied, is vulnerable to what could be termed a '51 per cent attack' in which an aggressor manages to seize more than 50 per cent of all network nodes containing a copy of the blockchain. This would be almost impossible, especially if a network was partially state-sponsored and defended against such attempts.

blockchain instances to be modified simultaneously across the entire network. While the encryption on a single instance would be difficult to break, to break down and modify the entire network would be virtually impossible.

As a potential replacement for conditional cash transfers, the AidDollar, rather than existing as a free medium of exchange, would be controlled by an International Aid Distribution Agency (IADA) in a developed nation and would be responsible for the creation, distribution and tracking of the path the AidDollar takes through its lifecycle, utilizing a distributed blockchain-like database technology.[14] Rather than existing in a physical sense, the AidDollar will be 'stored'[15] on one of the different pieces of technology individually tied to the end-user – the AidDollar Storage Unit (ADSU). These devices could be one of a wide variety of different technologies ranging from mobile phones and Radio-frequency Identification (RFID) cards to necklaces or other wearable devices. At the very low end of the storage chain, simple, cost-effective magnetically-charged cards with encrypted user data could be used. By combining the features of cryptocurrency with the low-level distribution of the M-PESA system,[16] which is based on mobile phone technology and is currently used extensively in Kenya, it will be possible for the AidDollar to achieve a level of saturation and utility with the end-user second only to cash, but with far greater control, tracability and end-user security.

These ADSU will allow access to a form of credit account that is linked directly to the user. When the user needs to make a transaction, they go into an aid center, select their items and scan their ADSU. Their account will then be debited and the details uploaded to a central server controlled by the IADA, as well as added to the publicly distributed blockchain. At the end of a set interval, ranging from individual transactions to weekly or monthly time periods, the retailer's transactions will be batched and the IADA server will issue a payment transfer to them in their local currency – based on a fixed but generous exchange rate. This will help encourage

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[14] The IADA could be an existing bank, a government organization, or any other organization deemed fit for such a purpose. The IADA is referred to as such so as to avoid associating the concept irrevocably with any particular institution or bureaucratic structure.

[15] The word 'stored' is used to aid visualization, though it might be more technically accurate to say that the unique tag assigned to the RFID chip will reflect the balance maintained on the IADA central servers and will update this total anytime the RFID chip comes within range of a connected IADA network node.

[16] The M-PESA system was launched by Vodafone for SafariCom and VodaCom in 2007. It allows the easy transfer of funds between mobile phones through a simple application. It is widely used throughout Kenya for everything from person-to-person transactions to utility payments. Users can then visit local payment counters to withdraw some or all of their balance in cash.

retailers to accept the AidDollar. Additionally, it will provide a large body of statistical data on who is using AidDollars and what they are purchasing. This data will ensure that AidDollars cannot be redirected or subverted, as every single AidDollar will be accounted for at its end-point and can be easily traced through its lifecycle.[17]

Tracking the acquisitions of an individual user could be done in several ways, the most secure of which would be through the use of biometric data collected when the ADSU is issued by an aid worker or volunteer at a dedicated center or as part of a mobile registration drive. Each ADSU will be linked to individual users by their thumbprint and picture, both of which will be recorded when they register. This will enable users to be monitored to ensure that AidDollars are being spent on necessities and not on superfluities.[18] The data can also be used to target additional aid, above the baseline level all beneficiaries receive.[19] A mother who is spending 100 per cent of her AidDollars on staple food to feed a family of four, for example, would potentially be eligible to receive an aid bonus, while a single man spending a large percentage of his AidDollars on alcohol and tobacco products would only receive the baseline level. However, it should be noted that penalizing these sorts of deleterious expenditures would not result in greater levels of compliance, only in higher levels of resentment. Therefore, it is important that performance-based disbursements and incentives do not take away from 'basic income' or baseline-level aid, but rather supplement it with incentivized targets.

It is important that a level of autonomy be built into the AidDollar network, allowing end-users to spend their AidDollars as they see fit. This can have a significant positive impact on overall self-esteem. In many situations, something as simple as allowing those in dire situations a choice of what food to buy, can have a positive impact on social order.[20]

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[17] In the event of a user acting in a way deemed to be unethical, it would be simple to revoke their right to access the AidDollar network. In this way, sanctions could be easily applied and enforced.

[18] The definition of what is considered a necessity is beyond the scope of this paper.

[19] It is beyond the scope of this paper to suggest how a baseline level would be arrived at.

[20] One notable success of this sort of system is the use of a voucher-based grocery system in the Zaatari Refugee Camp in Jordan under the direction of Kilian Kleinschmidt (Swedish International Development Cooperation Agency (Sida) 2014). The use of this voucher-based system, rather than in-kind disbursements in the form of food aid, had a profound impact on the stability of the camp due to the recognition of the basic human desire for self-determination in matters as simple as diet.

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The unique traceable blockchain configuration of the AidDollar would allow additional disbursements to be targeted through the distributed networks to those who benefit most from the use of AidDollars. Targeting additional disbursements of aid in this way will ensure that the money goes to where it can do the most good, not simply injected into the wider economy. By analysing this data, special care can be taken to ensure access to aid for the populations that are most at-risk. Equipping a mother with an ADSU linked to the majority of her family's AidDollars, would empower her, even if she does not have a conventional job. Depending on the national context, it would be possible to devise a system whereby the women must be present for the AidDollars to be used at a retail location.

There is a solid precedent for this gender-based aid distribution as evidenced by the work done in Bangladesh by Mohammad Yunus. In his book, *Banker to the Poor*, Yunus (1999) identified women as key to the success of microfinance efforts. As the long-term goal of aid is to stabilize a region, ameliorate suffering and eliminate poverty, the principles of microfinance can begin to be applied as the AidDollar system takes hold in a given region. As time progresses, those who have demonstrated an ability to manage and effectively use their supplied AidDollars can be prioritized for other forms of aid such as direct microfinance investments and entrepreneurial coaching. Users who have demonstrated competence in managing their expenditure will make potentially stable targets for microfinance-based aid which can then help develop grassroots economic growth.

In contrast to microfinance, which is often targeted at specific groups, the AidDollar will exist as a form of nanofinance,[21] targeted specifically at the individuals themselves. Due to the fact that the vast majority of the data being processed by the AidDollar network will exist in a decentralized form and not be as heavily reliant on aid workers on the ground, cost savings can be realized and disbursements can be highly targeted based on blockchain-tracked expenditures.

In addition to the work of the Bangladesh-based Grameen Bank, there is a wealth of research on the use of aid targeting.[22] Whether it is the targeting of aid recipients based on geographic

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[21] Nanofinance initiatives target individuals (as opposed to Microfinance, which targets small groups). The Kingdom of Thailand currently has a program which they term 'nanofinance' but it is directed solely at providing unsecured non-institutional loans of roughly $3,000 USD at a rate of around 30 per cent. The author has chosen to disregard this program because it is essentially a framework that encourages loan-sharking.

[22] While the AidDollar could very well be used to specifically target groups, it would not be a requirement for the concept to function in an aid context. As Guy Standing explains in his book,

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location, such as the rural poor by the International Fund for Agricultural Development (International Fund for Agricultural Development 2006) or the direct targeting of women by the OECD (GENDERNET 2012), it is clear that targeting aid could play a significant role in the international aid market. Output-Based Aid, as envisioned by the Global Partnership on Output-Based Aid (GPOBA), also has very clear benefits that could be adopted by the AidDollar system.

The use of AidDollar rewards for good behavior can also be used to encourage a range of activities, from school attendance to job coaching. Currently, conditional cash transfers and prepaid systems such as single-use credit cards are being used to some effect and have even been described as 'magic bullets' by the Center for Global Development's Nancy Birdsall (de Janvry and Sadoulet 2004). In Mexico, conditional cash transfers are being used to encourage postnatal care and school attendance. At the same time, there have been advances in the use of 'smart card' technology and mobile phones in South Africa, India, Kenya, and Liberia, which have resulted in a higher degree of aid targeting (Department for International Development (DIFD) 2011). These sorts of highly-targeted disbursements could also be used to track the access and spread of other services, such as medical access, transportation or other resources typically allocated in an aid environment.

By increasing the level of aid according to the effort on the part of the recipient to ensure that they are establishing themselves for a stronger future, AidDollars, can become an integral part of creating a culture of semi-supported, self-reliance, rather than one of aid dependency. This has the potential to have a positive domino effect on a society as beneficiaries become actively invested, not only in day-to-day survival, but in taking advantage of opportunities to build better and more sustainable futures for themselves, their community and their nation.

There is also room for significant involvements in Corporate Social Responsibility (CSR) initiatives in the promulgation of the AidDollar, as technological institutions such as Google and Facebook have a vested interest in enhancing the connectivity of the world as a whole. Currently, both Facebook and Google have semi-competing 'drone' projects to provide Internet access to all levels of the population. Google's acquisition of Titan Aerospace in April 2014, as well as the 'Project Loon' initiative, which uses high-altitude balloons to provide connectivity,

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Basic Income: A 21st Century Economic Right, there is also a very strong argument to be made for a non-conditional basic income. The AidDollar has the ability to fit very nicely between the camps for and against conditionality in that it can be used to disburse payments at a basic income level, as well as be used for the disbursement of conditional 'bonuses' if the situation warrants.

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represents a watershed moment in the history of human information exchange. The AidDollar represents the next logical step in the development of a global financial system (Williams 2015).

This will be possible for the first time in the history of aid disbursement due to the unique characteristics of the AidDollar system. It will serve, not only as an aid agency, but a consumer research agency, an individualized yet global nanofinancial institution, a positive reinforcement mechanism and a structure to support the coherence of the family group on a national level, while at the same time providing customized and closely targeted aid disbursements.

IV. Technical details: how does the aid-dollar work?

For international aid directed at the population of a region, the AidDollar will pass through five distinct phases, from issuance to return and replacement by local currency at the retail level.

However, before AidDollars can be disbursed, the hardware required to 'store' them – mobile phones, RFID cards, wearable devices, and other assorted tools – must also be distributed. This can be performed in one of two ways. Firstly, the ADSUs can be distributed in advance directly to a developing country as part of an established pre-existing aid package. As the ADSUs themselves will be of negligible value prior to their encoding by the National Aid Distribution Agency (NADA) in the recipient countries, they are unlikely to be misappropriated in any way. In the event that mobile phones are used, a distributed system like M-PESA could be promoted, while in the event of high rates of smartphone usage, specific AidDollar Applications could be developed and launched to allow end-users access to their AidDollars. It is likely, in any case, that a variety of methods would be used, as some users would have access to mobile phones while those at the very lowest end of the socioeconomic spectrum may rely on RFID cards issued by the NADA.[23]

At the same time, NADA-affiliated retailer registration teams could travel throughout the community and sign retailers up to the AidDollar 'PayPoint'. During this process, it is vital that a strong relationship is forged with the AidDollar PayPoint vendors, as they may be initially uncomfortable with the idea of accepting payment in a medium they are unfamiliar with in exchange for goods that have a real and tangible value. A potential pathway for gaining trust –

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[23] The use of RFID and magnetic strip cards is used only to illustrate the intended versatility of the system but could possibly turn out to be unnecessary depending on the level of mobile phone saturation in the target aid market. Even in the poorest areas of Kenya, mobile phone ownership has not halted the spread of the M-PESA system.

avoiding the 'chicken or egg' problem involved with signing up subscribers and retailers – and introducing a new means of exchange can be seen in the initial stages of Safaricom's establishment of the M-PESA system in Kenya (Mas and Ng'weno 2010).

Once PayPoint saturation has been achieved,[24] the NADA-affiliated registration teams can begin distributing the ADSUs to the local population and register them on the NADA and IADA systems. At the time of registration, all statistically relevant data would be captured and encoded to the end user's account. This could be as simple as an end user's national identification number, thumbprint, age, the number of dependents, etc. This device could also potentially serve as a supplementary form of national identification and be encoded with data on everything from residence and next-of-kin to advanced medical data. Once this distribution has reached saturation, the flow of aid can begin to be diverted from the normal leaky national channels to the more secure and direct AidDollar payment channel.

In the event of an emergency, where deployment must be more or less immediate, teams could work in concert with international aid agencies to record and register all treated, assisted or displaced persons, while working simultaneously with local logistics systems to get their systems online in order for them to handle basic transactions at short notice. In this event, it may be necessary to bridge, in the short term, with cash payments to retailers rather than use transactions directly from the IADA. While this would not be ideal, the immediate, short-term requirements for disaster relief means that complete control over expenditures may not be possible. In complex disaster environments, some loss of efficiency is to be expected. However, as the initial shock of disaster fades and is replaced by the day-to-day task of survival, the AidDollar can begin to develop the community in a more sustainable fashion.

V. Payment pathways: fewer 'real' monetary transactions minimize losses

Once AidDollars have taken root in the community, the regular cycle of funding – AidDollar issuance, distribution, purchase, and reimbursement – can begin. The first task is the issuance and disbursement of AidDollars by the IADA. AidDollars will be created and added to an encrypted and widely distributed blockchain, which is then 'transmitted' to the National Aid Distribution Agency (NADA) in the target country (See Figure 2; T1: Transaction 1). Because the AidDollar is not money in the macroeconomic sense, it does not count as income or affect the financial balance of a country in any way until it is spent and local currency is released into the

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[24] 'Saturation' is defined as a level of distribution that allows relatively easy access for all end-users, ideally with some overlap to allow free market systems to work, increasing the feeling that the AidDollar can be used as money and not only as a voucher.

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system. Due to the unique structure of the AidDollar, it has no value whatsoever until it is spent. Unlike other cryptocurrencies that are traded on the open market, the AidDollar exists only within the aid community and cannot be traded outside. As the AidDollar is not part of the normal economic structure, it does not have an inflationary or deflationary impact. However, in some situations, similar to those observed in Kenya with M-PESA, the AidDollar could potentially give rise to an increase in the rate of engagement with the banking system, while simultaneously reducing dependence on less formalized systems such as Rotating Saving and Credit Associations (ROSCAs). As aid is somewhat prone to change, AidDollars will, in some ways, replace local currencies (for AidDollar-approved transactions) but would not be seen as a long-term store of wealth, but rather as a revolving account for day-to-day survival, freeing up other resources for economic expansion.[25] However, the potentially time-limited nature of the AidDollar could be leveraged to encourage spending and reduce the propensity for hoarding – which has a negative impact on economic growth as it prevents capital from being injected into the system.

The AidDollar, especially if created at an international level by an organization such as the IADA, would work in ways that both M-PESA and other existing cryptocurrencies cannot. With the centralized creation of the AidDollar, it would be possible for the supply of AidDollars to a target region to be flexibly controlled, depending on the exigencies of the situation. Cryptocurrencies such as Bitcoin exist in a finite quantity, growing at a constrained rate, and cannot be 'mass-issued' in the event that a policy such as quantitative easing becomes necessary (Bank of England 2014). However, with centralized control from the IADA, such a policy could be pursued if needed, especially as the AidDollar gradually supplants the local currency as a means of exchange. The advantage of this system is its long-term flexibility and extensive reach, if managed correctly. In the broader macroeconomic context, the AidDollar could come to serve as 'money' in the real sense, as it would serve as a store of value, a medium of exchange and a unit of account. Due to the digital nature of the AidDollar, parameters could be modified as needed to facilitate economic growth and reduce overall dependence on aid disbursements.

Once the AidDollars have reached the NADA, they will be disbursed through the local distribution network to the intended beneficiaries (See Figure 2, T2: Transaction 2). Dependent on local technologies, this could be done in a variety of ways, including via mobile phones, AidDollar refill kiosks or teams to help users access the central database and update their ledger. It would also be possible for each local retailer to serve as a 'top up' location – to allow

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[25] In regards to M-PESA, this issue was explored in depth by the National Bureau of Economic Research (Mbiti and Weil 2011).

users to connect to the main database and have their account checked and updated. This could be done on a regular basis or as frequently as needed. It could even be possible to use a distributed automated system by piggybacking on existing technological data collection packages such as the garbage trucks currently used as 'data collection ants' in Nairobi (these could be fitted with a transmitable version of the updated blockchain, which could be sent directly to the end users and which could collect data from their distributed devices).[26]

Once the AidDollars have been deposited in the end users account, they can then go to a retailer and purchase items through the retailer's AidDollar PayPoint (See Figure 2; T3: Transaction 3). Depending on the situation, these AidDollars could be applied as broadly or as narrowly as required. In times of national plenty, restrictions could be relaxed to stimulate the economy as a whole, while in times of famine or disaster, the application of AidDollars could be limited to essential staple goods. While manufactured consumer goods fitted with SKUs[27] would be easy to track once their data has been entered into the merchant's system, it would be more difficult to keep stock of some types of staple goods or fresh produce which are difficult to divide up into segmentable units. This is especially true in disaster scenarios or other situations where the social structure has been significantly disrupted. However, due to the limited resources involved for each user and for each transaction, and the fact that the system is designed for the poorest members of society, small fraudulent transactions would still contribute to the overall economic development of the area rather than go straight into the pockets of corrupt politicians or be siphoned out of the country.

Once transactions have been processed at the retailer level, they will be uploaded to the central database and the corresponding AidDollars will be transmitted back to the IADA (Figure 2; T4: Transaction 4). According to a set schedule, the IADA would issue a disbursement of local currency or some other negotiable currency to the retailer (Figure 2; T5: Transaction 5). As this is the only time that money changes hands it is much more difficult to subvert or block, making it highly efficient and closely linked to aid that has already been used. This method also has the added economic benefit of ensuring that only money that has already been spent on aid will ever be disbursed. No longer will governments and private parties need to saturate an area with aid to achieve their aims; instead they can saturate an area with AidDollars through the IADA and only need to pay out actual currency as these AidDollars are spent on goods or

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[26] Currently, these are used primarily for collection of data on the road structure in Nairobi but the uses are potentially limitless (Mungai 2015).
[27] Stock-Keeping Units: The unique barcodes which track items throughout the logistic, shelving and sales processes. There are different varieties (e.g. UPC, EAN, GTIN) but they each serve a similar function: tracking the movement and inventory of countable or weighable goods.

services. This will drastically reduce the cost of aid as a whole. Rather than pouring resources into conditional cash transfers or 'basic income' foreign aid, these funds could be spent on larger national-level infrastructure projects to support macroeconomic growth. Additionally, the fact that AidDollars are distributed to the poorest communities, and should have a relatively minimal impact on the currency of the nation, avoids the threat of an imbalance in purchasing power that can undermine development efforts.

There is also the potential for flexibility ('variable fungibility') in the use of the AidDollar as a unit of account. As a nation uses the AidDollar more and more for the purchase of goods and services, the restraints on the AidDollar could gradually be relaxed. Initially, AidDollars could only be exchanged with a registered retailer or an NGO equipped to accept AidDollar transactions. However, as the system becomes more established, it would be possible for the AidDollar to be exchanged between people, operating more as M-PESA does in Kenya today. The strength of this system lies in the fact that the blockchain-based security could remain in place, allowing the monetary supply to be easily tracked, and it would not be as volatile as a national currency, especially in the event of a disaster.

As the AidDollar gradually gains greater traction in more nations, it would allow the IADA to serve as a form of global central bank, facilitating commerce and stability around the world. The AidDollar network would be able to process financial payments using the blockchain-based technology in a manner far more efficient than today's automated clearing houses (Bank of England 2014) and would make it possible for the first time in history to have a broader, truly international means of exchange, free from nationalistic interference or concerns.

VI. The broader applications of the aid-dollar: the future of charitable giving

While this system is designed primarily to handle large-scale government-sponsored aid initiatives, it could also be used to reform the private charitable aid sector. It is very difficult for those donating money to a cause to truly understand how their money is spent. There are frequently stories in the media,[28] highlighting the lack of efficiency in the aid industry – although, few who read the reports are aware of complexities of collecting and distributing aid. According to an Ernst and Young audit of Habitat for Humanity, roughly 54.8 per cent of all aid donated by individuals during the fiscal year ending in 2013 was spent on operational costs (14.8 per cent) and fund-raising/advertising (40 per cent) (Ernst & Young 2013). Both of these

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[28] "The 50 worst charities in America devote less than 4 per cent of donations raised to direct cash aid" (Hundley 2013)

are necessary for the organization to function. However, across the entire spectrum of charitable organizations, there is extensive duplication in attempts to disburse and account for this aid. Many aid organizations excel at raising charitable donations: Catholic Charities USA received a total of US$ 793.8 million in 2011, while the YMCA received a total of US$ 767.1 million in the same year (The Center on Philanthropy at Indiana University 2012). However, this breaks down badly at the distribution end with large overlaps in distribution efforts that result in lost efficiency or miss-targeted aid. Efforts to aid the youth in post-earthquake Haiti provide an excellent example of this type of duplication. With a wide variety of NGOs operating independently and without oversight, they were unable to leverage the economies of scale that would have greatly improved the functioning of their initiatives.

The AidDollar is a potential solution to these problems, as it would be able to serve as link between charitable donors and beneficiaries. The majority of the costs of running and administering a program would already be taken up by the operations of IADA and the local NADAs, and charitable aid could 'piggyback' on the larger government aid programs. As with government aid, funds would only be paid out after they had already been used and traced, leading to a massive increase in the overall accuracy and efficiency of the program. In addition, charitable funds could be paid into the IADA, providing a guaranteed level of funding to back the newly-minted AidDollars. The system would then be able to provide specific disbursements to pre-determined targets based on the intent of the charitable giving.[29] Those who are inclined to give but do not do so out of fear their funds will be wasted or misspent, may be more inclined to donate money as a result of the safety, security, and transparency of the system.

VII. Challenges for implementation

The best-laid plans and most rigorous theoretical structures are often plagued by the exigencies of reality. It is, therefore, worthwhile considering what could potentially go wrong with a system like the AidDollar. These can be broken down into: implementation, macroeconomic and microeconomic concerns.

Implementation Concerns: There are innumerable challenges regarding logistics, bureaucratic constraints and technical difficulties that could make it difficult to achieve the AidDollar vision.

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[29] This would not be a requirement and is unlikely to help the system overall, but could potentially provide assurances that donor's money is going to a cause that reflects their values. An example of this would be assurances that aid from a Catholic NGO would not be spent on abortion or other forms of birth control.

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All of these concerns should be studied in greater depth to determine exactly how they could be limited or avoided entirely. This, however, is beyond the scope of this report.

Microeconomic Concerns: One of the biggest problems with the AidDollar concept is the fact that if it began to supplant the local currency for everyday commercial purchases, it could stifle economic growth for those not on the restricted AidDollar network. Currency changes hands on a daily basis and an economy reliant on AidDollars could see a reduction in person-to-person commerce as users lacked a means of paying for informal and unofficial services. In the worst-case scenario, this could slow or halt economic growth or even force the return to a barter economy for person-to-person trading. This is obviously not what the system intends, and it should be avoided at all costs. If allowed to operate in a less constrained fashion, with allowances made for user-to-user transactions, the AidDollar could work in a way very similar to the M-PESA system currently used in Kenya.

Macroeconomic Concerns: Due to the fact that the AidDollar is not 'real' money, in the most literal sense, and so does not directly impact the monetary system of a recipient nation until after it has been injected into the system following the completion of the AidDollar cycle, it has several important implications for macroeconomic stability. The AidDollar, sitting in reserve in the ADSU, could potentially be a destabilizing influence if all spent at once. While this should have the effect of strengthening the currency of a given region due to increased demand, it presents a difficultly in accounting for 'missing money', not unlike the gap that can develop between pledged aid and disbursed aid. Recipient nations often include international aid in their budgeting, allowing other funding to be diverted elsewhere. However, if that funding never materializes, it can lead to imbalances and budgetary stress. While the AidDollar would only be disbursed by the IADA and NADA once funding was secured, there is a risk that recipient nations may attempt to conserve resources by reducing services to populations receiving AidDollars. This is obviously not what is intended by the system, and could potentially be managed by applying sanctions or leveraging conditional aid, but more research is needed on this point.

VIII. Policy recommendations

To implement the AidDollar or another cryptocurrency-based solution, it will be necessary to examine relevant policy areas in depth to determine the best course of action to pursue. While there are many different areas which could be explored, the prime recommendations to prepare for the implementation of an AidDollar system include communications infrastructure and the establishment of an organization to serve as the NADA.

Infrastructure: Due to the fact that it is a digital currency, a minimum level of communications infrastructure is necessary for the system to function. Nations and organizations looking to implement the AidDollar or another similar system, should determine the capacity of their communications infrastructure to ensure it meets the basic requirements. This could be greatly aided by supporting mobile phone saturation in the local market. Mobile phones could potentially be used as ADSU's similar to the M-PESA system; ensuring most of the population have access to mobile phones would greatly support the development of a functional cryptocurrency-based system without having to spend the time or resources to develop other forms of ADSU.

The international transmission of data will also be important and could potentially face legislative hurdles, particularly in 'single gateway' nations, where all internet traffic passes through a single point of ingress and egress. Because the AidDollar cryptographic hashes will be, by their nature, encrypted, nations with very strong legislation in place may be reluctant to permit the AidDollar to function within their borders due to the high level of encrypted traffic it would generate. The legal ramifications of this issue should be explored before a system is established.

Establishment of a National AidDollar Agency: There must be a single organization responsible for AidDollar distribution within recipient countries. This could be a national branch of an existing aid agency, a national bank or a corporate organization contracted to distribute the AidDollar. Depending on the legal system in that country, it will be important to develop strong relationships with local government and help them understand how the AidDollar can be used to improve their overall economy. Due to the unconventional nature of the AidDollar, and cryptocurrency in general, educational initiatives should be established to win over key stakeholders in local governments and then expanded to the broader population. The best way to do this is a potential subject of further research.

IX. Future research

There is a large amount of research to be done to unlock the full potential of the AidDollar system, particularly relating to targeting aid, technological development, and educational initiatives.

Aid Targeting: The AidDollar would make it relatively simple to combine the best of current approaches to targeting. Rather than being solely a system of basic income or a system of conditionality, the ease with which funds could be disbursed would make it possible for these two systems to be merged on a sliding scale. Further research needs to be done on how this

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system could be used to maximum effect. This requires a fuller economic and aid-based study to truly grasp the intricacies of this issue.

Technological Development: The creation of the AidDollar would very likely involve the creation of an entirely new type of cryptocurrency from scratch. There are a large number of potential areas of research including (but not limited to), how to design a distributed ledger that can be controlled by a single central entity but exist in multiple locations at once, how to prevent 'double spending' in the event of a loss of connectivity, how to ensure connectivity and reinforcement of the correct blockchain configuration across a wide network and how to effectively 'upload' the AidDollar onto devices.

Educational Initiatives: In many developing countries, demonstrating that the usability of AidDollars for purchases will be difficult. Making the step from a tangible bill, which can be pocketed, collected and exchanged for other tangible goods, to a digital currency which exists only in cyberspace, will be difficult for most users. To solve this problem and to encourage acceptance by the consumer will require extensive educational initiatives to demonstrate the value of the AidDollar in daily life. This issue will be compounded in nations with low rates of overall literacy, and a visual-based approach may be necessary to help aid learning.
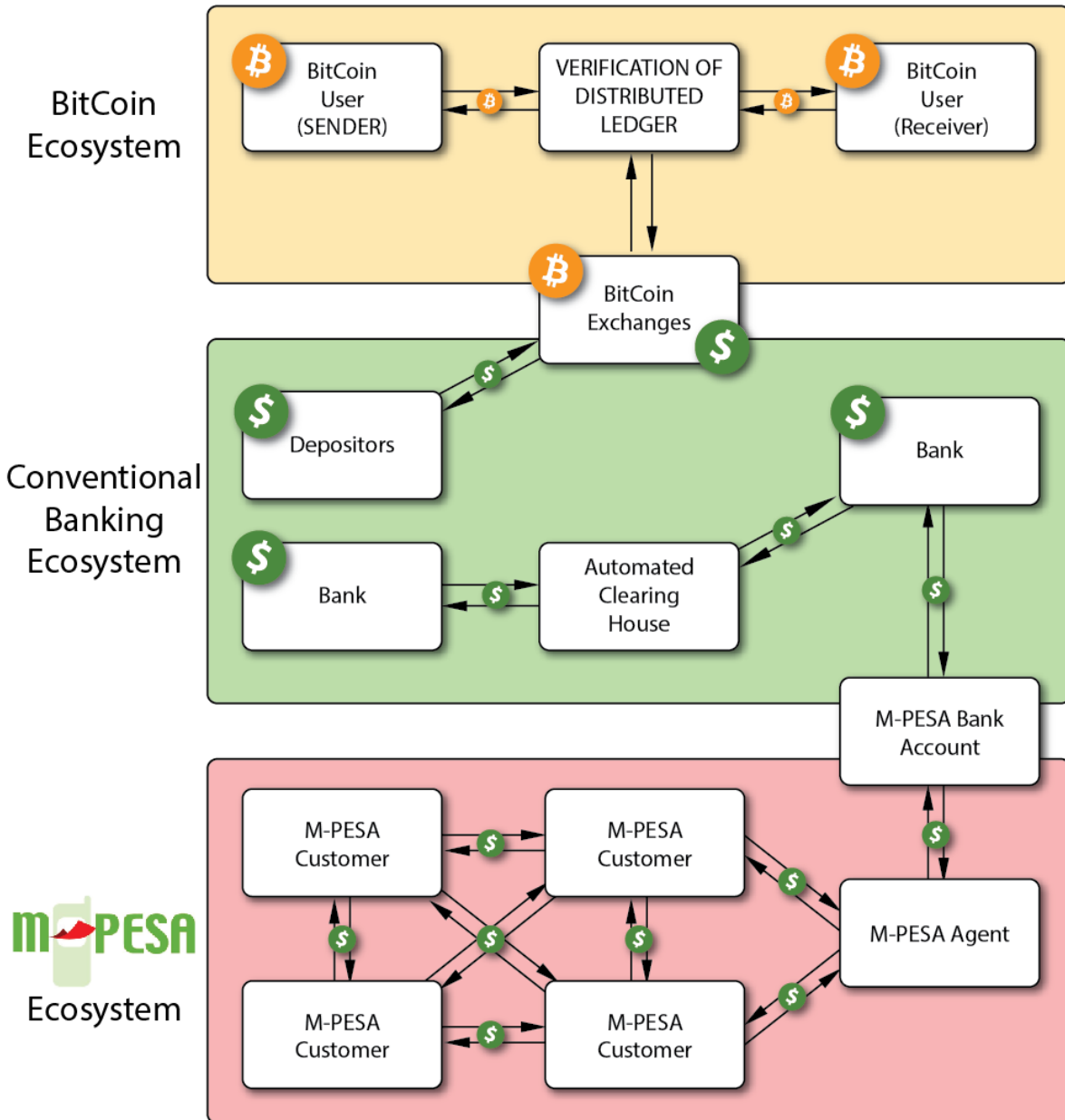
The Impact and Efficacy of Budget Support Versus Direct Payment to Targeted Individuals: This paper is intended to be an investigation into the potential for direct payment. It may be found, as time progresses, that budgetary support has a greater impact. If it is possible to reduce the number of variables to a degree that makes it possible for a comparison of these methods of aid disbursement, it will benefit the entire aid community, from those giving aid to those receiving.

X. Conclusion: dawning of a new era

For the first time in human history, we have the ability to create positive change on a truly global scale. With unprecedented global communications and interconnectivity, there is nothing that we, as a race united, cannot accomplish. While the challenges facing humanity are formidable, they can be overcome with tenacity and a willingness to challenge the established order. The AidDollar stands as a clear challenge to the traditional approaches to aid – not in condemnation of what has been done, but in order to propose a new solution to advance global prosperity through innovation and leveraging distributed ledger banking systems to level the economic playing field. There is a role for everyone in this continuously evolving system, from the smallest donors to the largest corporations and governments. It is only when we recognize that we not only have the will, but the ability (and indeed responsibility) to drive forward
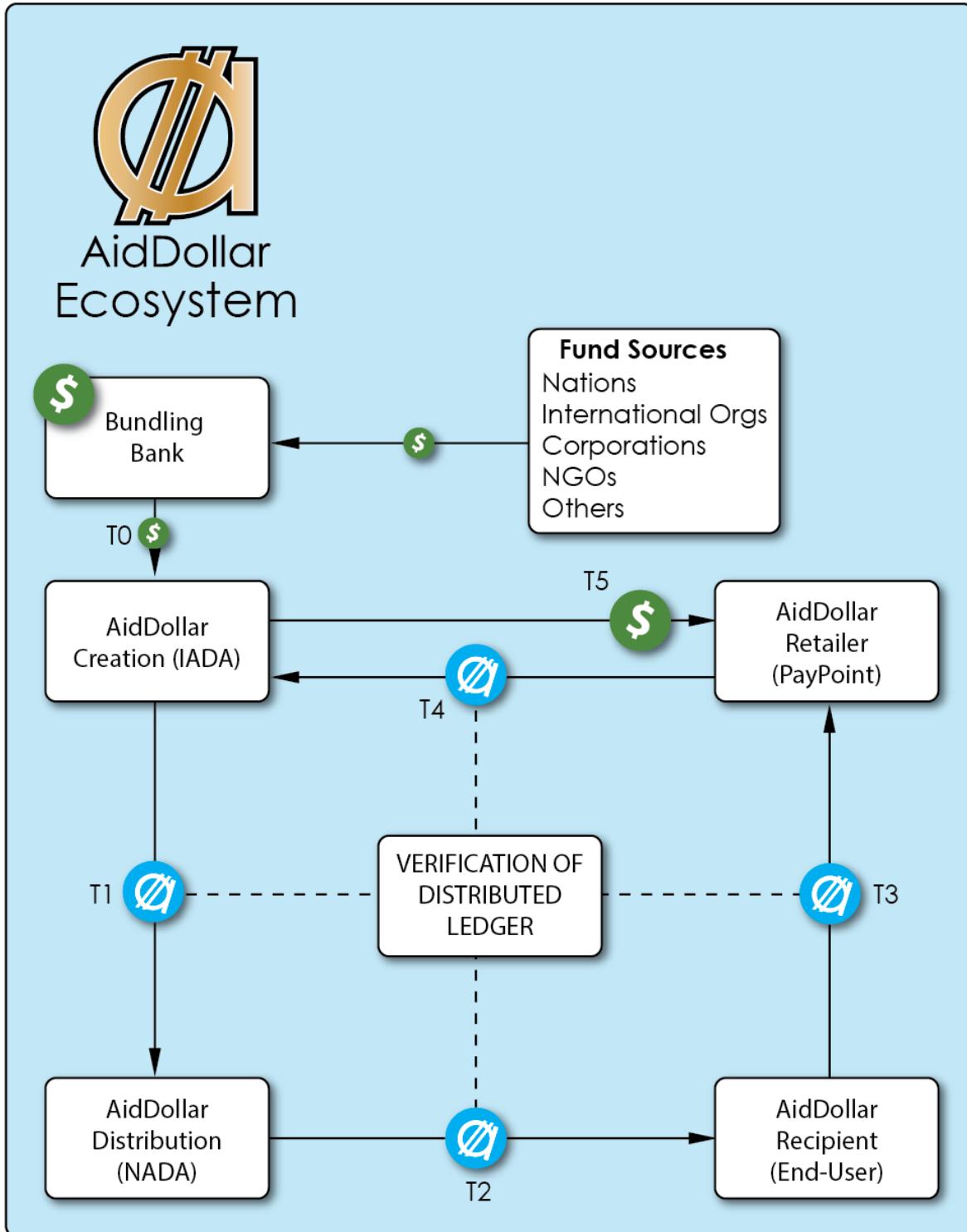
positive change that we will overcome the economic issues that have plagued us in the past and advance towards and brighter future.

Figure 1: Bitcoin, Conventional Banking and M-PESA Flowchart

Note: While the unit of account for the M-PESA system is the currency of Kenya, the Pesa, dollar signs have been substituted for ease of understanding

Figure 2: The AidDollar Financial Flowchart

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