next street LISC

Can Blockchain Revolutionize Impact Investing?

Blockchain technology has the potential to revolutionize impact investing, generating data that demonstrates impact in new and compelling ways.

Abstract

Today, organizations with social missions face increasing pressure to track impact data in addition to tracking traditional financial and operational data. Blockchain and other distributed ledger technologies (DLTs) can transform how this is done, providing a new foundation for the secure and trustworthy exchange of services and information. DLTs can help organizations increase efficiency and cut costs without sacrificing trust and data quality.

Most mission-driven blockchain applications are still in the ideation phase, but they are being widely tested—from creating digital identities for refugees to curbing the use of child labor in diamond mines. Now, Next Street and LISC have joined forces to identify pilot blockchain uses that address challenges within community development. We hope to identify whether blockchain solutions could help increase the flow of impact investments to projects, organizations and communities.

As we develop potential applications, we hope you will join us to test new solutions.

Contents

1
Abstract

3
What is blockchain?

What does blockchain do? 5
- Cryptocurrency Payments
- Data Tracking and Verification
- Smart Contracts

7
Blockchain for Social Impact?

10
The Challenges of Using Blockchain for Social Impact

Scalability 10
Lack of Recovery 10
Unclear Regulations 11
Lack of implemented pilots 11

12
Conclusion

13
Authors and Acknowledgements

What is blockchain?

Blockchain is a distributed, decentralized, public record book of transactions:

"'Block' describes the way this ledger organizes transactions into blocks of data, which are then organized in a 'chain' that links to other blocks of data. The links make it easy to see if anyone has changed any part of the chain, which helps the system protect against illegal transactions."[1]

Blockchain technology entered mainstream awareness with the first mass-adopted cryptocurrency: Bitcoin.[2] As the buzz around crypto grew stronger, developers began to seek non-currency applications for the underlying application of bitcoin—the blockchain.[3]

A blockchain is a continuously growing ledger—essentially, a distributed, decentralized, public record book of transactions. Each new block of data is linked to the larger existing chain using cryptography. There is no single owner of the blockchain network who reviews new records being added; rather, when new transactions or data are broadcast, "every node [computer] in the network is coming to the same conclusion, each updating the record independently, with the most popular record becoming the de-facto official record in lieu of a master copy."[4] This mechanism of coming to the same conclusion is the "consensus protocol."

The primary function of blockchain is to eliminate the need for third-party verification in transactions. For example, in 2017, the United Nation's World Food Program distributed aid to Syrian refugees using cryptocurrency vouchers; blockchain technology was used to record and authenticate each transaction.[5] Traditionally, providing cash transfers to beneficiaries utilizes multiple banks and payment systems. This increases costs (e.g., bank

1 Stanford, "Blockchain for Social Impact: Moving Beyond the Hype,"2018.

2 Stanford, "Blockchain for Social Impact: Moving Beyond the Hype," 2018.

3 Harvard Business Review, "A Brief History of Blockchain," 2017.

4 Coindesk, "What is Blockchain Technology?"

5 Coindesk, "United Nations Sends Aid to 10,000 Syrian Refugees Using Ethereum Blockchain," 2017.

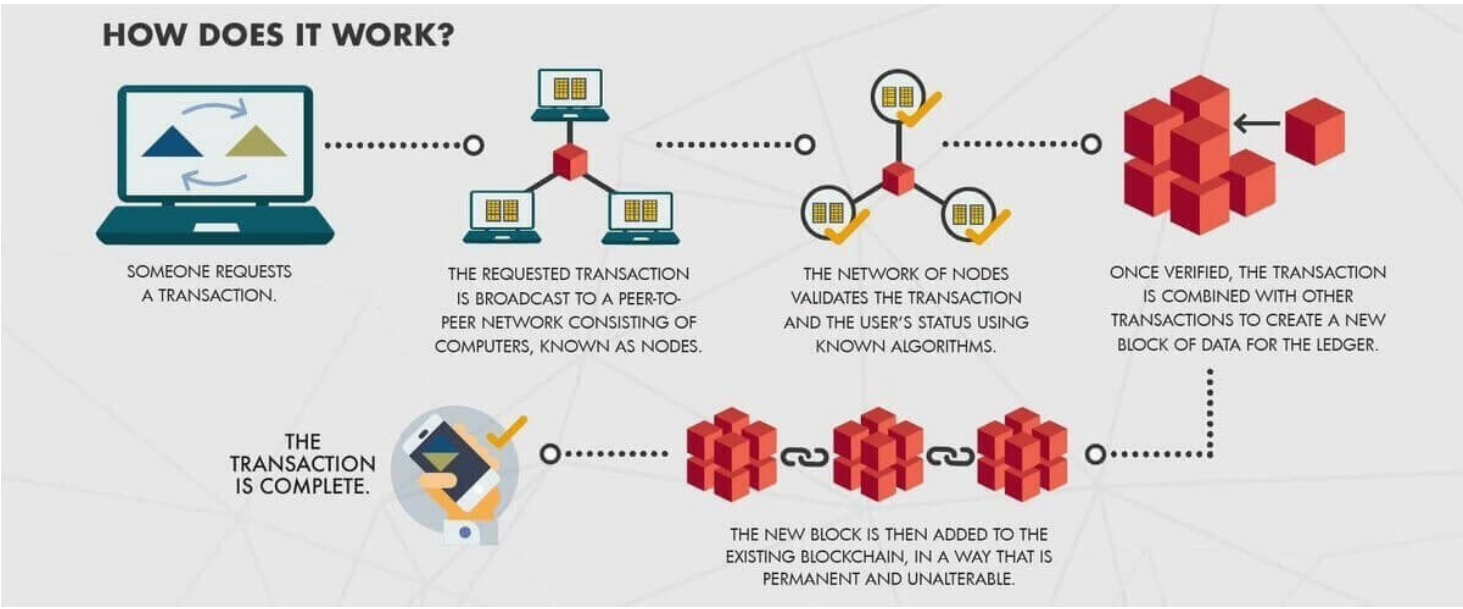
fees), introduces delays, and raises risks around financial mismanagement and the security of beneficiary data. By using blockchain, the United Nations introduced a faster, more streamlined process to aid distribution.

Blockchain is designed so that it is extremely difficult, if not impossible, to edit any of the existing data without other blockchain users noticing. It is built from three technologies:

- Private key cryptography, which allows users to fulfill authentication requirements
- Peer-to-peer network, which keeps records of transactions and reduces the risk of centralized corruption or failure
- Program (the blockchain's protocol), which serves as serves as a platform and ensures that the transaction network is committed to record-keeping and security.[6]

These technologies are not unique to blockchain, but the combination of them is what separates blockchain from its technological predecessors.

Diagram A: Overview of Blockchain[7]



6 Coindesk, "What is Blockchain Technology?"

7 MasterTheCrypoto.com, "Coins, Tokens & Altcoins: What's the Difference?"

What does blockchain do?

There are three core applications of blockchain—cryptocurrency payments, data tracking and verification, and smart contracts. By creatively structuring and combining them in different ways, organizations can develop blockchain technology across a variety of industries, including community development.

Cryptocurrency Payments

Cryptocurrency is a digital currency that facilitates secure transactions without a centralized intermediary (such as banks or government.). The transaction data is stored in immutable "blocks" of the same file size, which are distributed across all the nodes (computers) on the system rather than stored in one central location. This makes it more difficult to tamper with compared to conventional currency exchanges.

Cryptocurrencies take the form of tokens that have no intrinsic value but which can be exchanged for goods, services, or for traditional cash. Tokens are stored and managed on their respective blockchains, and the blockchains manage the creation, verification, and transfer of the tokens. Bitcoin, ether (Ethereum), and xrp (Ripple) are the largest cryptocurrencies on the market.

The front end of blockchain transactions is simple: to initiate a transaction, User #1 simply sends bitcoin to the public address of User #2. The system nodes verify that User #1 has enough bitcoin to execute the transaction. Then, the transaction is recorded in a blockchain block and the tokens are sent to User #2's wallet.

Data Tracking and Verification

Data tracking and sharing through a blockchain platform eliminates the need for some intermediaries, because data is verified and stored based on the consensus of distributed nodes. The lack of a centralized intermediary reduces costs and increases efficiency – and, it also increases security, as no centralized authority has control over all data. This makes it a particularly appealing platform for sensitive data (e.g., personally identifiable information).

A blockchain functions by recording each interaction or transaction. Unlike a traditional database, where historical records can be manipulated, block-

chains keep an unchangeable record of all the information that has come before – in essence, a history of themselves. As such, blockchains provide transparency to users of the data.

One example is the integrity of supply-chain records. There are many goods (e.g., medical products) that need to be stored at cold temperatures as they are transported through the supply chain. To ensure this, a distributor could program temperature, pressure, and other sensors to automatically upload relevant data to the blockchain at every step in the supply chain and transport process. This data is permanent and tamper-proof, so final recipients could view the full history to ensure quality.

Smart Contracts

Smart contracts are self-executing contracts. In a smart contract, an agreement – with specific rules and conditions for completion – is written directly into lines of computer code on top of a blockchain. If the rules and conditions are met, the contract automatically executes. Blockchain technology adds value by verifying that conditions are met and executing pre-determined actions in a decentralized manner.

This verification could replace costly intermediaries whose sole purpose is to create trust in the system, thereby reducing transaction costs and encouraging more transactions. Smart contracts also eliminate the risk of physical contracts being lost or forged. For instance, in might be for insurance, which typically requires company resources to verify claims from customers, a smart contract could be programmed to automatically release funds to users whenever a specific event occurs (e.g., natural disaster).

Blockchain for Social Impact?

These core applications could also be implemented to improve the operations and success of some social impact organizations. Non-profits and other mission-driven organizations, such as community development financial institutions (CDFIs), often face a combination of challenges, including:

- Data storage in outdated or technologically inefficient systems, which causes problems with data input, analysis, and impact measuring
- Growing demand for transparency and impact data from donors and funders, which is becoming increasingly critical for operations and fundraising[8]
- Reliance on centralized institutions, which could be unstable, or highly fragmented local networks for the delivery of aid and services

Social impact blockchain projects have already started to address these obstacles. According to a 2018 Stanford blockchain research paper, there have been 193 social impact blockchain projects launched since 2013. Even after five years, most of those initiatives are still nascent: 74 percent are still in the pilot or idea stage, and very few have been implemented successfully. The highest concentration is in the health sector (25 percent), with financial services coming in second (13 percent).[9] Below are examples of social impact blockchain solutions across each application type.

8 Nonprofit Quarterly, "Going Beyond Efficiency", 2001.

9 Stanford, "Blockchain for Social Impact: Moving Beyond the Hype", 2018.

	CRYPTOCURRENCY	DATA TRACKING AND VERIFICATION	SMART CONTRACTS
Problem	Refugees often lack the paperwork required to open a bank account, making it difficult for them to receive money from institutions, or pay bills electronically.	Consumers are increasingly concerned about the ethical sourcing of the goods they buy and want companies to verify ethical production procedures.	Non-profits struggle to 'prove' impact that they have achieved to governments or funding agencies that are increasingly interested in understanding the outcomes they are supporting. Tracking impact effectively can be a time-consuming and arduous process for organizations with limited resources.
Solution	The Finnish Immigration Service has been offering refugees pre-paid 'MONI' cards. These cards function like bank accounts, able to send and receive money. A cardholder can use the card at any Mastercard terminal to purchase goods and services (MONI has a built-in functionality that is able convert the digital currency into the Finnish fiat). Each transaction is recorded on the blockchain, allowing Finnish immigration officials to track refugees and verify the use of funds.	De Beers, which mines, trades and markets more than 30 percent of the world's supply of diamonds[10], now uses blockchain in its supply-chain management to track diamonds from their initial discovery in mining through their retail sales. Diamonds are certified at each step of the supply chain, and the certification is verified through the distributed nodes.[11] This increases transparency in the supply chain and helps prove to customers that diamonds have been ethically sourced.	ixo helps organizations to efficiently track, quantify, and verify their impact in order to access funding. In its first pilot at a pre-school in South Africa, ixo by teachers log student attendance (confirmed by an evaluator), and then generate "impact claims" that were automatically sent to the government in return for subsidy payments.
Description of Application	Although to the cardholder MONI seems to be a simple debit card, MONI operates on a public blockchain (meaning that data is visible to actors other than the MONI cardholder) in order to transfer digital currency onto the debit cards. Blockchain technology executes transactions (i.e. purchases at stores or online) and converts the digital currency to traditional, or fiat, currency.[12]	Managers certify diamonds using blockchain technology. Because that certification cannot be edited on the blockchain once it has been input, customers can trust that the certification is legitimate. They can verify each step of the diamond purification process with data from the blockchain.	Using an open-source protocol, ixo users collect, measure, evaluate, value, and tokenize verified impact data on mobile phones. ixo generates "impact claim tokens" for projects that ixo's smart contract has approved as likely to succeed, based on the proportion of verified impact claims versus the target number of claims.[13]
Year Started	2015	2018	2016
Current Status	Active[14]	Active	Active (Pilot stage)

10 Forbes, "How Blockchain Could End the Trade In Blood Diamonds - An Incredible Use Case Everyone Should Read," 2014.

11 Forbes, "How Blockchain Could End the Trade In Blood Diamonds - An Incredible Use Case Everyone Should Read," 2014.

12 MIT Technology Review, "How Blockchain Is Kickstarting the Financial Lives of Refugees," 2017.

13 Breaker Mag, "Nonprofits Make Big Claims for Themselves. IXO Can Tell You If They Deliver," 2019.

14 Crunchbase profile of Moni

Often, blockchain applications have an embedded financial function, even when outside of the financial services sector, as can be seen in the refugee and pre-school examples above. Blockchain solutions can ease deployment of funds, bolster trust and improve impact tracking, so that those funds continue to flow. These are valuable components for purely philanthropic donations but equally important in financial investments. As such, social impact blockchain solutions could accelerate the flow of impact investments – i.e., investments seeking both a social and a financial return – into communities, projects, and organizations.

In fact, the World Economic Forum reports that growth in impact investing is threatened by the lack of trustworthy data that links investment dollars to measurable, verifiable impact.[15] Blockchain can help track the impact of an investment through the value chain and provide a clear record of how a funder's investment contributes to a cause or fuels particular outcomes, like economic opportunity for families, small businesses, and communities. It can also create economies of scale; by more clearly delineating the specific impact of investment dollars, blockchain can aggregate smaller, differentiated funds that are focused on the same purpose.

In the United States, CDFIs are uniquely positioned to pilot the use of blockchain to improve the funding of services and deployment of capital across multiple social sectors. Already, CDFI leaders have recognized the need for more strategic, sophisticated, and transparent data management systems.[16] They are working to demonstrate their ability to be good stewards of impact investments in order to attract additional investors and capital at commercial scale. Blockchain is one possible solution.

15 World Economic Forum, "5 ways blockchain can transform the world of impact investing," 2018.

16 Next Street, "CDFI Leaders Thinking Ahead and Acting Now," 2018.

The Challenges of Using Blockchain for Social Impact

While organizations have begun to incorporate blockchain applications into their operations, digital ledger technology is still nascent. There are four significant challenges to using blockchain for social impact: scalability, data recovery, regulatory uncertainty and a lack of implemented pilots.

Scalability

Blockchain data blocks are capped in size and therefore limited in the number of transactions they can process. For example, Bitcoin holds a maximum of 1MB of data per block, meaning it can only process three to four transactions per second.[17] This limitation can cause networks to crash or experience processing lags. For example, in 2017 CryptoKitties (a blockchain game to breed and trade digital kittens) received an unexpected level of enthusiasm and clogged the Ethereum network, significantly slowing transaction times and filling blockchain blocks to their capacity. While the blockchain community has yet to figure out how to improve scalability,[18] several organizations are working to solve the issue. And, for the purposes of a social impact pilot within community development, the current transaction processing volume should not pose a significant hurdle.

Data Recovery

The same technology that ensures strong security and true decentralization also creates a risk: it does not allow for recovery of data once it is lost. Blockchain transactions are permanent and irreversible.

Here is why: "private keys" (a series of alphanumeric characters) are unique codes that allow blockchain users complete ownership of their cryptocurrencies or blockchain data. These private keys are required to access data

17 Cointelegraph, "Blockchain's Scaling Problem, Explained," 2018.

18 Social Science Research Network. The Limits to Blockchain? Scaling vs. Decentralization. Cybersecurity, Privacy & Networks eJournal. 2016

recorded in individual blockchain wallets. There is no centralized database of private keys, meaning that they cannot be recovered. When these keys are lost, all funds or data associated with them is also lost. This limits the number of cases in which true decentralization is advisable. In situations where theft or potential for damage is high, it is not responsible to implement solutions using private keys.

Global solutions are being explored, most resting on biometrics to confirm a user's identity and reinstate a private key. Institutions can also start with applications of blockchain that do not require multiple data-entry points in order to mitigate risk.

Regulatory uncertainty

Blockchain is still an evolving technology that has just started to make its mark on the world. As such, the regulatory environment for various blockchain uses is still unclear. It is difficult to predict what shape regulations will take, and how stringent they will be. Therefore, some blockchain solutions may not be sustainable if regulatory costs or restrictions overwhelm their efficiencies.

Lack of implemented pilots

Most social impact blockchain solutions (74 percent) are still in the pilot stage and have yet to be verified for scalability or impact.[19] This poses the greatest hurdle for blockchain-enabled community development. Only by moving more blockchain solutions from the pilot stage to implementation can community development stakeholders build the expertise needed to move from small-scale experimentation to fuller, real-world applications of this technology. Large CDFIs and other community development partners should collaborate on ways to test and deploy solutions that unlock new resources and support inclusive growth.

19 Stanford, "Blockchain for Social Impact: Moving Beyond the Hype", 2018.

Conclusion

Across the country, innovative efforts are taking shape to catalyze new sources of capital that benefit communities. From small loan funds that support entrepreneurs to sweeping infrastructure investments, funding for community development is increasingly focused on the social and economic impact of networks, systems, and regions, not just within individual organizations or projects.

CDFIs are helping lead this shift with integrated investment strategies that support a broadly shared prosperity—especially in communities that have not benefited from a robust national economy. The sector has more than $150 billion in assets under management, and new technologies like blockchain offer an opportunity to reimagine the flow of information and capital needed to drive greater impact.

Using blockchain technology, CDFIs can rethink data storage and reporting—moving away from outdated or inefficient systems in order to provide greater transparency to donors and funders. This evolution could help CDFIs provide the scale capital needed to revitalize communities.

LISC and Next Street are exploring potential blockchain pilots to address challenges within community development. We are eager for input from partners and colleagues as we test new solutions.

Authors and Acknowledgements

Kris Bala
ACCOUNTANT, LISC

Adam Gillette
ASSOCIATE, NEXT STREET

Mike Hearne
CHIEF FINANCIAL OFFICER, LISC

William Huber
DIRECTOR—FINANCIAL PLANNING & ANALYSIS

Gracie Hollis
SENIOR ANALYST, NEXT STREET

Marina Linhart
CEO & PARTNER, NEXT STREET

Apurva Pande
ASSOCIATE, NEXT STREET

Chris Shin
PROJECT 55 FELLOW, LISC