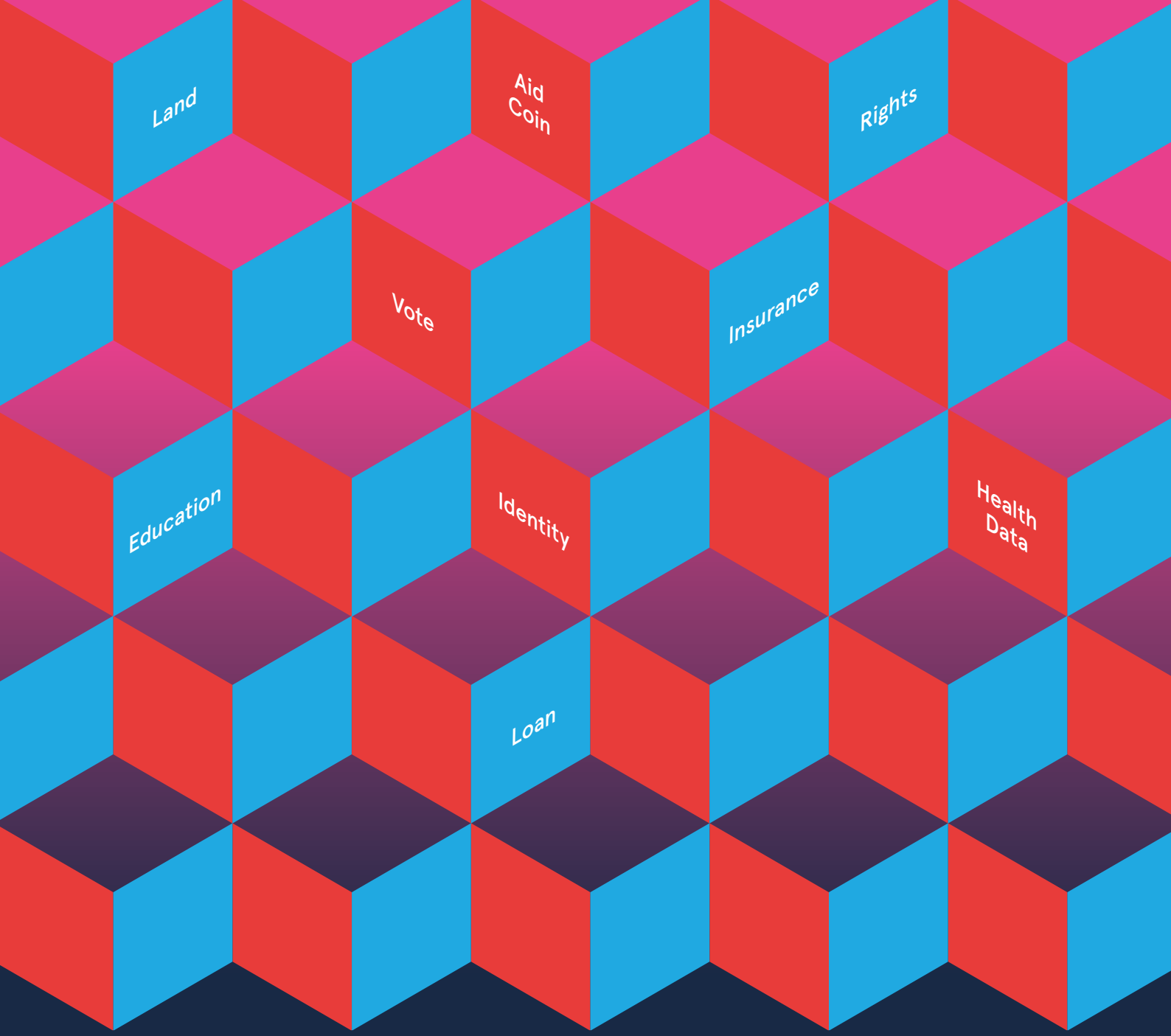


Hack the Future of Development Aid

SUSTAINIA

MINISTRY OF FOREIGN AFFAIRS
OF DENMARK
Danida

Coinify

CONTENT

The governments of the world have spent hundreds and hundreds of trillions of dollars bailing out a decaying, dickensian, outmoded system called banking, when the solution to the future of finance is peer-to-peer. It's going to be alternative currencies like bitcoin and it's not actually going to be a banking system as we had before 2008.

Patrick Young, Financial Analyst

4 ways to hack aid

This study opens by diving into what blockchain is and why it is a new tech tool for development. Thereafter, we explore four ways in which blockchain can be applied to hack the future of development aid and accelerate the Sustainable Development Goals.

HACK #1
INNOVATE (AID) MONEY WITH CRYPTO-CURRENCY

HACK #2
TURN RIGHTS INTO CODE ON THE BLOCKCHAIN

HACK #3
PROGRAM AID MONEY AND AGREEMENTS

HACK #4
DISRUPT THE AID MODEL

Each hack offers a way to change business as usual approaches to delivering on the Sustainable Development Goals. Not all potential uses will be discussed under each hack as this list is long and continuously growing. The bulk of the study will look at the two first hacks; whilst hack #3 will merely be introduced, as it is the most immature of the three. The uses of blockchain that are indicated in **bold** in the table; you can read more about in the coming chapters.

Finally, you will be invited to explore how the three hacks in convergence have the potential to disrupt the current aid model.

HACK #1	HACK #2	HACK #3
Remittances	**Land rights**	**Smart aid**
Financial products for the unbanked (incl.peer-to-peer)	**Identity (refugees, undocumented, etc)**	**Blockchain beats corruption**
Access to energy	**E-voting**	**Emergency aid smart contracts to manage pooled funds**
Instant payment in supply chains	**Smart services**	Automated welfare transfers
Fund transfers	**Health records**	Automated tax collection
Crowd funding start-ups	**Educational credentials and online learning**	Automated payments of e.g. school teachers
Payment for work in global free-lance economy	Business registration	Smart cities
Wealth storage in crisis & rapid response	ID to combat trafficking	
Crypto venture funds	Tracking of conflict minerals	

Key opportunities

Blockchain is a wild space. Innovative solutions emerge all the time. It was impossible to screen all of them and talk to all blockchain thinkers as part of this study. Still, the content is rich, and if you only have five minutes, here are key opportunities to hack business as usual aid approaches with blockchain.

INNOVATE (AID) MONEY WITH CRYPTOCURRENCY

Run in front with crypto aid: Development aid is slow money, whereas crypto is fast money, crossing borders as easily as emails. Denmark can choose to become frontrunner in making aid and humanitarian financial transfers using crypto, speeding up delivery as well as increasing the transparency of aid money as it moves down the value chain. The first trial could be to use crypto for humanitarian response. Crypto and crisis is a perfect match, because high speed money means more lives saved.

Use crypto for rural growth and innovation: Cryptocurrency can act as a strategic tool to help improve the position of small-scale farmers in value chains. Large-scale corporations are starting to experiment with blockchain in their supply chains for efficiency gains, not explicitly as a tool to improve conditions of small-scale farmers. Here, Denmark can act as a catalyst by facilitating innovative applications of cryptocurrency for fast payment of small-scale farmers in value chains. Or crypto solutions can strengthen rural digital marketplaces and support rural entrepreneurship.

Catalyse crypto capital into the Sustainable Development Goals: Cryptocurrency is a new category of money offering entirely new ways to finance innovations, start-ups, and projects in developing countries. The crypto-market recently entered into a period of exponential growth and reached a market capitalisation of 91 billion USD in May 2017. It offers opportunities to develop new financing models for development. Denmark can build infrastructure that allows crypto capital to be directed towards the SDGs. It could be a crowdfunding platform to support early stage innovative start-ups as complementary to the Danish SDG fund, or a SDG innovation fund blending fiat and crypto capital. Part of this work can be to spot high impact start-ups and support them through investments to scale change.

TURN RIGHTS INTO CODE ON THE BLOCKCHAIN

Use blockchain to innovate how institutions deliver rights: The bulk of the world's poor live undocumented lives, which locks them into poverty. Aid has worked to change this for decades for instance by supporting land reforms or identity programs. Instead of continuing to channel aid into outdated paper-based systems and institutions scaling rights too slowly, Denmark can choose a different approach. To help innovate how institutions deliver rights by putting land titles – and other rights - on the blockchain in a shared digital database every individual has equal access to and ownership over. It enables a person to walk into a bank with land rights on their smartphone – encrypted and secured. It can unlock a mortgage market, combat poverty, and accelerate decentralisation.

Make blockchain governance for human rights a Danish priority: Blockchain is like a continously accelerating car constantly being optimised by a community of developers. All while, no one is fixing the holes in the road, and only few are directing it towards human rights. Most blockchain solutions today emerge as private platforms, many with user fees as part of the financing model. This carrys a real risk of introducing payment for rights.

Denmark can bring more developing states into hands on experimentation and take the lead on a conversation on governance. Blockchain calls for distributed governance. With the blockchain, code will take over a number of state governance functions. People will be active in "do-it-yourself" governance by uploading data. It implies a need to especially stregthen governance at the local and/or city level to ensure validity of rights and equal participation. International governance of the blockchain space also needs to be distributed as the UN and regional bodies like the EU cannot alone design a relevant regime for responsible adoption of blockchain. It is a conversation which needs to include blockchain influencers, such as the Ethereum mastermind Vitalik Buterin, to ensure that governance principles get programmed into new blockchain platforms.

Use blockchain to hack difficult SDGs: There are a number of Sustainable Development Goals where blockchain can play a role but where only few innovations currently emerge, such as number five on gender equality. Denmark can organise global hackhathons to tap into tech talent everywhere to incubate blockchain solutions to these SDGs. Prizes can enable the best ideas to get further shaped in partner countries in collaboration with local tech communities. Denmark can issue a token for a global community to get involved in helping to scale the solutions. It will make Denmark a true catalyst for change.

PROGRAM AID MONEY AND AGREEMENTS

Experiment with smart aid: Smart contracts can do to the public sector what robots, 3D printing and drones are doing to production: automate workflows. It can also make public money programmable, including aid money. Aid agreements with ministries, organisation or multi-donor funds can gradually shift from paper contracts into a smart contract, where particular success criteria trigger payments.

Use Blockchain to beat corruption: Blockchain takes out the human touch in the storage of data and the transfer of value. It is a new tool to beat corruption. The Danish Ministry of Foreign Affairs can trial it in aid tranfers. Or experiment with smart contracts in investment projects to program funds to be spent on pre-defined inputs to increase efficiency and lower the risk of corruption.

DISRUPT THE AID MODEL

Transition from an aid value chain to an aid ecosystem: The transformative or disruptive potential of blockchain stems from its power to remove intermediaries, including in the development and humanitarian space.

It can transform the aid model from an aid value chain to a blockchain powered aid ecosystem. In the current aid value chain model, money flows through several actors before reaching the end user; in an aid ecosystem, it is the end user who has the power to choose the most relevant aid offers on a blockchain powered platform. This is an entirely new DANIDA - “DANIDA as a service”.

Instead of allocating funding for different themes, DANIDA can turn into a platform, onto which actors - start-ups, local organisations, NGOs etc. - upload their aid offerings. The end user can then log on and request the aid most suited to their needs. It is a future-fit model enabling the most in demand aid to scale.

Time to hack aid

Many of the problems the Sustainable Development Goals seek to address are getting exponentially worse. Take population growth, climate change, and inequality as examples, and the picture painted is bleak. Luckily, tech solutions to these problems are scaling quickly.

Technology is exploding exponentially, with computing power doubling and costs halving each year[1]. The democratisation of technology is making it accessible to more people than ever before; however, how tech is utilised in the future will either enhance or undermine progress on the Sustainable Development Goals. In short, whether exponential technologies are a risk or an opportunity to sustainable development is up to us.

A major risk is represented by states choosing to hold onto a mindset and toolbox of a linear past. As Chief Digital Officer Mats Snäll of Sweden's Lantmäteriet explains: "The traditional approach of the state is to wait and see until a technology is scaled to decide whether to adopt it." This approach leaves the strategic choices of how to design tech solutions in the hands of the global tech community, when a broader conversation is needed. The problem is that seemingly technical decisions about how to design a tech solution can influence people's lives and their rights. States and development actors therefore need to throw themselves into the discussion and into hands-on experimentation – and fast.

Technology will not wait. A do-it-yourself (DIY) movement is unfolding all around us, even in developing countries. Individuals are hacking every aspect of their daily lives, and the nature that surrounds them; they sequence their own genomes and produce milk without cows. A group of Nigerians just issued the country's first cryptocurrency, essentially printing digital money outside state control. Kenya, Nigeria, Ghana, and South Africa have cryptocurrency ecosystems working to re-invent the whole concept of money. Other groups are designing new crypto-nations (e.g. Bitnation) trying to disrupt the notion of the state.

A number of states have woken up to this new reality. They turn risk into opportunity by applying exponential technologies to innovate how public institutions deliver services to citizens, showing the required exponential path to delivering on the SDGs. One example is Rwanda, where drones reduce delivery times of blood and life-saving treatments to rural clinics from hours to minutes[2]. Another is Sierra Leone, which wants to become the first smart African country, with the help of blockchain.

To stay relevant, development agencies need to hack the way aid is designed and delivered. It cannot apply a toolbox of linear solutions to an exponential world. Denmark has taken the first step in its foreign policy with the announcement of the world's first tech ambassador. The next step is to apply exponential technologies to help implement an ambitious development policy. The aim of this paper is to start that conversation, looking at how blockchain can hack aid to fast track the SDGs and transform the aid model.

1- www.quora.com/I-saw-a-question-that-asked-about-Singularity-University-I-hadnt-heard-of-such-a-thing-so-I-looked-it-up-Wikipedia-mentions-%E2%80%9Cexponential-technologies-%E2%80%9D-What-are-exponential-technologies. 2- www.bbc.com/news/technology-37646474

Blockchain – new tech-tool for development

Blockchain is not just a technology but a strategy. A strategy for states to leapfrog years of capacity building and deliver efficient services to citizens in a transparent, efficient, and decentralised way. Just like off-grid energy is helping developing countries leapfrog into clean energy, blockchain can help these same countries leapfrog financial infrastructure and innovate delivery of rights and services.

A TOOL TO CHANGE AID

Blockchain has the potential to disrupt most industries by a process called disintermediation. It basically means that middlemen in a sector are replaced by the blockchain. Finance is the first sector at risk of disintermediation, because blockchain enables you to access financial products via your smartphone. You no longer need a bank.

Disruption via disintermediation can happen to any industry, including the aid and humanitarian industry. Alternatively, development actors can choose to embrace blockchain to innovate the current development aid model to make it future-fit and digitalised. It is a strategy to abandon 'business-as-usual' approaches to delivering on the Sustainable Development Goals. Hence, blockchain is one of the most promising new tech-tools for the development and humanitarian space.

ANTI-STATE TECHNOLOGY

Blockchain was born as an anti-state technology with the mission to re-distribute power from centralised bureaucracies to the individual[3]. It does so by offering an alternative to money controlled by states and national banks, instead delegating the job of issuing money, tracking transactions, and securing data to the code. The dream is a true peer-to-peer economy.

OWN YOUR DATA

It also offers to re-distribute the ownership and control over data from centralised institutions to the individual. On the blockchain the individual can control which data to share with governments and companies by using public and private key cryptography.

3- Ready the Satoshi Nakamoto White Paper here: https://bitcoin.org/bitcoin.pdf

I think the fact that within the bitcoin universe an algorithm replaces the functions of (the government)... is actually pretty cool. I am a big fan of Bitcoin.

Al Gore, 45th Vice President of the United States

Blockchain – what it is and how it works

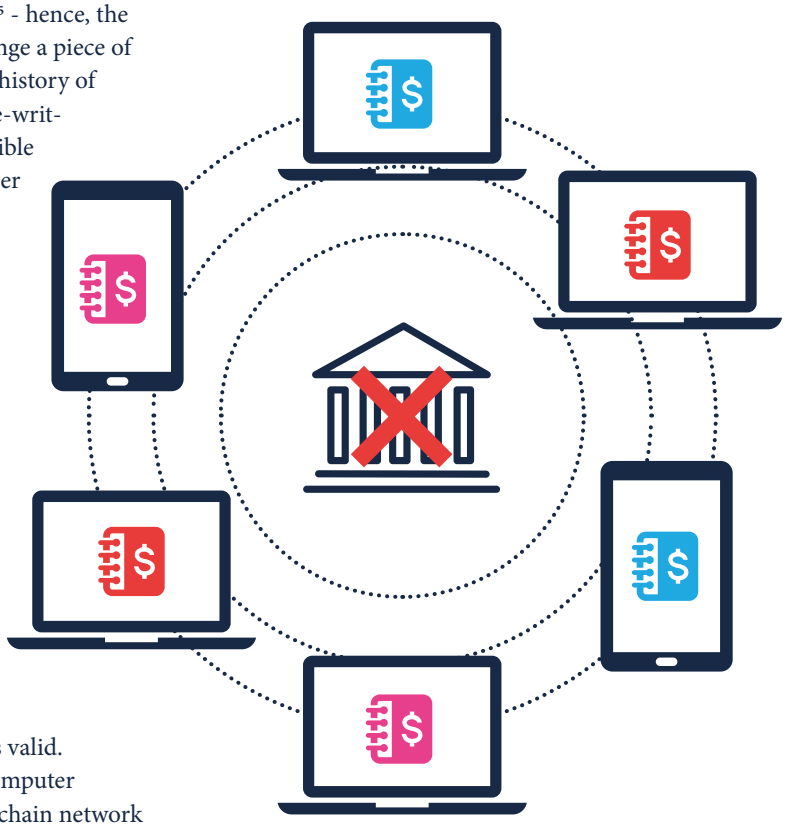
Blockchain is a distributed database. Think of it as a giant Excel spreadsheet shared across many computers in a network where anybody with an interest in the data can have a copy of the database on their device. No centralised version of the data exists making it impossible for a hacker, or anyone else, to corrupt the data.

A DISTRIBUTED DATABASE

Any type of structured information can be stored on the blockchain, from financial transactions to marriages or land ownership[4]. On the blockchain anyone can enter data but no single person can change it. Once data arrives on the blockchain, mathematical rules turn the data into a secure line of code called a hash, which act as the unique fingerprint of the data. Every 10 minutes, all transactions are verified, cleared, and stored in a block linked to the preceding block, thereby creating a chain[5] - hence, the name. If a person wants to change a piece of data, it requires that the entire history of the data on the blockchain is re-written, which is almost an impossible task. It makes blockchain tamper proof and digitalises trust. The need for intermediaries as trust brokers to reconcile data is eliminated and so is the need for a centralised ledger and institution.

MINING

When a person wants to make a transfer on the blockchain, the transaction is broadcasted to the network. Almost like posting it on a public bulletin board, open for all to see. The transfer is displayed unconfirmed until so-called "miners" confirm it is valid. Miners are people who have computer capacity available for the blockchain network to run on, as it requires large amounts of computer power. Miners solve complex mathematical puzzles every time a transaction is made in order to verify it. Hence, it is not a banker in a suit doing the bookkeeping but a miner, which can be anyone. In return for the work and computer capacity, miners are paid with cryptocurrencies. The mining sector has evolved from a hobby into a professional industry with its own value chain[6].



4- In the case of the Internet of Things, we're going to need a blockchain-settlement system underneath. Banks won't be able to settle trillions of real-time transactions between things. 5- (2016) Blockchain Revolution by Don Tapscott and Alex Tapscott, Portfolio Penguin.
6- www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/alternative-finance/downloads/2017-global-cryptocurrency-benchmarking-study.pdf

Hack #1
Innovate (aid) money with crypto-currency

Cryptocurrency is a form of digital cash stored on the blockchain. You cannot touch it in the same way as government-issued money like dollars, yen, or Danish kroner. Government money is printed, distributed, regulated, and controlled by national institutions, whereas cryptocurrency is decentralised, meaning it's not controlled by governments or banks. Payments using government money engage a trusted central authority to verify transactions.

The core innovation that makes cryptocurrency special is it uses consensus in a massive peer-to-peer network to verify transactions, meaning it does not require a trusted central authority.

Anyone with a digital wallet on their smartphone, computer, or another digital device can trade, receive, or send cryptocurrency. It allows everybody with a smartphone to be their own bank.

Consequently, what started out in 2009 as "nerd-money" for tech punks now has the potential to become mainstream money of the unbanked. As the tech literacy of the 2 billion[7] unbanked increases, the use of cryptocurrencies could boom in developing countries.

7- www.worldbank.org/en/programs/globalfindex

Cryptocurrency – what it is and how it works

Cryptocurrency is a long string of code that has monetary value[8]. To start buying, selling or receiving cryptocurrency, all you need is to install a digital wallet, which is a piece of software, to a smartphone, or use an online wallet from one of the many service providers. Downloading a wallet is equivalent to opening a bank account that enables you to send and receive cryptocurrencies as if it was email. Currently there are up to 11.5 million active wallets globally[9]. This way of handling your money and making transactions has several advantages:

1. **Trustworthy**
   The network itself acts as the trust broker, verifying all transactions and assuring that no one tries to cheat the system by spending a cryptocurrency twice. Every transaction is time-stamped and encrypted, making it a single source of truth.

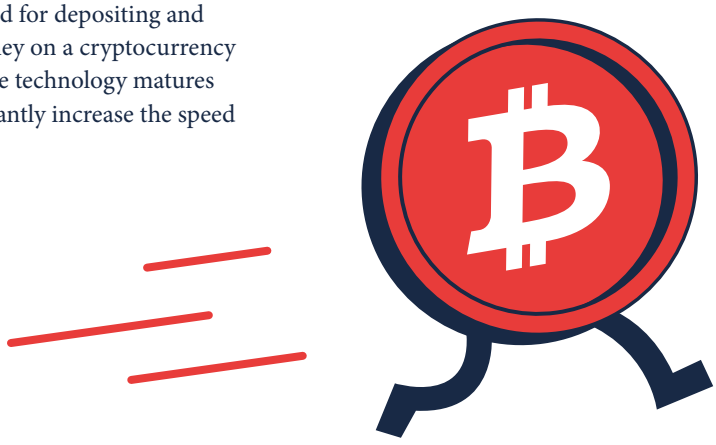
2. **Transparent**
   All crypto transactions are visible for the world to see on the blockchain, so people trading or, sending donor funds or other transfers can follow every step of the cryptocurrency's journey from sender to receiver.

3. **Fast**
   It is hard to transfer large amounts of cash overseas, but you can send the equivalent amount of cryptocurrency in just minutes. However, it is an immature technology and time is required for depositing and withdrawal of money on a cryptocurrency platform. But as the technology matures crypto can significantly increase the speed of money.

4. **Cheap**
   Cryptocurrency transfers are cheap because they travel directly from sender to receiver without passing through a chain of middlemen harvesting fees.

   However, not everyone is walking around with cryptocurrencies in a digital wallet and not all places accept payments in cryptocurrency. Therefore, most people must exchange into crypto prior to sending and the receiver will also often have to convert crypto back into fiat to spend it locally.

   This potentially means losing money on exchange rates twice. Many cryptocurrency platforms are aware of this and offer to exchange fiat on a one-to-one basis, avoiding such losses.



8- www.techworm.net/2017/06/bitcoin-bitcoin-mining-bitcoin-explained-dummy-language.html.
9- www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/alternative-finance/downloads/2017-global-cryptocurrency-benchmarking-study.pdf

Crypto accelerating the Sustainable Development Goals

Cryptocurrency is a tool to leapfrog banking infrastructure and accelerate financial inclusion, a target in eight of the 17 Sustainable Development Goals, covering five out of the seven priority SDGs of the Danish development policy for poor and fragile countries. Seven SDGs are prioritised in poor and fragile countries, however, it is worth mentioning that the Danish development policy is not limited to these, and technology is needed across the board.

LEAPFROG BANKING INFRASTRUCTURE

We are already witnessing the powerful change digital cash has to offer the world's poor. Just look at Kenya, where mobile money has kick-started a positive development spiral. Now crypto can do for other countries what mobile money has done for Kenya.

Cryptocurrencies mean people in other developing countries must no longer wait for the conditions in Kenya to travel to their country. All they need to do is to download a digital wallet and go to platforms offering cryptocurrency services. In many cases, cryptocurrencies are even cheaper than mobile money, with no banking fees and a decentralised system of verification.

FAST-TRACK SDGS

Cryptocurrencies will enable people to pay for off-grid energy, m-health services, e-learning, or enable them to engage in the global freelance economy of remote work in return for crypto.

Rural entrepreneurs can open digital shops accepting crypto as payment, and innovative ideas can be crowdfunded to finance their early-stage development. Of course, many energy, health and education providers are not yet accepting crypto, but it is an opportunity space to be shaped by innovators in the coming years. Development agencies can choose to be at the heart of facilitating this in order to fast-track progress towards the Sustainable Development Goals.

Selected applications of cryptocurrency to deliver on the SDGs

1 NO POVERTY	Access to financial services for the unbanked such as loans and insurance e.g. Blockbonds
2 ZERO HUNGER	Paying small-scale farmers instantly for their produce at the farm gate e.g. Bext360
3 GOOD HEALTH AND WELL-BEING	Digital payment for health care e.g. Sharada clinic Garborone.
4 QUALITY EDUCATION	Access to online learning. Schools can develop own cryptocurrencies e.g. Wooranna primary school in Australia
5 GENDER EQUALITY	Investing in women-led businesses through crowd funding platforms e.g. Bitmari in Zimbabwe
8 DECENT WORK AND ECONOMIC GROWTH	Online digital jobs as part of the growing global freelance economy. e.g. 'Jobs4Bitcoins'
16 PEACE AND JUSTICE STRONG INSTITUTIONS	Secure and fast relief to people trapped in conflict e.g. Building Blocks WFP
17 PARTNERSHIPS FOR THE GOALS	New innovative partnerships through peer-to-peer platforms e.g. Blockbonds with Jamoo Bora Bank

Today's Crypto Use Landscape

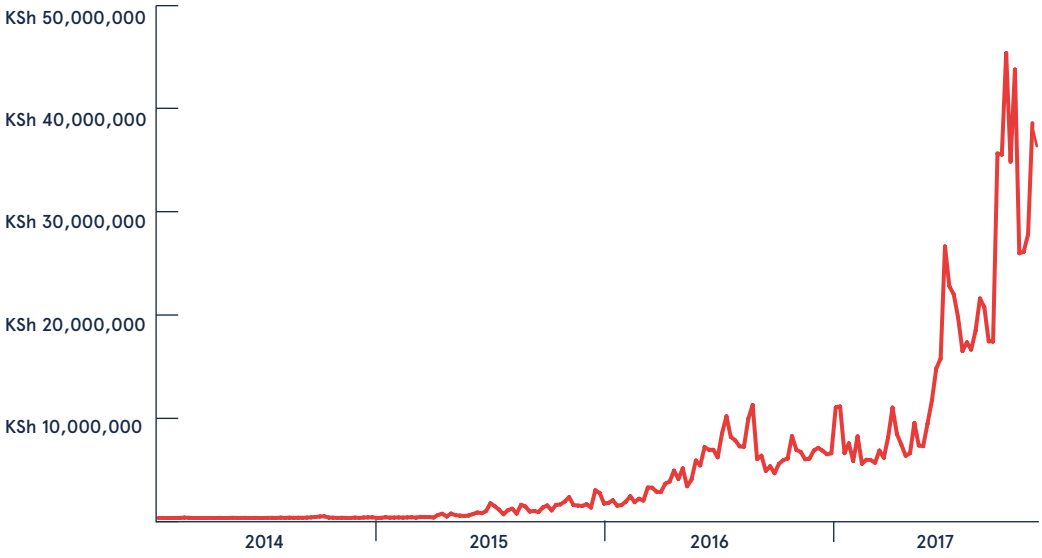
Bitcoin was born in 2009 and is the first example of a growing category of cryptocurrencies[10]. Since April 2013, 1,469 cryptocurrencies have been introduced[11]. The market is fast and wild with new currencies emerging and others dying all the time. The first application of blockchain was for cryptocurrency and it is the most mature use landscape both in general and in the development and humanitarian space. Local bitcoin trading is on the rise in Africa. Four countries in Africa now have actual cryptocurrency ecosystems. Kenya, South Africa, Ghana and Nigeria are developing blockchain startups, blockchain co-working spaces and blockchain focused accelerators.

GOVERNMENTS – A BALANCING ACT

The legal status of bitcoin and other cryptocurrencies vary from country to country. Most states do not explicitly make it illegal to use but without having specific legal frameworks in place at this point in time, and its status as money varies between countries. Only a small number of countries outright ban cryptocurrencies, two of these are Bangladesh and Bolivia. Japan grants it the same legal status as any other currency, whereas China has temporarily banned Initial Coin Offerings (ICOs) until regulation is formulated. Awareness about cryptocurrencies is increasing on the African continent, but only a few states are at the stage of looking into options for regulation. The most notable frontrunners on this conversation are Uganda and South Africa.

China is the first nation in the world to test a national cryptocurrency and many other states are considering the same, both to keep up, as well as to compete with cryptocurrencies to avoid one day having to hand over monetary policy to the code. In general, governments tend to have an ambiguous relation to cryptocurrencies. On the one hand they search for smart ways to regulate it, and on the other hand they do not want to be too restrictive at the risk of pushing local innovators to relocate elsewhere such as to Silicon Valley. However, the current trend towards mainstream adoption, where crypto is no longer only nerd-money, puts pressure on governments to start looking more into the question of regulation.

Weekly LocalBitcoins Volume (Kenyan Shilling) for Kenya



10 & 11- (2017) Bitcoin Ecology: Quantifying and modelling the long-term dynamics of the cryptocurrency market. Department of Mathematics - City, University of London. Abeer ElBahrawy et al.

Rather than trusting big companies and governments to verify people's identities and vouch for their reputations, we can trust the network.

Dan Tapscott and Alex Tapscott,
The Blockchain Revolution

CRYPTO USE CASES

Crypto can help Africa leapfrog financial service infrastructure, just as happened with landlines and is happening with energy grids. The uptake of crypto in Africa is growing, and the world will witness more uses of it in developing countries in the coming years. Here are six (non-exhaustive) current uses:

Remittances	Financial products	Access to energy	Payments in supply chains	Fund transfers	Crowd funding start-ups

REMITTANCES

Crypto is destined to become the remittance money of the future, with its many advantages as money crosses borders. The Chief Executive of Bitpesa, Elizabeth Rossiello, claims that bitcoin-based remittance services reduced the costs of international transfers by 75 per cent, and shortened the average time of settlement from 12 days to approximately 12 hours[12]. Barriers to scaling include low blockchain literacy and limited access to smartphones.

FINANCIAL PRODUCTS

Crypto platforms can offer bank-like environments inside a person's smartphone as well as peer-to-peer financial products such as insurance. An example of a platform offering crypto-based financial products to the unbanked is Humaniq[13]. Banks are waking up to this new competition, which is leading to innovative partnerships between banks and crypto platforms. One such example is between Kenya's Jamii Bora Bankone and Blockbonds[14]. Another is between Mitmari and Zimbabwe Bank of Agriculture. The latter made history by becoming the first crypto platform to partner with an African bank.

ACCESS TO ENERGY

Scaling off-grid, solar energy depends on access to payment services to enable people to pay as they go. Now crypto offers the potential to accelerate off-grid solar roll out to the unbanked by enabling new ways of paying for energy consumption. Crypto also offers new ways to crowd fund solar projects. Sun Exchange in South Africa[15] is just one example.

PAYMENTS IN SUPPLY CHAINS

Small-scale farmers often experience significant delays in produce payments and are often not paid at the farmgate. It means the risk of spoilage during transportation is carried by the small-scale farmer. Cryptocurrency can innovate value chains through fast cryptocurrency payments to small-scale farmers. One current example is in the coffee and cherry value chain by bext360[16]. Using blockchain to transfer cryptocurrency makes small-scale farmers visible in global supply chains, enabling them to establish a track record as producers.

FUND TRANSFERS

Crypto can speed up the transfer of funds and make the flow transparent whether it is in trade finance, aid, or other trans-border monetary flows. Disperse[17] and AID: Tech[18] are examples of fund management platforms using blockchain to transfer and trace aid.

CROWD FUNDING START-UPS

Nigeria is home to a number of ICOs. The country's first cryptocurrency is called AbjCoin and is used to crowdfund a tech start-up[19]. Another example is the collaboration between Bitpesa of Kenya and Bitbond, where individuals can offer loans to start-ups. "This means that a small business owner from Kenya can receive loan funding from investors from all over the world via Bitbond and have the funds paid out to his mobile money account in 20 minutes," explains Bitbond founder Radoslav Albrecht[20]. Another example is the Mitmari[21] accelerator in Zimbabwe fundraising bitcoins for female farmers in Zimbabwe.

12-www.news.bitcoin.com/bitpesa-ceo-claims-bitcoin-based-remittance-companies-have-reduced-costs-by-75. 13- www.humaniq.com.
14- www.blockbonds.io/bank-partnership-kenya. 15- www.thesunexchange.com. 16- www.bext360.com . 17- www.disberse.com. 18-www.aid.technology
19- www.lindaikejisblog.com/2017/8/abjcoin-nigeria-first-blockchain-crypto-coin-for-global-payment.html .
20- www.news.bitcoin.com/bitcoin-africa-fertile-ground-crypto-solutions. 21- www.bitmari.com/core

Access to energy – *case example*

For those living in poverty, the upfront cost of purchasing a solar system is often insurmountable. In an attempt to widen access to solar resources, companies are installing solar systems for a small fee and using mobile money to charge regular payments thereafter. Such systems typically include an online monitoring function, which registers mobile money payments and unlocks access to energy after a manual verification step.

MOBILE MONEY VS. CRYPTO-PAYMENTS

Fees for mobile payment systems such as M-pesa, mean less money is spent directly on the solar systems themselves. In addition, those outside the reach of mobile banking services are offered no access to off-grid solar power. This represents the most significant barrier to scaling off-grid renewables: lack of access to banking services.

Here, cryptocurrency has huge transformative power. Anyone can open a crypto-wallet and start accepting payments instantly, without the need for a bank account or mobile payment service. Using the most basic phone and a standard GMS network, the tools exist to send and receive bitcoin; no smartphone needed.

Alongside this study, Coinify Innovation Lab is developing a concrete solution that uses cryptocurrency payments to scale off-grid renewable energy.

SOLAR SYSTEM WALLET – MODEL TO SCALE ACCESS TO ENERGY

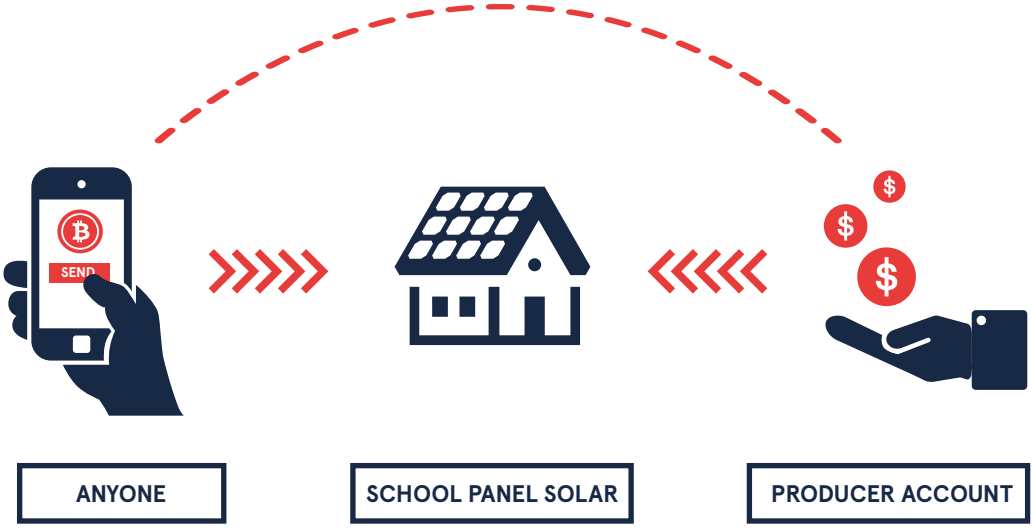
In the same way that smartphones can be used to send and receive cryptocurrencies, crypto-wallets can also be integrated into domestic solar power systems. This allows a home solar system to receive funding from anywhere in the world without passing through a person's hands or phone. As it is blockchain based, it eliminates the need for a trusted party or intermediary to validate the completion of payments. With cryptocurrencies, anyone can transfer money directly

to a unique ID of a solar housing system, which automatically registers the available funds and makes electricity available to the end user. Aid agencies, NGO's, investors and individuals can all act as funders under this model, which also offers a new way to send remittances, as relatives abroad can send money directly to their family's solar panel wallet. Truly power to the people.

In Coinify's solar system wallet, the producer and installer of the system has full ownership, and the controller unit is linked through a QR code with a unique payment address to their Coinify merchant account. Anyone from anywhere in the world can send cryptocurrency to the QR code and the producer will receive his or her preferred currency directly, as Coinify handles the exchange from crypto to fiat. Cryptocurrency is fast money, and within seconds, the producer can see the funds in their Coinify merchant dashboard, and a small script will activate the solar system for the amount of time that it has been paid for.

The point of sale is therefore a simple QR code that can be scanned by any bitcoin wallet, with funds instantly sent to the merchant account of the producer. The QR code has a unique payment address that looks something like this: 13Jvo8DYa3Ti8YfSa6MDSmMcfQZfJurP43 When scanned, any amount of funds can be transferred directly to the specific device.

This technology allows NGOs to collaborate with producers and install vital infrastructure in schools, hospitals and community centers, powering everything from lighting to MRI machines. From any corner of the earth, anyone can instantly fund such solar systems, safe in the knowledge that 100% of their donation is converted into clean energy. This innovation unlocks new streams of capital for delivering on Sustainable Development Goal number seven. Micro-grids provide another interesting application of this model, leapfrogging the need for a central utility, allowing residents and businesses to trade excess electricity from their solar systems with their neighbors. Secure transactions are executed through the solar system wallet, creating an innovative energy sharing economy and driving development in even the most remote areas. With the Internet of Things and smart contracts, the local energy trading can happen in an automated way.



Anyone can send cryptocurrencies to specific solar systems.
Funds are exchanged to USD and added to producer merchant account.

Crypto in crisis – a particular use case

Crypto and crisis is the perfect match for several reasons. Crypto is fast money enabling a faster emergency response. It also enables donors to track precisely who receives the digital cash and when, removing the need to build expensive verification processes and use multiple intermediaries as trust brokers.

Crypto emergency aid can be sent directly to local organisations in the affected areas. In 2014 only 0.2 per cent of reported humanitarian funding was channeled directly to national and local NGOs[22]. Crypto can enable donors to work more with the local response actors building their capacity, enable them to develop a track record while benefitting from their local network and context specific knowledge.

THE CRYPTO LIFELINE

Crypto is starting to become a new way to store value for people living in countries with high inflation rates and weak national currencies. It can also be a lifeline for families to access basic necessities as part of a survival strategy.

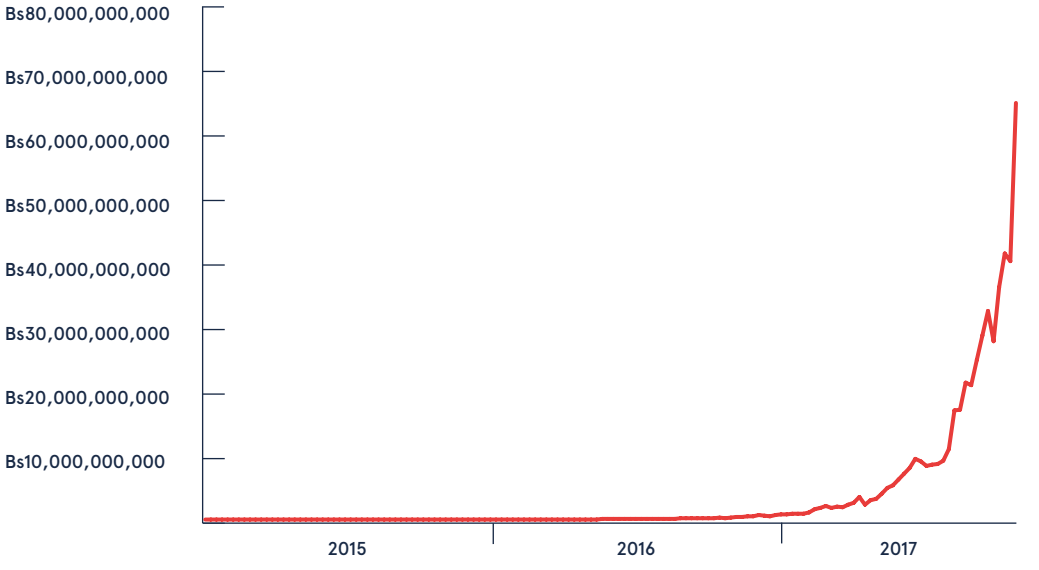
An example is Venezuela, where crypto mining has become a way to earn an additional income in a situation where high inflation is undermining salaries. Crypto in return for mining allows families to buy medicine and other necessities from abroad in a situation where local stores are almost empty. Therefore, it becomes attractive for people in conflict to mine.

However, in Venezuela miners are at risk of being jailed, and it is pushing mining into an underground movement[23]. Mining is legal, but the perceived threat to a weak bolivar is a potential explanation of the hard treatment of miners. Venezuela is only one example of a country in deep crisis where crypto is gaining importance. Zimbabwe is another.

PARANOIA NATIONS

Nations with strong national currencies tend to see the benefits of growing national crypto ecosystems, whereas crisis-stricken countries struggling with weak currencies tend to be more paranoid, often trying to control their use.

Weekly LocalBitcoins Volume (Venezuelan Bolivar) for Venezuela



22- www.reliefweb.int/sites/reliefweb.int/files/resources/%5BHLP%20Report%5D%20Too%20important%20to%20fail%E2%80%94addressing%20the%20humanitarian%20financing%20gap.pdf. 23- www.cnbc.com/2017/08/30/venezuela-is-one-of-the-worlds-most-dangerous-places-to-mine-bitcoin.html

Use crypto to innovate finance for development

Potential impacts of cryptocurrency do not stop at access to financial services for individuals and families, cryptocurrency also has the potential to innovate how to finance entrepreneurship and innovation in developing countries. Many developing countries are defined by a large landscape of small businesses, but still not enough investment capital reaches them, as many investors typically find the deal sizes too small[24] and risks too high.

ICOS – INNOVATING CROWD FUNDING

Crowdfunding can step in to provide capital for innovative start-up ideas, and can be used as a new tool for development actors, complementary to large-scale development investment funds. The crowdfunding industry is projected to grow to over $300 billion by 2025.

Cryptocurrency offers a new generation of crowdfunding. ICOs are a tool to crowd fund start-ups using cryptocurrency, which bypass the rigorous and regulated capital-raising process required by venture capitalists and financial institutions, and the documentation for fund-raising can be in the simple form of blogs and a white paper about the solution.

The entrepreneur creates a bitcoin or ethereum address to receive funds and displays it on a webpage. It is like opening a bank account and displaying it online for people to send money to. The entrepreneur uses the received cryptocurrency to pay staff, or exchange for fiat currency to fund the start-up or project. The first Nigerian ICO was issued on September 1st 2017, offering everyone the ability to invest in AbjCoin.

One risk is that investors are not safeguarded, due to the lack of regulation involved in ICOs. Whilst the transfers are transparent, identities are not, making money laundering a real risk. On the opportunity side, it democratises investments in start-ups, allowing the masses to participate, and offering tech entrepreneurs a fast-track to capital.

It also empowers people everywhere to invest in entrepreneurs in developing countries, either through ICOs or through loans paid in cryptocurrency via platforms like Bitbond[25]. This can help foster new meaningful relationships between people via distinct types of micro – or even large - investments.

NEW MONEY FOR DEVELOPMENT

Development actors can act as catalysts by directing crypto-capital into innovations that deliver on the Sustainable Development Goals.

UN WOMEN is currently looking into this by exploring how to help design platforms, such as digital trade platforms for women, which can become attractive investment products for the crypto community and/or impact investors.

These types of investors are unlikely to invest in the UN, directly, but the UN can act as a stamp of legitimacy that a solution is designed to maximise impact for a population group.

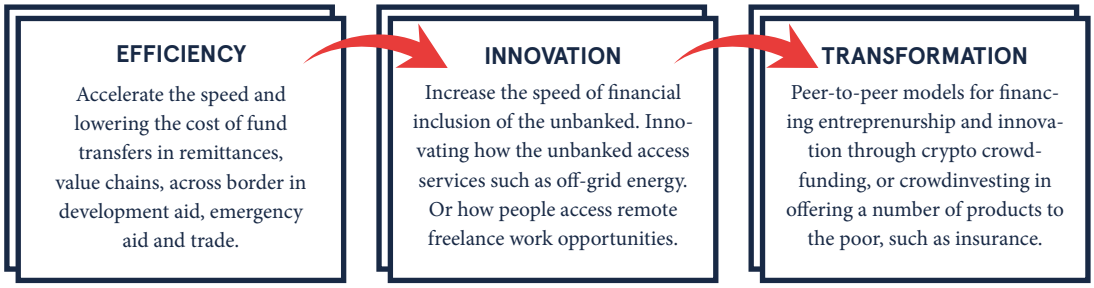
24- www.africatbn.com/blog/impact-capital-or-venture-capital-an-africa-tech-financing-dile
25- www.bitbond.com

At its core, bitcoin is a smart currency, designed by very forward-thinking engineers. It eliminates the need for banks, gets rid of credit card fees, currency exchange fees, money transfer fees, and reduces the need for lawyers in transitions...all good things.

Dr. David Isiawe, President of the Information Security Society of Nigeria (ISSAN)

Crypto risks and opportunities

Cryptocurrencies tend to be extremely volatile, reacting to even minor changes in the market as it is not supervised by institutions. Volatility is one of the biggest challenges aid agencies will have to manage if choosing to work within the cryptocurrency space. There are many platforms and ICOs that do not conduct due diligence on the cryptocurrencies they receive, which carries a risk of money laundering.



BLOCKCHAIN – AN IMMATURE TECHNOLOGY

Even though crypto is the most mature blockchain application it is still early days and the technology is constantly adapting and improving. The crypto space is mainly dominated by start-ups, which means finding partners with solid structures and a proven track record can be difficult. Hence, a different approach for selecting partners is called for. One that is open to less mature partners without long track records, but with a potential to develop.

SELECTED OPPORTUNITIES FOR ACTION

It is clear that there are many potential ways to use cryptocurrency to accelerate the Sustainable Development Goals. The question is where the competencies and positon of DANIDA adds the greatest value. Here are three selected opportunities for action:

Run in front with crypto aid

Development aid is slow money, whereas crypto is fast money, crossing borders as easily as emails. DANIDA can become frontrunner in making aid and humanitarian financial transfers using crypto, speeding up delivery as well as increasing the transparency of aid money as it moves down the value chain. The first trial could be to use crypto for humanitarian response. Crypto and crisis is a perfect match, because high speed money means more lives saved.

Use crypto for rural growth and innovation

Cryptocurrency can be used as a strategic tool to help improve the position of small-scale farmers in value chains. Large-scale corporations are starting to experiment with blockchain in their supply chains for efficiency gains, not explicitly as a tool to improve conditions of small-scale farmers. Here, Denmark can act as a catalyst by facilitating innovative applications of cryptocurrency for fast payment of small-scale farmers in value chains. In addition, Denmark can strengthen rural digital marketplaces and support rural entrepreneurship.

Catalyse crypto capital into the Sustainable Development Goals

Cryptocurrency is a new category of money offering entirely new ways to finance innovations, start-ups, and projects in developing countries. It is a market which recently entered into a period of exponential growth and reached a market capitalisation of 91 billion USD in May 2017.
It offers opportunities to develop new financing models for development. Denmark can build infrastructure that allows crypto capital to be directed in the direction of the SDGs. It could be a crowdfunding platform to support early stage innovative start-ups as complementary to the Danish SDG fund, or a SDG innovation fund blending fiat and crypto capital. Part of this work can be to spot high impact start-ups and support them through investments to scale change.

Hack #2
Turn rights into code on the blockchain

A digital currency is to blockchain what an email is to the internet. Sending an email is only one way in which you can use the internet; transferring digital currency is only one way you can use the blockchain.

Bitcoin and other digital currencies receive most of the hype and investments, but it is the technology behind bitcoin that is the transformative of the two. The blockchain will entirely reshape society. It has the potential to create a rights revolution – but only if we ask it to.

Rights are worthless without proof; a land title to protect you from land grabs, or an identity card giving you access to a whole host of rights. Institutions have failed to deliver this proof of rights to many people living in poverty - especially women. A woman often depends on male family members to prove her right to e.g. land. But now blockchain can step in to innovate how institutions deliver rights to citizens by offering proof of a right in a secure distributed ledger, which the individual can access via a digital device such as a smartphone, or in a digital kiosk.

There is a wide range of rights which can be turned into code on the blockchain to combat poverty. However, also rights that are not poverty related can be translated into code on this distributed ledger.

2.4B

2.4 billion people lack official identification, including children up to the age of 14, whose birth has never been registered - as for all the rest who live undocumented lives. Here young people face particular challenges.

70%

70 percent of the world's population does not have a legally registered title to their land.

Rights as code – what it is and how it works

Blockchain eliminates the need for centralised physical archives, instead creating a distributed digital database (i.e. no one party controls it, limiting opportunities for abuse), that government and citizens can share and that everyone can trust. Everybody participating in the network has his or her own copy of the database on a computer, a smartphone or another device. It can, for instance, be a land registry, a registry of health records, or of educational credentials to mention a few.

RIGHTS AS CODE – HOW IT WORKS

Blockchain offers a fast-track to decentralisation by either fully eliminating the need for centralised institutions or reducing their role significantly.

Let's look at land rights as an example. When a piece of land needs to be registered, data such as measurements of the plot size and photos of the plot are uploaded onto the platform registry.

Next, state-of-the-art algorithms work to verify the data entry. Once it is verified as a truthful entry, for instance not being land that is already held by someone else, it is granted a cryptographic code unique to that exact piece of land. Now the rights holder carries proof of the right in the pocket as a piece of accessible code, not as a piece of paper. The entry can never be erased, so the blockchain never forgets and corruption is almost impossible.

The rights holder can walk into a bank and, armed with a smartphone, access a loan as she has proof of land ownership. The land owner can also choose to sell the land directly on the smartphone using digital currency.

Accelerating the Sustainable Development Goals

Data to prove a right plays an important role in delivering on all prioritised Sustainable Development Goals of the Danish Development Strategy. Take the example of unlocking access to finance for farmers to invest in their farming business, which requires an ability to prove land ownership as collateral in return for a loan. If that proof is stored on the blockchain it can be presented and transferred by a farmer without time delays and in a safe way. In general blockchain is a tool to make the individual the owner of his or her data, which can accelerate delivery on the Sustainable Development Goals. It can empower a patient to show up at the clinic with their medical records on a smartphone transforming the power relation between the doctor and the patient.

EMPOWERING SMALL-SCALE FARMERS

Blockchain can be a tool for farmers to give their products a 'digital passport' showing key data about the produce such as when it was harvested and how it was produced to respond to the increasing demand of traceability from many importing countries. Once the farmer controls this data, it offers a better position to negotiate fair prices locally as well as to better position the farmer to access global value chains. Blockchain can also be used to power digital marketplaces for farm produce which are emerging across many developing countries.

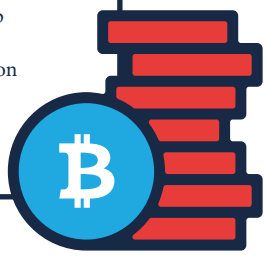
A NEW TOOL FOR GENDER EQUALITY

Blockchain can protect the land rights of a woman in the case of divorce. If she has her land title encrypted she is better protected from property grapping by her husband and in-laws. Even if she does not have a smartphone, data about her rights is owned by her, not the family.

Data is empowerment. It is a tool for negotiating rights as explained by Co-Founder of BanQ Hamse Warfa: *"When you own your data, you become a dignified human being."*

Selected applications of blockchain for data-registry

1 NO POVERTY	Access to financial products.
2 ZERO HUNGER	Farmers become visible in supply chains by registering produce e.g. Provenance.org
3 GOOD HEALTH AND WELL-BEING	Health data on blockchain empower patients.
4 QUALITY EDUCATION	Educational credentials on blockchain e.g. Kenya & IBM
5 GENDER EQUALITY	Women obtain immutable record of landownership for protection in case of divorce.
8 DECENT WORK AND ECONOMIC GROWTH	Registry of businesses on the blockchain accelerates exports and job creation.
16 PEACE AND JUSTICE STRONG INSTITUTIONS	Combat conflict minerals by transparent tracking e.g. Everledger.io
17 PARTNERSHIPS FOR THE GOALS	Partnerships to develop inclusive blockchain platforms e.g. Innovation Norway, Consensys & UNWOMEN



The current use landscape

Blockchain has been up and running for almost nine years, but the number of truly innovative companies and governments using it for something other than financial services is still relatively small. Currently, the main driver of demand for innovative blockchain data registry solutions is companies operating global supply chains. The aim is to shift from antiquated paper-based methods of tracking the movement of goods to a shared database where everyone can logon and follow the movement of goods real time in the supply chain[26]. It lowers costs as data is co-created and managed in a decentralised ledger.

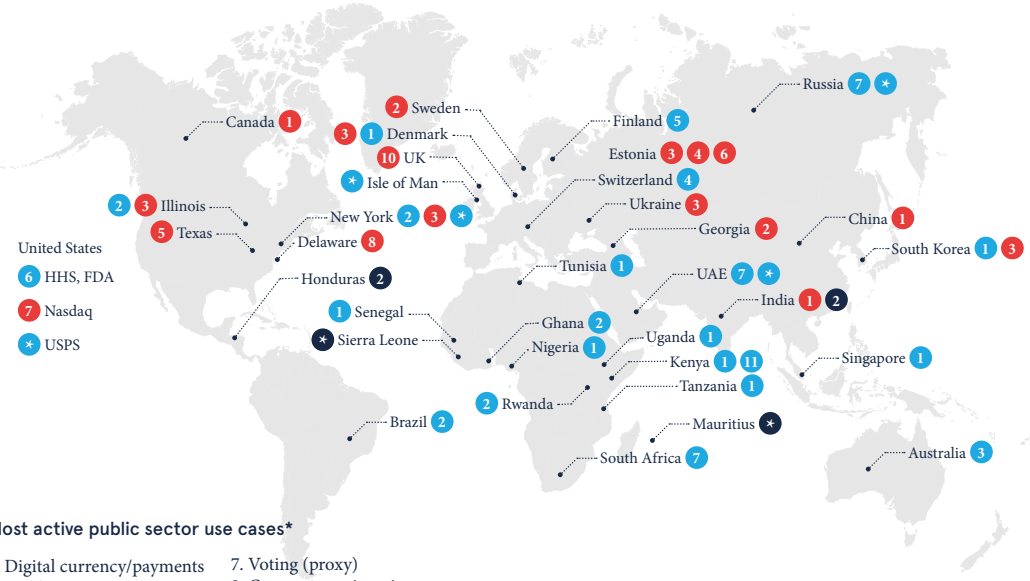
LEGACY SYSTEMS AND EARLY ADOPTER STATES

Looking to governments, less experimentation is taking place, even though blockchain promises to fast-track decentralisation, innovate how rights are delivered, and to increase the efficiency of public institutions. Some states are waking up to this transformative potential of blockchain; however, the majority of states are not yet exploring blockchain and have limited or no understanding of what it comprises and what sorts of problems it aims to solve[27]. Africa is fortunate not to be locked into legacy systems and therefore has an opportunity to follow in the footsteps of blockchain early-adopters states such as Dubai, Estonia, and Georgia. These states use blockchain to innovate how institutions work and thereby leapfrog into a digital and decentralised public sector.

Africa is home to one blockchain early adopter nation, Mauritius, with a mission to become "Ethereum[28] Island". However, in general, very few countries on the continent are actively implementing the technology.

Blockchain in the public sector (March 2017)

Blockchain experiments in the public sector are accelerating globally, with a concentration in the US and Europe.



Most active public sector use cases*

1. Digital currency/payments
2. Land registration
3. Voting (elections)
4. Identity management
5. Supply chain traceability
6. Health Care
7. Voting (proxy)
8. Corporate registration
9. Taxation
10. Entitlements management
11. Education

*Several public sector blockain experiments

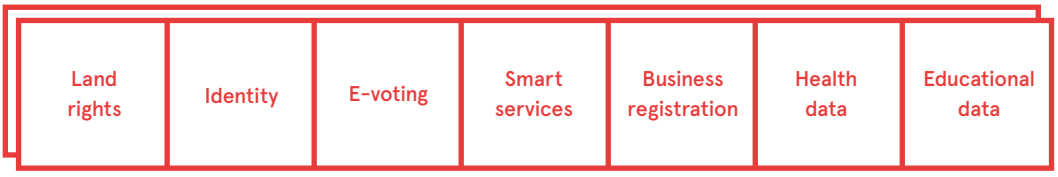
In progress
Planned
Announced

Source: Adapted from Deloitte analysis in conjunction with the Fletcher School at Tufts University

26- www.ethnews.com/juniper-research-reveals-6-out-of-10-large-corporations-seek-to-integrate-blockchain-technology .27- dupress.deloitte.com/dup-us-en/industry/public-sector/understanding-basics-of-blockchain-in-government.html. 28- Ethereum is an open-source, public, blockchain-based distributed computing platform featuring smart contract scripting functionality. https://en.wikipedia.org/wiki/Ethereum

The current use landscape

The public sector needs to be engaged if blockchain solutions for data registry are going to evolve with the same dynamism as blockchain innovations for cryptocurrency. The business case for decentralisation of ownership and storage of data is not clear, as many business models generate value from selling data harvested on centralised platforms. The incentive to innovate is limited. States can play a crucial role in helping such innovations to emerge. Below are seven selected use areas, but the potential is much broader.



LAND RIGHTS

Blockchain can make land rights systems transparent and co-owned by citizens. It can also unlock large investment inflows via the creation of a mortgage market. Several states are experimenting with land and property registration on the blockchain, including Georgia, Brazil, and Dubai, and Sweden. Also, the Indian state of Andhra Pradesh is exploring use of the technology in its land ownership system to combat corruption. It is estimated that $700 million is paid in bribes to land registrars across the country[29].

Looking to Africa, only a handful of states are engaged in registering land rights on the blockchain. Several private platforms are in the early stage of experimentation on the continent. One is BenBen[30] in Ghana, where the CEO and Founder Emmanuel Noah has a strategy to start with the private sector in dialogue with the public land registry system. He explains: "We are trying to push digitalisation of the land administration system from the private sector. It enables the state to get financing for land record digitalisation from financial institutions and citizens. It subsidises land registry digitalisation costs and tackles transactions from a demand side perspective". The platform is an innovative blockchain solution responding to a clear demand from banks to unlock new markets via land registration. It is a model where rights and inclusive growth go hand-in-hand, as the user has proof of rights and direct access to financial products via one digital platform.

The BenBen model

BenBen is a private sector platform that integrates land registry, land information and fintech aimed at providing digital land transaction solutions to emerging market economies. Once land is registered on the blockchain-powered platform, land information can be digitally shared with BenBen's banking clients, which opens a whole host of financial products to the land owner. The land records uploaded onto the platform are provided by the land sector agencies and they in turn get an API to the BenBen platform enabling them to access the data. The business model is that the landowner pays a digital registration fee, whilst the bank pays a licensing fee to the platform and a percentage of mortgage-processing fees. BenBen pays land sector agencies on a transactional basis.

Entrepreneurs in this space are aware that the state is the problem-owner when it comes to securing land rights, but also that it is faster to work with banks. Chief Security Officer and co-founder of Bitland, Chris Bates explains: "Putting land titles on the blockchain is not difficult, but without legal recognition by governments it is useless". The limited experimentation of many African states means that the public sector is not actively shaping the market for innovative blockchain-powered land rights solutions.

29- www.cointelegraph.com/news/indian-state-uses-blockchain-technology-to-stop-land-ownership-fraud.
30-www.benben.com.gh

IDENTITY

Various governments plan to use blockchain to establish a national identity system. Among these are Singapore and Estonia[31]. Turning to Africa, the platform Amplify[32] - a digital identity protocol - launched a pilot project at a government funded pre-school in South Africa to replace paper-based systems with a blockchain powered identity register. It will make a child's digital identity and personal data privately owned and controlled by the child. Over time, their life records become a rich source of data and value they can use to receive services. The UNICEF Venture arm has invested in the Amplify solution. Identity on the blockchain is a fast and efficient way to include the many undocumented into society.

E-VOTING

Blockchain enables digital casting of votes without having to engage a third party such as a public electoral authority. The potential of blockchain technology to radically change traditional voting systems is enormous[33]. There are also organisations and parties that want to take the use of blockchain a step further to fully re-design democracy to liquid or direct democracy, where people do not vote on representatives but on issues. Parties such as Flux, in Australia, or organisations such as the non-profit Democracy Earth Foundation in Colombia are already doing this.

SMART SERVICES

Storing data on a blockchain-powered open platform can visualise the distribution of services, such as where water infrastructure is available and where it is not. This offers transparency to citizens and is a tool for accountability. It can also enable data-driven services. In addition, service providers can be displayed on the platform for citizens to access. Sierra Leone aims to establish such a national platform to leapfrog legacy ICT systems and into a blockchain-powered smart state[34].

BUSINESS REGISTRATION

Using a blockchain-powered e-business register can significantly reduce the time it takes to register a business and lower the costs of bureaucracy. It can also increase legitimacy of the businesses, better positioning them for global export, and combat business fraud.

HEALTH DATA

Storing health records on the blockchain not only secures sensitive health data, it also makes it possible to share health data across institutions without compromising the security of the information stored. In addition, it can empower the individual by making him or her the co-owner of their health data, so that a person can show up at a clinic or a hospital equipped with their own data.

EDUCATIONAL DATA

A paper-based system for storing educational credentials is subject to loss and even fraud. In an increasingly global educational market, where students in developing countries engage in online learning to gain certificates from universities abroad, there is need for a digitalised, reliable system of educational record keeping. Blockchain is a way to future-fit the system by enabling the individual to have easy access to his or her own data to prove qualifications and access online courses and online jobs.

The Kenyan government is working with IBM to launch an academic certificate issuance platform on a blockchain network. The main motivation is to combat fraud with educational credentials[35].

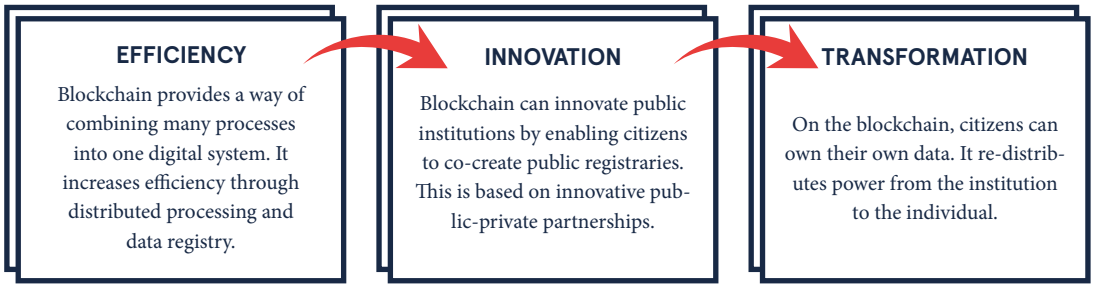
31- www.cointelegraph.com/news/governments-eye-blockchain-in-their-creation-of-national-identity-systems. 32- www.amply.tech. 33- www.oecd.org/gov/innovative-government/embracing-innovation-in-government-colombia.pdf. 34- www.ripplenami.com/the-republic-of-sierra-leone-transitioning-as-africas-first-ever-smart-country. 35- www.coindesk.com/sony-and-ibm-team-to-secure-education-data-with-blockchain

The impact of the emergence of blockchain and cryptocurrency will be felt in the nation just as in the global community. Nigeria must be proactive rather than reactive by considering how these technologies would affect and influence our lifestyles and business operations and channel, and thus fashion our rules of engagement for their adoption.

Dr. David Isiawe, President of the Information Security Society of Nigeria (ISSAN)

Risks and opportunities

Thus far, states are only to a limited extent developing blockchain solutions for public utility purposes to deliver rights to citizens. Most blockchain solutions emerge as private platforms responding to a need in the market not necessarily a public sector need. There is a real risk of introducing payment for rights.



SELECTED OPPORTUNITIES FOR ACTION

There are multiple opportunities for development actors to actively turn this risk into opportunities for action to the benfit of citizens. Here are three selected opportunities:

USE BLOCKCHAIN TO INNOVATE HOW INSTITUTIONS DELIVER RIGHTS

The bulk of the world's poor live undocumented lives, it locks them into poverty. Aid has worked to change this for decades by supporting for instance land reforms or identity programs. Instead of continuing to channel aid into outdated paper-based systems and institutions scaling rights too slowly Denmark can choose a different approach. To help innovate how institutions deliver rights by putting land titles – and other rights - on the blockchain in a shared digital database every individual has equal access to and ownership over.

MAKE BLOCKCHAIN GOVERNANCE FOR HUMAN RIGHTS A DANISH PRIORITY

Blockchain is like a car constantly accelerating being optimised by a community of developers. All while, no one is fixing the holes in the road, and no one is guiding it in the direction of human rights. Most blockchain solutions emerge as private platforms, many with user fees as part of the financing model. This carrys a real risk of introducing payment for rights.

Denmark can bring developing states into experimentation and take the lead on a conversation on governance. Blockchain calls for distributed governance. With the blockchain, code will take over a number of state governance functions. People will be active in "do-it-yourself" governance by uploading data. It implies a need to especially strengthen governance at the local level to ensure validity of righs and equal participation. International governance of the blockchain space also needs to be distributed as the UN and regional bodies like the EU cannot do it alone. It is a conversation which needs to include blockchain influencers, such as the Ethereum mastermind Vitalik Buterin, to ensure that governance principles get programmed into new blockchain platforms.

USE BLOCKCHAIN TO HACK DIFFICULT SDGS

There are some SDGs where blockchain can play a role but where few innovations emerge, such as number five on gender equality. Denmark can organise global hackhathons to tap into tech talent everywhere to incubate blockchain solutions to these SDGs. Prizes can enable the best ideas to get further shaped in partner countries in collaboration with local tech-communities. Denmark can issue a token to enable the global community to get involved in helping to scale the solutions. It will make Denmark a true catalyst for change.

Hack #3
Program aid money and agreements

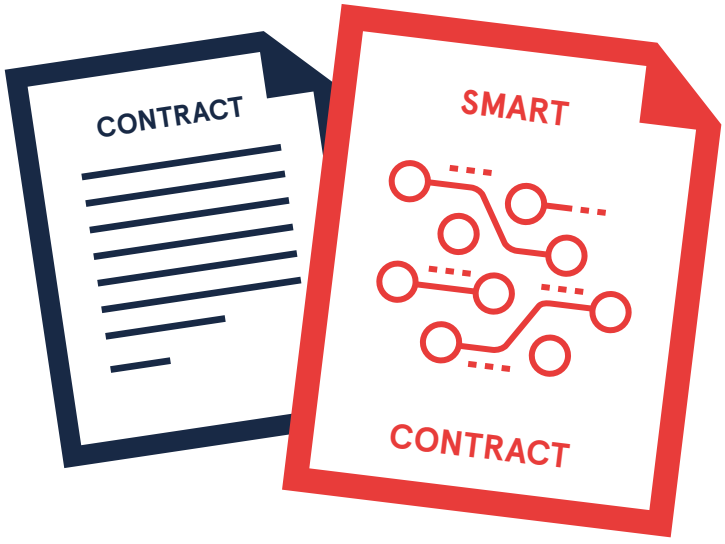
Bitcoin was the first blockchain application – built on the bitcoin blockchain network. Smart contracts are a new application on the more recent Ethereum blockchain. It is a newer, more immature blockchain with enormous potential but currently has fewer use cases. Hence, it will only be introduced here. It is important to start exploring the topic, however, as smart contracts will be a central component of next-generation blockchain platforms.

Smart contracts have the potential to help governments collect taxes, deliver benefits, issue passports, record land registries, assure the supply chain of goods, and generally ensure the integrity of government records and services[36]. All in an automated, efficient, and transparent way to combat corruption and re-build trust in public institutions. The same goes for the institutions handling taxpayer aid money.

WHAT IT IS AND HOW IT WORKS

Ethereum renders the blockchain capable of being more than just home to a cryptocurrency or a data registry. It makes it possible to transfer assets and cryptocurrencies in an automated fashion. Smart contracts work from a logic that goes like this: **"If This Then That."**

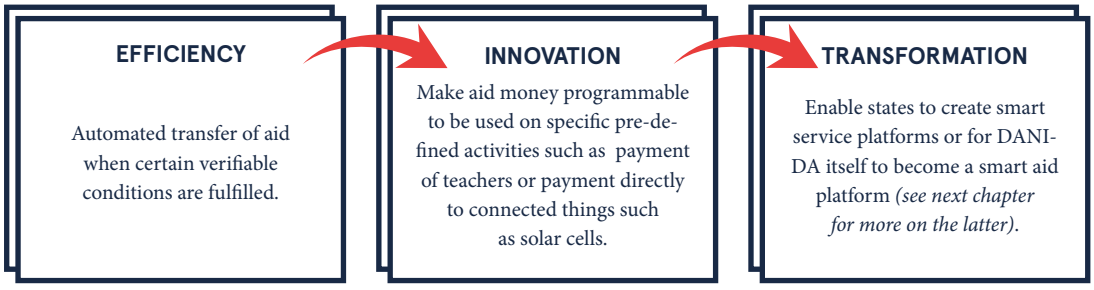
Think about the case of buying a house using a blockchain-powered land and property platform. If you deposit a pre-defined amount, the smart contract will display all the historical and legal information on the house for you to see. You do not need a lawyer to verify it as the blockchain has already done so. Once you sign off on the smart contract for the house, your cryptocurrency bid is automatically transferred and you are the new owner. The ledger is updated, so that everyone knows you purchased the house. It speeds up the process of buying, eliminates paperwork, and brings down the costs of intermediaries.



36- www.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf

Potential use landscape for smart contracts

Smart contracts can do for the public sector what robots, 3D printing, and drones are doing for production: automate workflows. It can also make public money programmable, including aid. It can make aid faster, and lower costs of fees and administration. This enables more aid to reach end users, and importantly, can make aid more trustworthy.



RISKS AND OPPORTUNITIES

Smart contracts are a recent blockchain innovation. It is still immature and has proven not to be entirely without vulnerabilities to hacker attacks. The benefits are however, so promising as a tool to innovate the public sector, that waiting to act would be a mistake.

One branch of UNICEF – UNICEF Ventures – is responsible for finding new and emerging technology that can help the organisation move funds. In an effort to increase public confidence, efficiency, and transparency, UNICEF Ventures is testing ethereum-based smart contracts to reduce the "cost of trust" in their asset transfers across the internet.

SELECTED OPPORTUNITIES FOR ACTION

Development actors, such as the The Danish Ministry of Foreign Affairs, can explore how best to use smart contracts to support the public sector in developing countries. For example, automating service delivery to citizens and payments to teachers or other public-sector officials in areas without banks, or where payments are irregular. They can also explore how to use smart contracts as a tool to innovate aid.

Experiment with smart aid

Aid agreements with ministries, organisations, or multi-donor funds can gradually shift from paper contracts to smart contracts, in which success criteria trigger payments. In addition, emergency aid pooled in large funds can be managed by smart contracts programmed to transfer funds to crisis-hit areas once a set of predefined criteria – e.g. number of casualties – is recorded.

Use Blockchain to beat corruption

Blockchain takes out the human touch in the storage of data and the transfer of value. Hence, it is a new promising tool to beat corruption. Smart contracts is one application that The Danish Ministry of Foreign Affairs can trial in aid tranfers. Or in investment projects where large amounts are involved and where programming funds to be spent on pre-defined inputs can increase efficiency and lower the risk of corruption.

Hack #4
Disrupt the aid model

Development aid has evolved via different paradigms. However, the aid model has remained unchanged: designed as a value chain with aid money delivered via intermediaries. NGOs, consulting firms, international institutions, and local organisations act as trust brokers, tracking and delivering aid money from Denmark to end users. Blockchain is a technology and a strategy with the potential to re-design the aid delivery model in 3 ways.

1. EFFICIENT & TRANSPARENT AID

Blockchain can make the aid delivery model more efficient and transparent through the use of cryptocurrency aid transfers. This will speed up the delivery of aid money and offer full transparency as it travels down the chain. Disperse and AID:Tech are two fund management platforms offering to help aid agencies test this method of using the blockchain for increased efficiency and transparency via cryptocurrency transfers.

As the use of blockchain in the aid space is still in its infancy, use cases are limited. However, one could imagine an emergency coin pool where a smart contract is programed to execute emergency aid transfers when a pre-defined threshold of registered casualties is reached. It could significantly speed up emergency response.

2. INNOVATIVE AID

Blockchain can innovate the aid delivery model by re-shaping current processes. First, it can bypass actors in the value chain to deliver more aid with less bureaucracy. In theory, crypto aid coins can be transferred directly to users in developing countries from The Danish Ministry of Foreign Affairs.

3. TRANSFORMATIVE AID

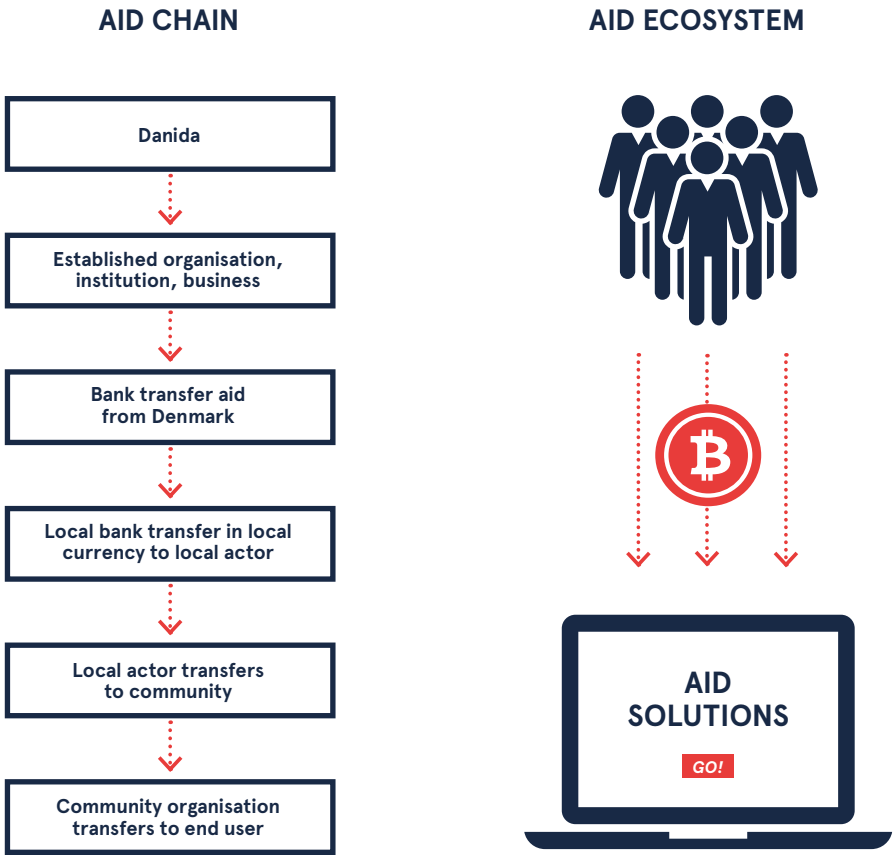
The transformative or disruptive potential of blockchain stems from its power to remove middlemen, regardless of industry, including in the development and humanitarian space. It can transform the aid model from an **aid value chain** to an **aid ecosystem**, where the end user is granted the power to choose the most relevant aid offers to meet his or her needs.

This represents an entirely new DANIDA. It is "DANIDA as a service". Instead of having pre-determined allocation of funding for different themes, DANIDA could become a blockchain-powered platform, onto which actors (start-ups, local organisations, NGOs, INGOs etc.) upload their aid offerings. Beneficiaries can then log on to the platform and request the aid most suited to their needs. A smart contract could then execute a cryptocurrency transfer from DANIDA to the service provider.

The platform is a demand-driven, open aid ecosystem, which can engage experts for quality assurance of uploaded solutions. It responds rapidly to emerging innovations via crowd sourcing and bring them into the platform. With the proper use of blockchain, The Danish Ministry of Foreign Affairs can respond to changes in the ecosystem in an agile and flexible way.

A blockchain platform approach has a number of advantages. First, it can generate big data on how all aid is spent. Second, it leverages the solutions most suited for the problems people face and thereby transforms the role of The Danish Ministry of Foreign Affairs into a true catalyst for change. It is also introduces the disciplines of the market into the aid sector by enabling the aid most in demand to scale. The platform does not need to be fully tax payer funded; parts of it can open up for crowd funding or to impact investors.

As Ben Joakim of Disperse explains: "It is not a new debate, as it essentially is about re-distributing power from the top to the bottom of the aid chain". However, blockchain is a powerful tool to move from incremental changes to the aid model to making it fully fit for a 21st century world defined by rapid changes. As opposed to assuming the same set of actors The Danish Ministry of Foreign Affairs has worked with for decades will deliver the best innovations to accelerate the SDGs, it takes an open approach leveraging innovative solutions from a large landscape.



ECOSYSTEM GOVERNANCE
Mechanisms for governing the aid ecosystem can be a combination of design principles reflecting the values of the Danish development policy, driven by feedback from the beneficiaries of aid, with blockchain as the enabling tech tool.

DESIGN PRINCIPLES
Firstly, a number of design principles will guide the composition of the ecosystem. Principles such as a defined percentage of female led businesses, organisations or initiatives in the system helps the ecosystem to accelerate SDG 5, a core value of Danish development policy.

Another eco-system design principle could be that a percentage of the solutions need to use blockchain to digitise rights of vulnerable groups and grant them ownership over their data. The ecosystem therefore becomes a driver of transformation as well as a vehicle for delivering relevant aid services.

In the early stages of ecosystem development, external expert panels can rate each solution in terms of potential impacts, guiding entry into the system and insuring a high quality of solutions. Over time, this process can be automated through algorithms that measure impacts, mixed with feedback on the quality of the aid delivery through beneficiary ratings.

BLOCKCHAIN
Secondly, blockchain will be a core governance tool of the ecosystem. It should be blockchain powered; allowing secure and transparent voting, automated fund transfers and full transparency on how aid is spend.

When a pre-defined number of aid users request the services of a particular aid solution in the ecosystem, a smart contract will automatically transfer aid funds to the service provider to enable it to respond to the demand from the people. It will free up time in a resource-constrained ministry by demanding less resources for administration, allowing more time to be spent on analysing big data from the platform to make aid more data driven. Such data can feed into the policy dialogue between The Danish Ministry of Foreign Affairs and partner countries.

USER RATINGS
Thirdly, each aid user will cast e-votes on whether a given solution should stay in the ecosystem and rate its performance. Blockchain based, the voting processes will be secure and transparent. The ratings can help solution providers improve their offerings, leading to a shift in focus of aid providers from upwards to downwards accountability.

In addition, it will make the new currency of aid organisations and institutions the reputation they manage to build in the eyes of the people the aid money is destined to help.

MATURITY – AN AFTERTHOUGHT
The world is not yet fully blockchain powered or blockchain compatible. Will it take months or years before this happens? Most probably the latter.

It is a space dominated by start-ups and early adopters, however, larger corporations are now also venturing into experimentation and ordinary people are starting to invest. We all want to be part of the new world.

The Danish Ministry of Foreign Affairs can add value by leading experimental practices and thinking on blockchain as a tool for rights in the development and humanitarian space. It requires the introduction of a mindset and a set of practices in The Danish Ministry of Foreign Affairs based on experimentation, openness to failure and continuous learning through hands-on engagement.

The time is now to take a position as co-designer of the fourth industrial revolution.

Understanding a new language

The world of blockchain has its own particular language full of technical terms and jargon. Very few people speak this language fluently, so having to think twice is the normal way to start-off in this space. We have made an effort not to alienate anyone by excessive use of technical terms; however, there are a few words and concepts that are helpful to get an upfront explanation of. These are listed below:

1. **Hack**
   In this study the word "hack" is not used as a reference to computer crime, rather it is used to describe the application of technology to change a given process or method of working to deliver aid or humanitarian assistance.

2. **Fiat money**
   Currency that is declared by the state to be legal tender and typically administered by a national bank, for example the Danish Krone, British Pound Sterling or U.S. Dollar. It is not backed by a physical commodity, but given a value based on supply and demand.

3. **ICO**
   Initial Coin Offering. A tool to crowd fund start-ups using cryptocurrency, which bypasses the rigorous and regulated capital-raising process required by venture capitalists and financial institutions. The documentation for fundraising can be in the simple form of blogs and a white paper about the solution.

4. **Cryptocurrency mining**
   The process by which cryptocurrency transactions are verified and added to the blockchain. Anyone with internet access and computer hardware can mine, which involves solving a computationally complex puzzle. Miners are then rewarded with cryptocurrencies.

5. **Peer-to-peer network**
   An approach to computer networking in which all participant computers share responsibility for processing data. It is the antithesis to the idea of large central server networks housed in data centers.

6. **Digital wallet**
   A secure system that stores payment information and passwords on a digital device such as a smartphone or computer. In cryptocurrency, a digital wallet is used to store, send and receive digital currency, and is a necessity to using cryptocurrency.

7. **Legacy systems**
   Systems and technologies that are a product of history. They are typically outdated and in need of replacement.

8. **Ethereum**
   A blockchain-based, decentralised computer platform that runs smart contracts. It is designed to run without the possibility of fraud, interference or technical failure.

9. **Disintermediation**
   The process of removing the middleman in future transactions, lowering the overall costs. This results in faster transactions with funds flowing directly from the sender to the recipient.

WHO IS BEHIND –
HACK THE FUTURE OF AID?

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Every informed person needs to know about Bitcoin because it might be one of the world's most important developments.

Leon Luow, Nobel Peace prize nominee

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