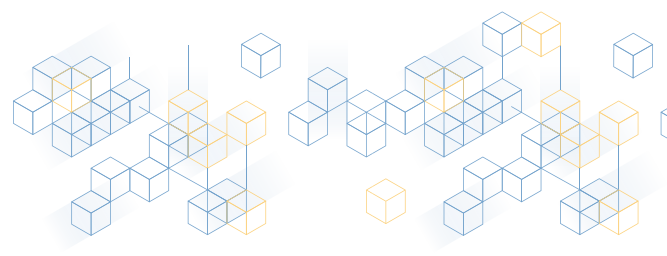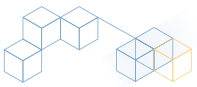# Decentralized Possibilities
for Locally-Led Development

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Acronym list

CEFACT	Center for Trade Facilitation and Electronic Business
CIC	Community Inclusion Currency
DAO	Decentralized Autonomous Organization
LLD	Locally Led Development
NGO	Nongovernmental Organization
SDG	Sustainable Development Goal
SMS	Short Messaging Service
UN	United Nations
USAID	United States Agency for International Development
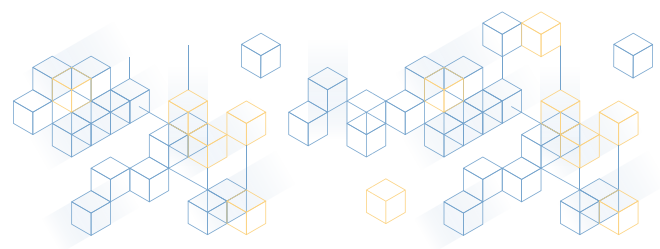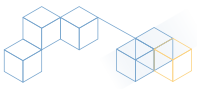
Abstract

Decentralization has emerged as a potentially transformative force reshaping local development approaches worldwide. This paper explores the potential of decentralized systems powered by blockchain technology to improve how communities drive sustainable progress. The paper seeks to take an honest assessment of how the technology could be used as a tool to incrementally improve local development program cycles or more foundational uses of the technology that create new models of collaboration around local development objectives. It delves into the limitations of traditional centralized models and highlights the key advantages that decentralization can offer in terms of transparency, community ownership, and equitable resource distribution.

The paper begins by examining the historical context of centralized development initiatives, often characterized by top-down decision-making, bureaucratic inefficiencies, and a lack of community involvement. It then introduces the concept of decentralization, explaining how blockchain-based systems can facilitate direct peer-to-peer interactions, eliminating the need for intermediaries and enabling secure, transparent, accountable and tamper-proof record-keeping. The core principles of decentralized local development are outlined, emphasizing the importance of community governance, collective decision-making, and the redistribution of power and resources.

Furthermore, the paper provides brief examples of how the technology is currently being used to improve specific tasks within development program cycles. These applications include automated functions in decentralized identity management systems to protect individual privacy and data sovereignty, ensur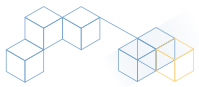ing that personal information remains under the control of community members or the application of decentralized finance (DeFi) in local development contexts, highlighting its potential to provide access to alternative funding sources, microfinancing opportunities, and innovative incentive mechanisms.

More foundational uses, like Decentralized Autonomous Organizations (DAOs), can serve as powerful tools for community-driven initiatives, enabling collective ownership, democratic decision-making processes, and the equitable distribution of resources and benefits.

The paper explores the integration of decentralized governance mechanisms, such as quadratic voting and token-based incentive systems, to promote inclusive and equitable decision-making processes. It examines how these mechanisms can amplify the voices of marginalized groups and incentivize active participation in local development efforts.

The paper concludes by addressing potential challenges and limitations associated with decentralized local development, including scalability concerns, regulatory uncertainties, and the need for education and capacity-building within communities. It also outlines future research directions and practical considerations for the successful implementation of decentralized systems in local development contexts.

The hope of the paper is to provide an honest assessment of a much-hyped technology that is in its infant stages with experimental applications. The transformative potential of the technology warrants a thorough examination of whether, when and how it can be used as an equitable local development tool.
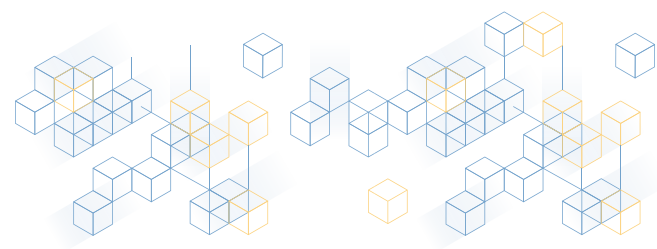
Digital Decentralization and Locally Led Development

"Today's global development and humanitarian challenges are vast, demanding, and complex. They are also inherently local, shaped by the unique histories, power dynamics, and other factors specific to each context in which they occur. **Our responses to these challenges must build on the priorities, knowledge, and aspirations of the people who live them every day and know them best.**"

– USAID Administrator Samantha Powers[1] (emphasis is the authors')

As technology allows more and more connections between people and devices, it is changing how society works on a global scale. Many developing contexts are undergoing a digital transformation where networks are becoming the main way that groups of people interact and work together.

Networks enabled by modern technologies like the inter- net are increasingly the most important form of collective action and organization, overshadowing more traditional hierarchical structures. This networked way of operating is transforming society worldwide while creating new opportunities for empowering communities to identify and solve barriers to their economic and social development. The ability of development actors to build on this new form of networked collaboration could be definitive for their ability to leverage impact moving forward. But focusing on the technology misses the point since it is about the new types of collaboration that networking technologies enable.

Amongst these networking technologies is the emergence of decentralizing tools like blockchain which could offer new opportunities to integrate locally led development (LLD) principles in alleviating LLD barriers to achieve LLD objectives in more effective and possibly equitable ways. These new methods and tools could empower local communities to solve their development problems consistent with USAID principles and regulations, but with improved efficiency and equity.

The successful use of blockchain could not only be reliant on learned principles and methods learned from decades of development practice, but also on the maturation of new skill sets and technology-driven learning to help answer three primary questions:

- **When could blockchain be used to enhance LLD?**
- **How could it be used?**
- **How do we learn to use it better?**

The answers to these questions will evolve over the coming years as the technology matures, but this paper seeks to assess the ability of the technology (1) to contribute to LLD objectives in a manner consistent with USAID requirements for transparency and accountability by (2) integrating LLD principles into LLD methods while (3) overcoming barriers to LLD outcomes. If researchers and relevant stakeholders assess the technology to meet all three criteria demonstrated through present-day applications, then additional steps could be warranted to explore how to build on the lessons of these early applications and expand USAID's toolkit for achieving its LLD goals. This paper presents various ways in which blockchain technology is being used, with some examples provided, to decentralize different functions and authority and how these practices could possibly offer LLD opportunities. These functions range from simple automation of tasks within program cycles to more complex models of collaboration where donors and other supporting actors, like implementing partners, find new ways to engage with emerging models of local actors self organizing around their needs. While this paper focuses on USAID's approach to and experience with LLD to answer these questions, its content is applicable to any bilateral, multilateral, NGO, or other actor supporting LLD objectives.

USAID's Legacy of Locally Led Development

"Decentralization invests new actors with public responsibilities. The newly involved actors that decentralization empowers (or "should" empower) include appointed officials in subnational administrations, elected officials in subnational governments, and **increasingly engaged citizens themselves.**"[2] *(emphasis is the authors')*

USAID has been working to transform its LLD approach by emphasizing the role local partners can play in designing activities, managing projects, monitoring and evaluating

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1 "Localization at USAID: The Vision and Approach."
2 Keshishian, "DEMOCRATIC DECENTRALIZATION PROGRAMMING HANDBOOK (USAID)."
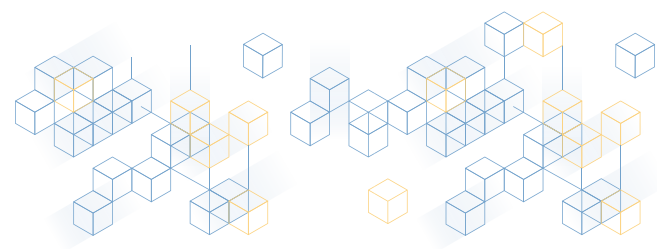
results, and sustainment of outcomes.[3],[4] This includes a push to increase funding to local partners as USAID reemphasizes its commitment to empowering local communities to take the lead in identifying and solving their local development problems.[5]

USAID defines LLD as: "The process in which local actors – encompassing individuals, communities, networks, organizations, private entities, and governments – set their own agendas, develop solutions, and bring the capacity, leadership, and resources to make those solutions a reality."[6] The 2020 USAID LLD Guidance expands on this definition with principles meant to foster sustainable results across the Agency's development and humanitarian assistance work.[7] The key, but not comprehensive, LLD principles include:

1. **Identifying local actors:** Identifying the people, communities (including civil society), private sector actors, academic institutions, and host country government entities to engage effectively around local problems and solutions, with special attention to including local marginalized populations.

2. **Understanding local systems:** Identifying key local actors; understanding relationships and interdependencies, perceptions and incentives; and supporting local actors in developing and leading their own development solutions that sustainably transform those local systems.

3. **Shifting power dynamics:** Shifting priority-setting, decision-making, leadership, and power to local actors, aligning with local priorities, leveraging local resources, and increasing locally led implementation to sustain results over time. This includes recalibrating the role of donors (specifically conditions attached to funding and issues of information asymmetry), as well as understanding and valuing local knowledge, capacity, and expertise.

4. **Experimenting and learning:** Taking calculated risks and experimenting with innovative approaches, measuring what matters to local actors, building an evidence base

of what works, and sharing this learning with stakeholders who are actively interested in supporting local actors to take the lead in defining and addressing their own development challenges.

However, efforts to use these principles to achieve these LLD targets have encountered barriers to include:[8]

- **Defining local actors:** While USAID has a policy definition of local actors—as organizations that are legally organized under the laws of the country where they operate—operationally USAID has problems identifying local actors that (1) fit within its policy definition and (2) meet the criteria outlined in the USAID principles for LLD (as opposed to possible international actors who fit the policy definition only), and (3) have the capacity to contract directly with USAID. This has led to significant barriers in USAID's ability to procure local actors directly.[9],[10]

- **Regulatory and bureaucratic hurdles:** USAID's current rules and regulations can hinder flexibility and innovation, making it challenging to adapt to LLD approaches. Additionally, it is difficult to fund local partners directly, without significant intermediary and third party costs, creating bureaucratic burdens to engage local partners.

- **Accountability and measurement:** USAID's procurement processes are complex, and local actors may find it challenging to meet the strict accountability and reporting requirements. The lack of effective LLD indicators for measuring constructs like "local leadership" and other performance targets, in addition to a lack of monitoring and evaluation capacity by local actors, has contributed to concerns about direct engagement with local actors and their ability to meet USAID's accountability requirements.[11]

- **Colonial Legacies:** Many consider the development field to still frame issues from the "white man's bur- den." This attitude is the belief that the people providing aid know what's best for those receiving it. There is an imbalance of

3 "Local Capacity Strengthening Policy."

4 Rader, "USAID Risk Appetite Statement - A Mandatory Reference for ADS Chapter 596," 596.

5 "Localization at USAID: The Vision and Approach."

6 "Locally Led Development Initiatives Fact Sheet." *https://www.usaid.gov/sites/default/files/2022-05/Locally_Led_Development_Initiatives_Fact_Sheet.pdf* Accessed 4/16/24

7 "Local Works Guidance 2020."

8 "Locally Led Programs Indicator."

9 "USAID ADS Chapter 303 - Grants and Cooperative Agreements to Non-Governmental Organizations."

10 "USAID Must Set Agency-Wide Definition of Local Entity for Its Localization Work." *https://www.fhi360.org/articles/usaid-must-set-agency-wide-definition-local-entity-its-localization-work/*. Accessed 4/28/24.

11   Ingram, "Locally Driven Development: Overcoming the Obstacles."
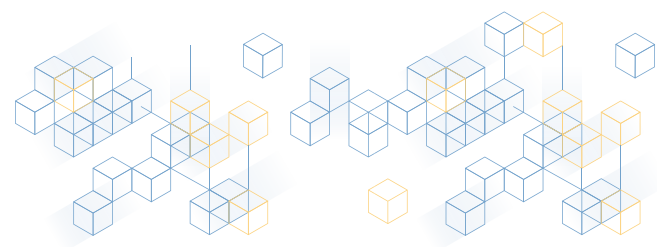
power between the donors and the beneficiaries they are trying to help.

While development workers may see their work as noble, many of them unconsciously believe they know better than the local people about what those people need. You can see this attitude in how development projects actually operate:

› Outside experts design the projects without much understanding of the local culture and context

› Consultations with the beneficiaries are done quickly and in a "take it or leave it" manner

› Rigid project budgets make it hard to adapt based on lessons learned

› Those implementing the projects are rarely held truly accountable if the projects fail to achieve their goals

The Role of Trust in Local Development

"Trust is a familiar concept, yet one too often ignored in programme design. It is an essential ingredient of mutually beneficial human relationships. International development projects, particularly those in the field of governance, rely on relationships to meet their objectives. Trust smooths collaboration between project staff, donors, local stakeholders, governments, and, ultimately, the people who benefit from programming."

– Why Trust Matters in International Development[12]

The lack of trust can prevent the formation of these crucial relationships and undermine the impact of development programs.[13]

There is increasing recognition that trust should not be the privilege of those with power and money but vested in those with the knowledge and direct influence on the barriers to local development. This has led to calls for a shift away from development organizations deciding problems and solutions and instead supporting community leadership, ownership, and vision for change.

To lead their own development effectively, local communities need two key things. First, they need to trust that any external assistance or funding does not come with strings attached that undermine the community's own goals and priorities. Second, they need to have trust in the various intermediary third-party actors, such as government officials, service providers, and others, who are necessary to implement local development activities. Research has shown that where these third parties exist, there is often a lack of trust or prohibitive costs prevent their optimal use, resulting in lack of local development opportunities. In contexts where these third parties are not present, the problem is magnified, resulting in high levels of opportunity cost.[14] Likewise, donors need to trust that their funds are being spent in the manner required with reliable performance monitoring data.

This paper creates two categories by which blockchain technology is already being used to achieve these types of trust, 1.) Incremental and 2.) Foundational. Incremental opportunities are where block- chain is being used to make incremental improvements in an LLD program cycle by providing trust in the information that motivates the relationships necessary for the LLD outcome. These program cycles could, and have, functioned without blockchain in the past but with less efficiency. Foundational opportunities are where blockchain serves as a transformational tool for new types of LLD collaborations between communities and donors. These collaborations could happen without a blockchain, but so far, the technology is the only tool that enables these types of collaborations in a cost-effective manner.
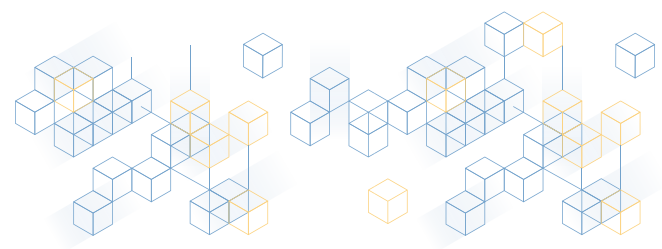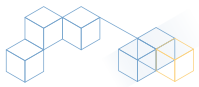
Incremental Blockchain Opportunities

Blockchain decentralizes power by mitigating the need for third parties who exercise their overall authority by leveraging their control of information. For example donors are powerful in part because they control information flows within development projects by requiring what is reported and when. Likewise, donors and, to a lesser extent, implementing partners, control information around what development needs and solutions (i.e., programs and activities) are funded. There are numerous ways in which the control of information translates into control of the development program lifecycles. This section outlines how blockchain has decentralized control over information both in and outside of the development sector.

12 Chandiramani and Marshall, "Why Trust Matters in International Development."

13   "ERS 4.0 Thematic Brief - Trust.." https://www.usaid.gov/sites/default/files/2023-02/ERS%204.0%20Thematic%20Brief%20-%20Trust.pdf accessed 4/16/24

14   Keefer and Scartascini, "Trust."

Blockchain was popularized in January 2009 with the release of its first application, a cryptocurrency called Bitcoin[15] by the anonymous person or group known as Satoshi Nakamoto.[16] While a currency was the first applied use of a blockchain, since then, there have been thousands more uses in the fields of finance,[17] supply chains,[18] healthcare,[19] manufacturing,[20] and governance[21] (to name a few). Public sector entities are now experimenting with using blockchain[22] within local e-government and co-management of public services, and so are projects targeting societal needs, labeled as "blockchain for social good" or "blockchain for social impact" to include social, collaborative economies.[23]

Blockchain is a decentralized, digital ledger that records transactions across many computers in a network. It is designed to be secure (through its decentralized network design and use of cryptography), transparent, and resistant to modification, as each block in the chain contains a number of transactions, and every time a new transaction occurs, a record of that transaction is added to every participant's ledger.

The decentralized nature of blockchain eliminates the need for many third-party intermediaries, sometimes referred to as "trust agents or trust actors" because their purpose is to provide the underlying trust needed to facilitate digital interactions (the agent could be a bank, government, or development implementing partner funded by a donor for example). Blockchain is important because it helps to solve problems with conventional digital transactions, such as the costs associated with the need for third parties, the risks of fraud and data tampering, and the inefficiencies of centralized record-keeping. Key benefits of blockchain include advanced security, improved efficiency, faster auditing, and the ability to create trust between parties that may not know or trust each other.[24]

The philosophy of blockchain emphasizes several fundamental concepts, including trust, decentralization, and self-sovereignty, that could benefit development outcomes. In the context of blockchain technology, self-sovereignty[25] means that individuals have control over their own data and identity, which lowers barriers to accessing different financial and social services critical to local development.

Many types of blockchains can be designed for specific applications with varying levels of centralized control, transparency, etc.[26] Some blockchain applications are specific to supply chain management, while others are specific to digital identities. Blockchain is a cross-purpose technology given the scope of potential applications , especially when smart contracts are used. A smart contract is a self-executing computer program that automatically enforces the terms of a contractual agreement between parties without the need for intermediaries. It is a digital contract stored on a blockchain that automatically executes when predetermined conditions are met. The contract code defines the rules and penalties around an agreement, and when the conditions are verified, the contract self-executes the agreed actions. Retailers are using smart contracts to resolve disputes with vendors; insurance systems automatically process claims when pre-established conditions are met; and numerous entities, from companies to governments, are using smart contracts to reduce resource costs in routine transactions.[27] While, traditional contracts need a third party to determine that the conditions have been met to allow for the contract to be executed, smart contracts automate this function through code.

For example, the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT) is exploring the use

of smart contracts to record key trade events and transactions, reducing the need for brokers and expensive monitoring agents in international trade processes. Likewise, the

15   Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System."

16   Adams, "Who Is Satoshi Nakamoto? – Forbes Advisor."

17   "Blockchain in Finance & Fintech." *https://consensys.io/blockchain-use-cases/finance* Accessed 4/28/24/

18   Gaur and Gaiha, "Building a Transparent Supply Chain."

19   Haleem et al., "Blockchain Technology Applications in Healthcare."

20   Kanfar, et. all. "Sustainability | Applications of Blockchain Technology in Sustainable Manufacturing and Supply Chain Management: A Systematic Review."

21   Bustamante et al., "Government by Code?"
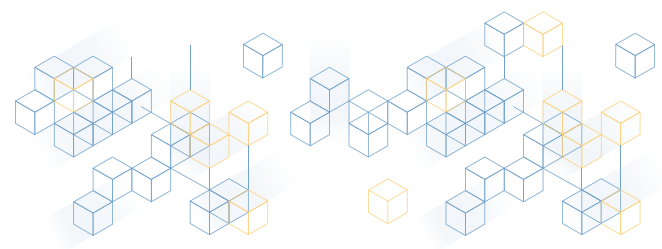
22   Viano et al., "Civic Blockchain."

23   Mattsson, Criscione, and Takes, "Circulation of a Digital Community Currency."

24   Makridakis and Christodoulou, "Blockchain."

25   Wang and De Filippi, "Self-Sovereign Identity in a Globalized World."

26   Faqir-Rhazoui, Arroyo, and Hassan, "A Comparative Analysis of the Platforms for Decentralized Autonomous Organizations in the Ethereum Blockchain."

27   Lipton and Levi, "An Introduction to Smart Contracts and Their Potential and Inherent Limitations."
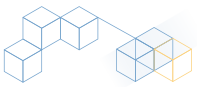
UN is considering how to use smart contracts to facilitate international sales agreements under the UN Convention on Contracts for the International Sale of Goods, allowing for local communities to sell directly to overseas customers without the use of sales agents and other facilitators.[28]

Likewise, the United Kingdom's Foreign, Commonwealth and Development Office has used blockchain-enabled smart contracts to register property titles to citizens in Karnataka, India, where there was no centralized land registry. The Karnatakan state government and citizens used smart contracts to bind land contractually to its community-recognized owner, who became the newly registered owner documented on a blockchain. Hence, when the newly registered owners present their credentials—which validate their identity as the rightful landowner, thus fulfilling the conditional requirements of the smart contract—the smart contract self-executes, granting the landowner all applicable rights to the asset (e.g., the landowner can sell the land or use it as collateral for a loan).[29] This example demonstrates that blockchains and the smart contracts they use

do not mitigate the need for third-party functions, but they can fulfill the function where those intermediaries are not present, thus expanding the benefits of their services without incurring their costs. It also demonstrates the shift in power due to a control of information. While land titles could only be previously validated by a government agency that also verifies the identity of the owner, those owners now own the information related to their own identity (or at least the information required to gain permission to the land title). Moving forward, these landowners do not need government assistance in verifying their identity in relation to the land title because they themselves own that information.

The spectrum of these incremental applications is constantly growing, given the adaptable nature of blockchain, since the blockchain itself is just code that can be easily modified. The rules and protocols governing the blockchain, including how it can be upgraded or modified, are encoded in the blockchain's codebase. This allows the blockchain network to evolve and adapt over time through community-driven rule (i.e., code) changes.[30]

The non-hierarchical nature of blockchain systems is quite different from the typical top-down structures of development actors. Most, not all, blockchains have no central authority controlling them. Instead, they rely on a network of participants following agreed-upon rules.

To take full advantage of what blockchains offer development actors need to adapt. The potential of blockchains to streamline development logistics and ensure accountability is promising. But it requires development actor to build new technological capabilities around this decentralized model.

The leading international development actors have documented the technology's potential to contribute to the United Nations' Sustainable Development Goals (SDGs).[31] A demonstrative list includes:

SDG 1: No Poverty

- In Thailand, the government is using blockchain-based digital IDs to authenticate and verify the digital identities of citizens, helping provide official identification for the poor who may lack it.[32]
- The technology is enabling financial inclusion and access to basic services for the unbanked and underserved populations in some Latin American countries.[33]

SDG 2: Zero Hunger

- Organizations are using blockchain to manage assets and track the use of funds allocated for improving child nutrition, ensuring the money is used as intended.

SDG 7: Affordable and Clean Energy

- The technology is enabling peer-to-peer energy trading, renewable energy certificate tracking, and tokenization of energy to increase transparency and efficiency in the renewable energy sector.[34,35]
- Blockchain projects like Powerledger and WePower are using the technology to facilitate renewable energy trading and adoption.

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28 Grimmelmann, "All Smart Contracts are Ambiguous"

29 Moore, "My Three Takeaways from a Year Working on Blockchain in India."
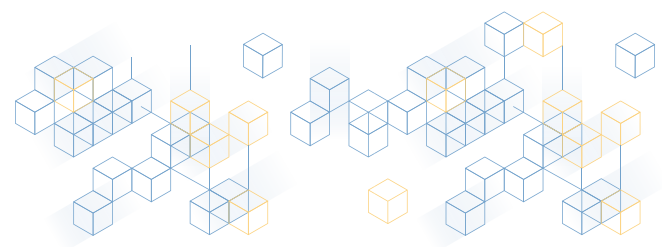
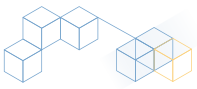30 Vzhuk, "How Does Blockchain Work?"

31 The Development Podcast, "How Crypto Technologies Could Revolutionize Development"

32 Mattila, Dwivedi, and Gauri, "The Role of Blockchain in Sustainable Development Goals (SDGs)."

33 Ibid.

34 "Energy Web." *https://dev-energyweb.pantheonsite.io/* accessed 4/28/24

35 "Bitlumens." *https://www.bitlumens.com* accessed 4/28/24

These examples demonstrate the ability of the technology to decentralize power by empowering aid recipients to have greater control over critical information. For instance the digital id project in Thailand empowers individuals to have access to the information contained in their digital identity (by their improved ownership of this information they gain access to the goods and services). Likewise, the use of technology to manage supply chains provides local actors with access to up-to-date information on the supply chain status where, whereas before, they were reliant on the centralized third-party actor to provide this information. While many of these applications have shown varying levels of performance, from abject failure to resounding success, they have demonstrated the early learning necessary to use the technology in more innovative ways for social impact. Research[36] on early applications has shown promise in the use of a blockchain to provide the security and trust normally provided by third-party centralized actors in contexts where these third-party actors are not present. The potential for technology to provide trust and security for the inter- actions necessary to achieve LLD outcomes is an exciting opportunity. Rather than relying on resource-intensive efforts to extend the functions of third-party intermediaries, technology may enable these trusted interactions directly. By leveraging technology to build trust and security, development actors may be able to more efficiently and effectively collaborate, transact, and support development solutions at the local level.

Decentralizing power to local communities requires more collaboration than currently exists in the hierarchical governance of local development. Localization means donors connect more directly with recipients to allow more feedback than traditional top-down hierarchies. However, there is fear that this could lack the strict accountability mechanisms that hierarchies provide as often codified in the contracts between donors, implementers and local development actors.

However, blockchain has demonstrated some capacity to mitigate many of these risks and could provide an opportunity for new models of LLD where the technology play a more foundational role in the approach.

Incremental Opportunity Challenges

The above examples have been illustrative of incremental uses of blockchain in a project lifecycle. Most of these examples used blockchain to automate specific components of their relative lifecycles for different reasons (security, cost savings, improved accessibility, etc.). It is important to note that as promising as incremental use is, it comes with costs and risks, including:

- **Lack of Standardization:** Unlike traditional software development with established frameworks and tools, blockchain is a relatively new field lacking mature and standardized development frameworks, making development more complex and error-prone.
- **Security Vulnerabilities:** While blockchain is often touted for its security features, vulnerabilities in smart contract code or consensus algorithms can lead to significant financial losses, as funds on the blockchain are immutable and difficult to recover. Traditional software allows for more flexibility in addressing security issues.
- **Integration Challenges:** Integrating blockchain solutions with existing legacy systems and ensuring interoperability between different blockchain platforms can be complex, unlike traditional software that operates within a single ecosystem.

The rest of the paper will focus on more complex uses of the technology to coordinate actions around common community objectives,

Foundational Blockchain Opportunities

Blockchain technology is in its infant stages but is widely seen to have the potential—and pitfalls[37]—to transform how communities organize themselves and interact with each other. Smart contracts enable a new model for procuring and managing local development partners, such as NGOs, companies, or cooperatives. The technology creates opportunities for experimenting with a collaborative model by which communities can lead every phase of the program cycle. These local partners can self-organize (with possible external technical assistance), with their operations and governance managed through online, blockchain-based smart contracts. The

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36 Chapiro, "Working Toward Financial Inclusion With Blockchain."
37 Achenbach "The Potential—and Pitfalls—of Blockchain Technology."
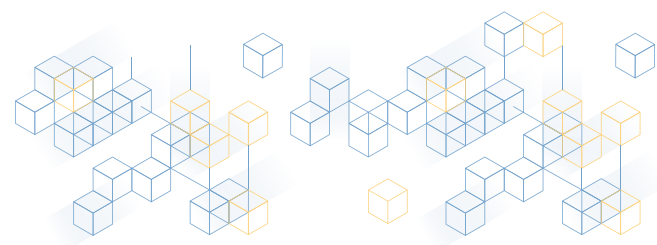
smart contract terms can be co-created amongst stakeholders (whether they are a donor, a community group or local government) to provide varying levels of accountability, transparency, and even opportunities for results-based financing.[38] This approach can lower barriers to market access and reduce transaction costs, while empowering local partners to drive their own development agendas and solutions.

Such an approach could allow local communities to organize themselves into novel organizational entities that pursue their mutual interests using co-created governance structures that align incentives around desired behaviors (whether it be sustainable fishing practices or responsible supply chain management) that further the local development objectives. Not only could there be a greater ability for collective input into decision-making, but every decision made or transaction completed would get documented publicly on a blockchain ledger that anyone with permission could audit at any time. This approach is called a decentralized autonomous organization, or simply a DAO (pronounced "DOW").[39]

There is no consensus[40] on what exactly constitutes a DAO, but for simplification purposes, this paper uses a general definition of a DAO is any entity that uses blockchain technology with self-enforcing and conditions-based contracts (smart contracts) to provide functions such as security and

trust in lieu of traditional third-party providers to achieve a collective objective for which the community has an aligned interest in which the community members can opt into and out of it freely (as documented in a co-created governance framework).

It is theoretically possible for a DAO to exist without a blockchain, and specifically without smart contracts, but there are resource barriers to doing so.

Because smart contracts can partly fulfill the functions of third-party intermediaries—or more specifically, their role in providing the underlying trust needed for parties to interact with each other—DAOs can self-organize for common objectives that used to require

a third-party intermediary. Without the resource savings afforded through the use of a blockchain-enabled smart con- tract, many communities are not able to self-organize around their common objectives due to the prohibitive costs of these third-party intermediaries. One of the benefits of using blockchain, either Incrementally or Foundationally, is to create resource savings in time and cost. It is the ability to provide these trust services faster and cheaper that could make it an appealing solution for developing communities.

DAO Example: Fishcoin [41]

Problem description: The seafood supply chain is fragmented, leading to challenges in enforcing regulations against overfishing, resulting in depleted fishing waters and limited economic growth.

Objective: Fishcoin is a decentralized supply chain that incentivizes data capture for a transparent seafood supply chain comprising individual fishers, private supply chain actors, restaurants and third-party developers, who each benefit by opting into and conducting their transactions within the Fishcoin network (i.e., the seafood supply chain). The result is an increase in sustainable fishing waters and improved livelihoods for fishers.

DAO solution: Fishcoin addresses this by creating a peer-to-peer supply chain network using blockchain that begins with fishers in Singapore and Indonesia and ends with restaurants in North American cities. This network allows members (i.e., supply chain actors who are members of the Fishcoin DAO) to share data securely and transparently. Digital vouchers flow through the supply chain from buyers to sellers, tracking the movement of fish through the supply chain and rewarding those supply chain actors who collect and share the data. This system shifts the responsibility for traceability of the fish to downstream actors like hotels and restaurants, which benefit most from knowing the product's origin. Fishcoin is not controlled by a central entity. Instead, it operates as a decentralized ecosystem that incentivizes data sharing. This approach allows various companies and developers to contribute value to the network, benefiting all involved parties.

Takeaway: Responsible environmental resource management and its effects on livelihoods are a common theme in development. Fishcoin has benefited from the technical support of global experts and small seed financing for startups, resulting in a well-documented model that could be modified for replication in other contexts. Likewise, Fishcoin demonstrates that a DAO can fill a vacuum where no third-party intermediary exists to provide the necessary trust for cooperation. In the case of Fishcoin, there was no regulatory agency enforcing sustainable fishing habits, resulting in poor fishing waters and a lack of economic development. Blockchain technology and the DAO that it enabled filled the vacuum.
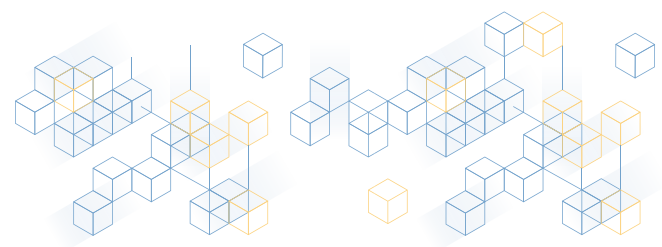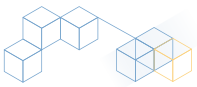
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38   Uzsoki and Guerdat, "Impact Tokens: A Blockchain-Based Solution for Impact Investing."

39   Roose, "What Are DAOs? "

40   "What are DAOs, or decentralised autonomous organisations?, The Economist. January 26, 20222.

41 "Fishcoin." _https://fishcoin.co/_ accessed 3/14/24

DAOs are experimental but innovative and potentially transformative structures that leverage blockchain, digital assets, and related technologies to manage resources, allocate capital, and coordinate individuals. Spanning sectors like finance, technology, and social media, DAOs have experienced rapid growth in recent years. Just in 2021, the value of DAO treasuries (the financial coffers of DAOs that fund their individual operations) skyrocketed by a staggering 42-fold, surging from $380 million to $16 billion. Data from DeepDAO indicate that current DAO treasuries collectively amount to $18.4 billion.[42]

While DAOs are experimental, there are common attributes in how communities create and govern themselves. At the core of a DAO's approach is the prioritization of collective intelligence and community involvement over traditional hierarchical leadership. DAOs, thus far, tend to embrace a system that elevates those who have the best understanding of what needs to be done next. This allows them to tap into the diverse knowledge and decision-making power of the community.

DAOs involve community members in their governance and decision-making processes, giving them a direct say in the organization's direction. The low barriers to entry that DAOs typically have enable this participatory model, making it easier for interested individuals to get involved.

The voting and decision-making structures within DAOs are often designed to be democratic, using approaches like "one person, one vote" or weighted voting based on an individual's contribution and expertise. This transparent and inclusive approach empowers community members to shape the DAO's trajectory.[43]

Beyond just governance, advocates see DAOs serving as global public infrastructure, producing, managing, and distributing resources and benefits that can directly support and empower local communities. Two of the DAOs mentioned in this paper, Commons Stack and Gitcoin, offer training, seed funding, and development tools to support DAOs focused on locally driven impact.

## DAO Example: Commons Stack[44]

Problem description: The management of shared public resources, or "commons," often suffers from misaligned incentives between different stakeholders. This leads to inefficiencies and tensions, resulting in suboptimal solutions. Commons can include natural resources like forests, as well as digital platforms or local services.

Objective: To enable communities focused on public goods to establish regenerative microeconomies. To achieve this, communities will use open-source, blockchain-based toolkits that simplify the management of shared commons resources. These tools will facilitate the funding, administration, and governance of these collective assets.

Fund and govern
your mission.

COMMONS STACK

DAO solution: The Commons Stack project supports communities dedicated to public goods by providing open-source, blockchain-based toolkits. These tools simplify the management of shared commons resources by enabling better funding, administration, and governance of these collective assets. The Commons Stack team develops these digital tools based on applied research, considering the unique challenges and needs of each community for collaborative commons governance.

For example, Commons Stack has worked with Grassroots Economics to provide Community Inclusion Currencies (CICs) in areas where centralized financial services and fiat currency are largely unavailable, lowering the ability of local communities to transact among themselves or with others. Grassroots has implemented Community Asset Voucher and CIC programs in over 45 locations across Kenya; assisted with two in South Africa; and helped more than 60,000 small businesses, churches, and schools take an active role in their own economy and development. These local solutions build on pre-existing community programs and identify the community development objectives and governance norms through a collaborative, community-driven design and performance monitoring approach.[45]

Takeaway: Sustainable management of shared public resources, or the commons, is a widespread problem in international development that has not yet seen scalable solutions. The ability to provide effective, decentralized, and collaborative solutions to commons problems, tailored to local contexts, has the potential to be transformative.
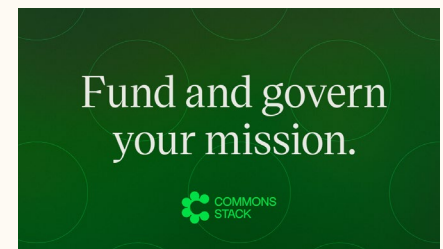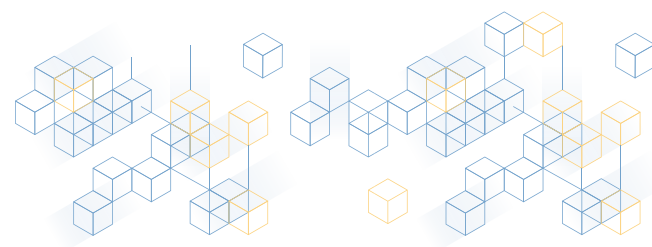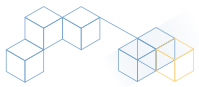
42   "Decentralized Autonomous Organizations Beyond the Hype", World Economic Forum (in conjunction with Wharton School and Digital Asset Project), June 2022.

43 Choi and Hexlant, "DAOs."

44 "Commons Stack." https://www.commonsstack.org/ accessed 3/14/24

45 "Grassroots Economics." https://www.grassrootseconomics.org accessed 4/29/24

DAOs Compared to Traditional Organizations

DAOs are set up to pursue a specific purpose, be it political, commercial, social, or other. Users manage them collectively, and ownership structures incentivize collective action, reward individual members for actions that contribute to the DAO's objective, and disincentivize actions that harm it. DAOs are meant to mitigate principal-agent problems (where an organization's leaders act in their own interest at the expense of the organization) partly by diminishing information asymmetry through the transparency of the blockchain. The management of a DAO is largely automated through the use of smart contracts, and while the overall design of the DAO can vary greatly, the role of the programmable token in sustaining the DAO is paramount. (This paper will not go into the details of the emerging field of tokenomics, which studies this relationship between token design and optimal DAO governance.[46])

Table 1. DAO Benefits

DAO Benefit	Description[47]
Aligned interests	DAOs require varying levels of engagement and commitment, to include having "skin in the game," which selectively attract members who demonstrate dedication by investing their time, assets, and expertise, thus cultivating an alignment with the DAO's mission.
Efficient processes	In contrast to traditional actors like corporations, DAOs excel in agility, given their transparent and adaptable management structure. This enables timely decision-making and responsive- ness to change by mitigating the need for intermediaries, whose function of providing trust is fulfilled by using a blockchain.
Global expertise	While DAOs can pursue local community objectives, given their decentralized and remote ethos, they have access to the talent and expertise needed to achieve these objectives can stem from anywhere in the world with direct engagement through the blockchain. This allows the DAO quickly to gain access to the expertise needed to address evolving problems.
Rapid startup	DAOs offer a swift setup process, devoid of bureaucratic intermediary processes. This enables timely action in urgent scenarios, such as humanitarian crises, without delays from regulatory procedures—depending on the level of regulatory prohibitions in the context. Blockchain itself reduce the transaction costs of routine digital interactions, making it feasible to stage more targeted interventions at smaller scale and greater speed.
Promotion of inclusivity	DAOs foster an environment where members can maintain pseudonymity, reducing the impact of biases and promoting inclusivity within the community. Smart contracts can also be coded to mitigate or outright prohibit behavior deemed to be against the mission of the DAO. But this assumes that all members have the ability to engage safely with the DAO and that the DAO does not build on pre-existing racist, sexist, and other exclusionary prejudices in the community system. Mitigating exclusionary behaviors could include addressing technological barriers in collaboration with affected communities and ensuring DAO governance is transparent and inclusive of underrepresented voices.

As DAOs have expanded in size, their reach has broadened as well. While many prominent DAOs primarily operate within decentralized finance,[48] there has been a notable trend toward establishing DAOs focused on driving positive impact across domains such as climate action,[49] community development,[50] and universal basic income.[51] These initiatives aim to promote inclusivity, equity, and sustainability through community-driven decision-making processes within the DAO framework.

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46 Voshmgir, Token Economy.

47 "What Is a DAO? A Crash Course." *https://impactdaos.xyz/what-is-a-dao* Accessed 4/29/24

48 Ozili, "Decentralized Finance Research and Developments around the World."

49 Jirasek, "Klima DAO: A Crypto Answer to Carbon Markets."

50 Choi and Hexlant, "DAOs."

51 Avanzo et al., "Universal Basic Income in a Blockchain-Based Community Currency."

Key Features of a DAO

Decentralized decision-making: Instead of having a centralized authority making all the decisions, a DAO empowers its community members collectively to shape the organization's direction through a decentralized, bottom-up process.

Blockchain foundation: DAOs are typically built on blockchain technology, which provides a secure, transparent, and tamper-resistant digital ledger to record all transactions and decisions made by the community.

Automated governance: At the core of a DAO are smart contracts—self-executing pieces of code that automatically enforce the organization's rules and facilitate key processes like voting, funding, and resource allocation.

Community ownership: DAOs are owned and controlled by their members, who hold voting rights. This allows the community directly to propose and vote on decisions that impact the DAO.

Transparent operations: Since DAOs are built on blockchains, their inner workings—including the code, finances, and activities—are transparent and open for anyone with relevant permissions to view and audit.
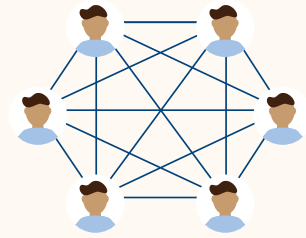
Any type of entity can become a DAO, and many already have.[52] Because DAOs are partly governed by code (and partly by the same type of governance mechanism of any organization, such as board meetings), they are limited only by the effectiveness of their decision-making in designing and testing the optimal governance structure for their given objectives.

Given the key features and benefits of a DAO, they could be a tool to help local development transition from what Paul Curion has called Hierarchical Humanitarianism (donor mandated from the top down) and Market Humanitarianism (competitive, profit-driven, power concentrated in few actors) to Network Humanitarianism (collaborative, builds on digital transformation, power is distributed to those closest to the problems).[53]

DAOs seek to restructure traditional hierarchical management frameworks and broaden ownership and participation in governance by aligning rewards with labor, contribution and participation.[54] DAOs distribute incentives[55] such as tokens (representing rights and permissions to different types of assets), reputation, voting rights, access, recognition, or other benefits to motivate and reward members for their contributions.[56] These incentives and overall governance structures can be built on pre-existing community social interactions and cultural norms to create motivation in the DAO.

These organizations enable communities to pool and allocate resources toward shared goals without centralized management and with increased automation of routine transactions, saving time and cost. Due to the use of a blockchain, the ledger records all transactions and decisions with full transparency for permissioned users, thus facilitating accountability requirements[57] and trust[58] between funders and local actors. DAOs empower members to propose, vote on, and implement changes collectively, promoting community engagement and ownership of development initiatives through mechanisms that align members' incentives.

DAO members align incentives[59] through various mechanisms like tokenomics,[60] governance, reputation systems, feedback mechanisms, and social norms. These incentive structures aim to align the interests of contributors, investors, users, and regulators with the mission of the DAO.

Given that blockchains are just code, and thus have limitless potential for experimentation, DAOs may also benefit from a high degree of customizability.[61] This area is still developing and in need of evidence to guide its decision-making, but the ability to customize local impact solutions has in part fueled the emergence of a new type of DAO focused on sustainable social impact.

52   Ruane and McAfee, "What a DAO Can and Can't Do."

53   Currion, Paul, Network Humanitarianism. *https://www.kuno-platform.nl/wp-content/uploads/2017/12/Currion-P.-2018-Networked-Humanitarianism.pdf* accessed 5/28/24

54   Digital Public Goods Alliance, "Community of Practice Reports " . *https://digitalpublicgoods.net/highlighted-digital-public-goods/* accessed 4/29/24

55   Voshmgir and Zargham, "Foundations of Cryptoeconomic Systems."

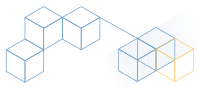56 Voshmgir, "What Is the Token Economy?"

57 Batubara, et al., "Unraveling Transparency and Accountability in Blockchain."

58 Shin and Bianco, "In Blockchain We Trust: Does Blockchain Itself Generate Trust? "

59 Ellinger et al., "Skin in the Game."

60 Lamberty et al., "Efficiency in Digital Economies -- A Primer on Tokenomics."

61 Faqir-Rhazoui, Arroyo, and Hassan, "A Comparative Analysis of the Platforms for Decentralized Autonomous Organizations in the Ethereum Blockchain."
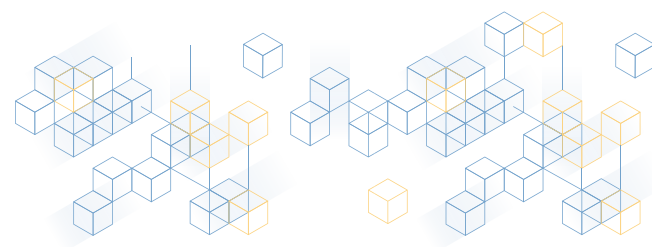
Impact DAOs

There is hope that Impact DAOs can achieve scaled impact and efficiency that is impossible within current social impact and nonprofit models. Though Impact DAOs represent a fraction of the overall DAO ecosystem, their rapid development has led some to question whether this novel organizational form could inform the development of future LLD. [62]

Impact DAOs can be established for any type or scale of local social impact, such as the inclusion of vulnerable populations,[63] natural resource management,[64] economic development, or civil society.[65]

Table2. DAO Integration of LLD Principles

LLD Principles	DAO Integration of Principles
Listening to local actors	**Localization and community engagement:** DAOs could empower community members to engage local participants, especially during onboarding, to align interests more equitably during co-created governance design.
	Transparent decision-making: The community votes on varying levels of decision-making in DAOs, ensuring transparency and alignment of interests among members.
	Member/stakeholder education: DAOs can educate stakeholders about the vision, values, and technical aspects of joining and contributing through various channels like community meetings, SMS outreach, and radio or internet messaging.
	Incentive schemes: Incentive schemes built into the governance model can promote stakeholder empowerment, active engagement, and recognition for contributions.
	Participatory processes: DAOs rely on varying levels of member participation in proposing and voting on adaptive measures.
Understanding local systems	**Empowering local participation:** DAOs can build on pre-existing community dynamics, given that the community itself creates the DAO.
Experimenting, learning, and sharing	**Community feedback:** DAOs can seek feedback from members to understand their needs, experience with the DAO, and areas for improvement through periodic voting and off-chain deliberations.
	Iterative development: DAOs engage in iterative development cycles implementing changes based on feedback, measuring the impact of these changes, and adjusting their strategies accordingly. This iterative approach allows DAOs to evolve and improve over time.

LLD Barriers	DAO Mitigation
Defining local actors	**Empowering local participation:** DAOs can build on pre-existing community dynamics, given that the community itself creates the DAO.
Accountability and measurement	**On-chain data:** Because all DAO transactions and agreements are recorded to the blockchain as a management tool, the blockchain ledger itself serves as an audit-ready data source for performance measurement.
	Smart contracts: Accountability requirements can be coded into smart contracts to ensure automated enforcement of regulations.

Impact DAOs can be designed for any context, sector, or problem, using a variety of scopes, models, and mechanisms to achieve their purpose. There is no definitive list of Impact DAOs, and such a list is highly unlikely given the decentralized nature of their evolution and increasing application scale.

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62 World Economic Forum, "DAOs for Impact."

63   Bell, "Blockchain and Authoritarianism."

64   Oberhauser, "Blockchain for Environmental Governance."

65   Kassen, "Understanding Decentralized Civic Engagement."
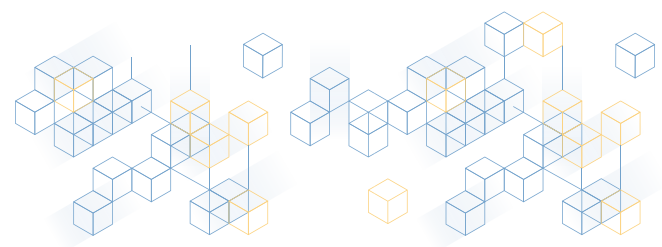
DAO Example: Gitcoin[66]

Description of problem: Communities lack developer skill sets to help them establish their own DAOs for their own purposes.

Objective: Gitcoin is a blockchain-based platform (built on the Ethereum blockchain) that aims to support the development of open-source software and other public goods that benefit communities. Its core purpose is to help open-source developers collaborate and financially benefit from their contributions to community grants.

DAO solution: Gitcoin achieves this purpose through its grants program, which uses a unique funding mechanism designed to direct more funding to projects that have broad community support. It weights contributions based on the square root of the number of contributors, rather than just the total dollar amount. This approach is intended to ensure that projects with many smaller contributions receive more funding than those with a few large donations. The goal of this approach is to fund those projects with broader support in the community as opposed to those with vested power.

Gitcoin employs sybil detection and identity verification measures to help mitigate potential misuse or manipulation of the funding system. The platform is also working to improve the user experience and expand support for grantees working with varying levels of digital capacity, while addressing challenges around evaluating the quality of projects.

BanklessDAO is a Gitcoin grant recipient that works on improving the financial health of those without access to traditional financial services (or those who wish to divest from them). The DAO has established departments, guilds, and collaborative projects to organize its community efforts, including over 15,000 developers and other experts to provide professional services in areas like marketing, tech, legal, finance, and management.[67]

Takeaway: A primary innovation of Gitcoin is its funding mechanism that mitigates the elite capture of grants. This funding approach offers opportunity for anyone wishing to invest more in local solutions that reflect the interests of the broader community as opposed to specific established power bases. Such an approach could enable new possibilities to tap into the latent talent—and interests—of local systems and allow equitable representation in determining the community goals using a more democratic funding mechanism.

DAO Challenges

While the medium and longer-term outcomes correlated with different DAO designs and models are largely unknown, the current experimental phase of DAOs has exposed various barriers to their successful application so far that are useful to when considering the role DAO's could play in LLD.[68]

Smart contract vulnerabilities: DAOs built on smart contracts are vulnerable to errors or flaws in the code, which malicious actors can exploit for their own profit.

Regulations: DAOs, especially those governing decentralized finance applications, are susceptible to regulatory action if their services are deemed to be in breach of securities or other regulations. Governments, businesses, and communities worldwide lack clarity and certainty on how DAOs may fall within national legal and regulatory frameworks. This uncertainty leads to difficulties in entering contracts with third parties, enforcing contracts among DAO members, and accessing legal remedies in case of disputes. At present, DAOs do not directly address USAID's difficulties in working directly with local actors. However, DAOs are making advances in this space—for example, the U.S. state of Utah is piloting models for legally recognizing DAOs as corporate entities following the path taken by other jurisdictions.[69]

Interpersonal differences: Differences of opinion and disputes can arise between co-founders, founders, and investors within a DAO.

Entrenched centralization/information asymmetries: Some DAOs allow participants to be anonymous, which can lead to potential abuses at higher levels of authority, to include examples of governance capture by more powerful actors within the DAO.

Member/stakeholder education: DAO members and stakeholders may lack sufficient knowledge and training in DAO operations, governance models, and requirements, hindering their ability to optimize the use of a DAO fully. This has given rise to various training and educational curricula tailored to the different member roles in the DAO ecosystem.
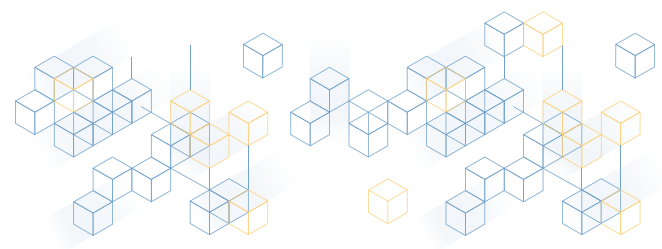
Resistance to change: Implementing decentralized governance structures like DAOs requires a shift away from traditional top-down authority models, which can face resistance from stakeholders accustomed to centralized decision-making processes.

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66 https://www.gitcoin.co accessed 4/16/24

67 https://www.bankless.community accessed 4/16/24

68 Wright and Law, "The Rise of Decentralized Autonomous Organizations."

69 Teale, "States Recognizing DAOs as They Embrace Blockchain."

Conclusions and Future Steps

What this paper calls the Incremental and Foundational (DAO) uses of blockchain are in their infancy and are highly experimental. It should not be surprising that little is known about how to use the technology, but if it is to be a tool for LLD, then it should be honestly assessed for that purpose and without much of the hype and snake oil promises of many promoting it. These conclusions are meant to inform the decision-making about whether and how blockchain could be an LLD tool.

This paper began with three questions:

- **When could blockchain be used to enhance LLD?**
- **How could it be used?**
- **How do we learn to use it better?**

This concluding section is organized around these questions, with proposed future steps for question #3.

1. When could blockchain be used to enhance locally led development?

Researchers have already begun work on identifying the optimal conditions for the incremental use of blockchain for development purposes.[70] The answers proposed below build on that initial research to identify the conditions for the Incremental and Foundational use of blockchain for LLD.

Enabling Conditions

Absence of a third-party intermediary to provide critical services, or the presence of an intermediary that is providing critical services at an ineffective or in-equitable level.

Blockchain is meant to provide the trust, security, and transparency needed for individuals and groups to engage, transact, and interact with each other without the use of a third party (such a bank or government entity[71]). When these third-party functions are not present (for example, in rural areas without banking or financial services), then stakeholders could explore the use of a blockchain-enabled DAO.

Trust to facilitate initial collaborations around LLD objectives.

Players in this field have discussed—but largely neglected—the role of trust as a foundation for successful collaboration (e.g., economic, social, or legal) and partnerships between various stakeholders in LLD (including governments, donors, and communities themselves).[72] Any effective LLD outcome depends on trust to enable individuals to take action with a level of certainty in an expected result (e.g., depositors expect the money to be in their accounts the next day).

Many development problems can be attributed, in part, to this lack of foundational trust, which stakeholders need to conduct the actions necessary for the development outcomes to materialize. Some researchers have touted blockchain as a trust-making tool that can facilitate trust-building in the absence of traditional institutional trust actors (such as banks and notaries). This absence is common in developing contexts, where communities often rely on local social trust networks to fill the gap.[73] The use of a blockchain to bootstrap and manage a DAO could build on any pre-existing social trust network, including its norms, while providing the benefits of a traditional trust actor.

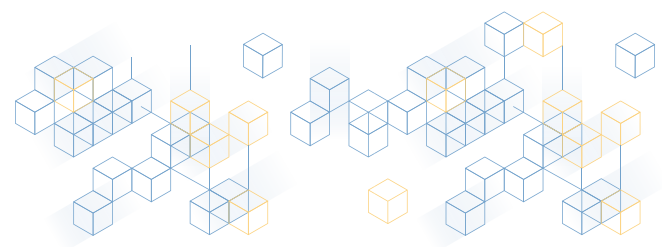*The possibility of an enabling regulatory environment.*

Legal structures are essential for DAOs to operate effectively. Some places (like the U.S. state of Wyoming) have begun designating DAOs as entities with legal status. However, most nation-states have not yet considered the existence of DAOs within their jurisdictions, leading many DAOs to engage regulators and lawmakers (1) to create necessary reforms or (2) to test the lack and/or ambivalence of existing regulations. The principles of LLD can inform collaborations with policymakers to co-create necessary reforms to enable the innovation necessary for DAO maturation. The lack of an enabling regulatory environment could be the most significant barrier to implementing a DAO, but increasingly various U.S. states (Vermont, Wyoming, Tennessee, and now Utah) recognize DAOs.

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70 Nelson, "Primer on Blockchain."

71 Grassroot Economics and OCTOPI, "Research Findings Expert Opinions on the future of Community Inclusion Currencies (CICs)".

72 Chandiramani and Marshall, "Why Trust Matters in International Development."

73 De Filippi, Mannan, and Reijers, "Blockchain as a Confidence Machine."

2. How could it be used?

Given the infancy of blockchain technology and the experimental stage of DAOs, there is no systematic evidence base on "what works" and why. The implication is that any usage of the technology, especially in a DAO, should be treated as a pilot, and implementers need the appropriate capacity to monitor early results and make adaptive changes. Stakeholders can capture the evidence needed for learning beyond single applications. They can begin building the standardized best practices, protocols, toolkits, and guidance needed for any successful application at scale.

Blockchain (and DAOs) can be a tool either for positive social impact or to further inequitable objectives.[74] To say that blockchain and DAOs should be used equitably means little without giving equity the same priority as profit or other performance targets.

3. How do we learn to use it better?

At this stage of DAO maturation, this is perhaps the most important question of the three. Current DAO applications are grossly under-researched, which creates a perilous situation where an easy-to-use technology has outpaced the evidence-driven decision-making to use it effectively and equitably. Heightening this risk, the transformative capacity of the technology has just as much potential for good as for harm. Still, some current DAO research areas can contribute to their initial application as an LLD tool.

Current DAO Research Areas

Governance and Regulatory Frameworks

- Creating frameworks, typologies, and models of governance structures and decision-making processes of DAOs, including voting mechanisms, asset ownership, and community participation.[75]
- Creating risk management strategies, dispute resolution protocols, and donor-specific accountability systems within DAOs.
- Developing tools for assessing the legal and regulatory hurdles for DAO development and policy reform approaches.

Organizational Design and Dynamics

- Studying the motivations, incentives, and behaviors of DAO members, and how these factors shape the overall functioning of DAOs.[76]

Technological Foundations

- Creating smart contract capabilities (trained developers, templates, guidance, and risk management protocols) that can be tested in early DAO pilots.
- Assessing the scalability, security, and interoperability challenges associated with DAO technologies.

These current research areas have an emerging evidence base that requires technical rigor and a social impact lens to ensure it is applicable to any type of DAO learning agenda for LLD. Such a learning agenda would need to build on this early research with existing LLD and digital development evidence and principles. To help answer question #3, following is a proposed initial learning agenda.

LLD DAO Learning Objectives

Ethics: The use of blockchain technology to bootstrap and manage a DAO creates specific ethical considerations and a need for safeguards to ensure that the tool is used equitably—not just efficiently. Already existing ethical guidance from decades of development using digital technologies—like the Principles for Digital Development[77]—will need to be updated to ensure they account for the specifics of using a blockchain.
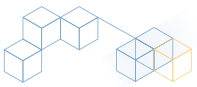
A primary ethical concern with blockchain is the potential conflict of the technology's immutable and transparent nature with an individual's right to privacy and the ability to delete or remove personal data. This is particularly

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74 Yang, "China Just Announced a New Social Credit Law. Here's What It Means."

75 van Vulpen, Siu, and Jansen, "Governance of Decentralized Autonomous Organizations That Produce Open Source Software."

76 Barclay et al., "Tokenizing Behavior Change."

77 *https://digitalprinciples.org/* accessed 4/14/24
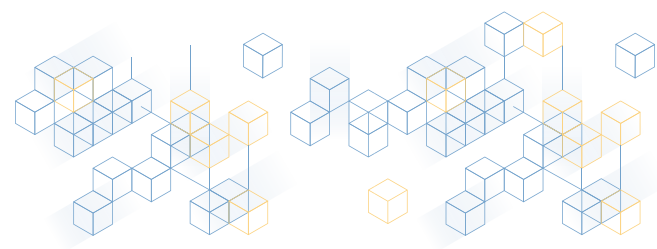
problematic in sensitive sectors like healthcare, or in identifying data from vulnerable populations. Assessing the need for building sufficient capacity (e.g., data literacy) for communities to use a blockchain will be one of the biggest challenges for the technology as it goes to scale. For example, the UN has used blockchain to provide digital identities to millions of refugees, but it has maintained control over accessing those identities instead of fully divesting the responsibility to the individuals, reflecting concerns that the refugees would not safely manage their own digital keys. Given that the ethos of blockchain is to devolve power back to individuals and the communities they live in, this practice has led to ample debate and an acknowledgment that there will be a long learning curve in optimizing the use of blockchain.[78]

While blockchain promises decentralization, in reality there can be significant centralization of power and influence among a small group of core developers or consortium members. This centralization can lead to concerns about bias, conflicts of interest, and lack of accountability.

The increasing use of algorithms and automated decision-making in blockchain-based systems also raises ethical questions about algorithmic bias and the implications of "algocracy"—the use of algorithms to make important decisions that impact people's lives. There is also a tension between the transparency of blockchain and the need for confidentiality in certain business and personal transactions. Striking the right balance between these competing principles is an important ethical consideration.[79]

Treat the technology as a tool: To borrow a phrase from Nick Moore, technology is normally the smallest part of the problem.[80] The misapplication of technology in development usually stems from an overreliance on the ability of the technology to address the problem at hand, often using the technology as the end instead of the means.[81] USAID has made advances in creating evidence and providing guidance on designing the use of technology in various ecosystems where interventions will take place and that they could influence.[82] This guidance will need to be updated if blockchain applications mature and go to scale, primarily due to the vastly different influences blockchain applications will

have on social structures compared to other technologies like artificial intelligence or mobile phones.

New intermediary functions: While the use of a blockchain alleviates much of the need for intermediary services, there will always be a need for intermediaries. But their function could change to facilitating the community's interests through new types of services. These services could include the technical assistance to design, test, and scale a DAO. Bilateral and multilateral development actors already have varying levels of experience providing this type of technical assistance to blockchain projects within their portfolios,[83] but no one has yet conducted a systematic capture of this learning to drive the creation of initial guidance and tools.

Contractual procurement of a DAO: One of the primary challenges for a government agency in contracting with a DAO is the unclear legal status and liability associated with these decentralized, blockchain-based organizations. Since DAOs operate without a clear legal entity or hierarchy, it can be extremely difficult for a government agency to determine where the legal liability lies and who is ultimately accountable for the terms of the contract. This lack of legal clarity creates significant risk for government agencies looking to engage with DAOs.

Another difficulty lies in the governance and decision-making processes of DAOs. These organizations rely on decentralized, community-based voting mechanisms to make decisions, which can be opaque and difficult for a government agency to navigate. Without a centralized authority, it becomes challenging for the agency to identify the key decision-makers and ensure proper accountability throughout the contractual relationship.

Potential vulnerabilities and operational risks inherent in the underlying blockchain and smart contracts that power DAOs could pose unforeseen risks to USAID. These emerging technologies can be prone to bugs, hacks, and other startup/piloting failures that could lead to significant financial losses or disruptions. The unproven nature of these systems could make USAID hesitant to entrust priority functions or services to a DAO.

78 Franke, "Refugees' Loss of Self-Determination in UNHCR Operations through the Gaining of Identity in Blockchain Technology."
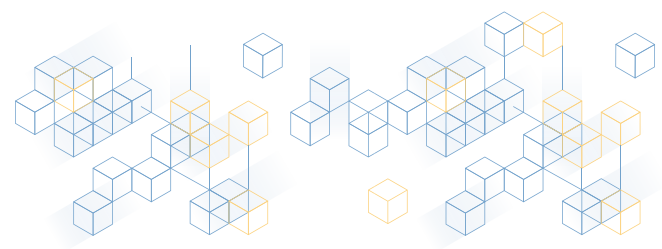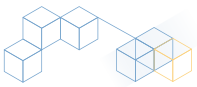
79 Blackman, "Why Blockchain's Ethical Stakes Are So High."

80 Moore, "My Three Takeaways from a Year Working on Blockchain in India."

81 Toyama, Geek Heresy.

82 USAID, "Digital Ecosystem Framework" .

83 UN Blockchain Group, https://www.uninnovation.network/un-group-pages/blockchain Accessed 4/29/24

The lack of well-established governance models for DAOs presents a challenge. Because DAOs are a new and evolving organizational form, government agencies have few precedents or best practices to rely on when developing appropriate governance frameworks and decision-making processes for DAO contracts. Developing these frameworks from scratch would be a significant undertaking.

Skill set mapping: At the very least, no DAO can exist without an initial developer to code the blockchain and codify its governance and management system. At present, these developers are in short supply and command high pay, but DAOs may have little ability to provide adequate technical oversight over their work given their novel expertise.[84] Demand may also emerge for new types of technical assistance services, given the new roles of DAO intermediaries. These services could use expertise from those with knowledge of blockchain architecture,[85] DAO design, or tokenomics. Initial pilots could require mapping out the necessary staffing and correlated skill sets to get started on iteratively identifying staffing/skill set gaps.

Identifying initial learning pilots: Stakeholders could identify pilots that would address initial evidence requirements needed for wider application. These pilots could fall into two categories: (1) new projects or (2) adapting current projects to a DAO model. Given the flexibility of the DAO model, there could be opportunities to identify a donor project currently in implementation—either a project experiencing a barrier that a DAO model could mitigate or a project that could greatly improve its effectiveness using a DAO model. Preexisting and ongoing research could inform selection criteria to identify these projects.

Typology of DAO applications: The flexibility and accessibility of DAO models could mean that the evidence needed to inform their applications is always lagging. An effective protocol for collecting, organizing, and sharing evidence could be the most effective way to ensure that the evidence lag is as short as possible. Researchers and stakeholders could build an initial DAO typology using governance models and focus of application (e.g., agriculture or finance) to create an understanding of the current application landscape and identify the knowledge gaps for pushing the application landscape further.

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84 Bambysheva, "Web3 Growth Stymied By Scarcity Of Programmers."
85 Ali Syed et al., "A Comparative Analysis of Blockchain Architecture and Its Applications."
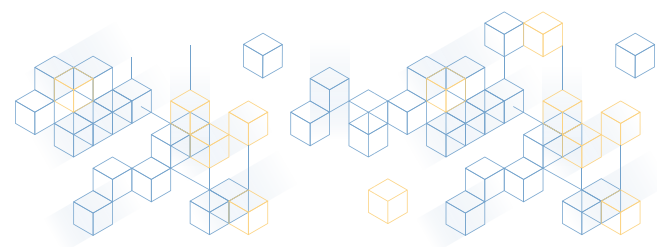
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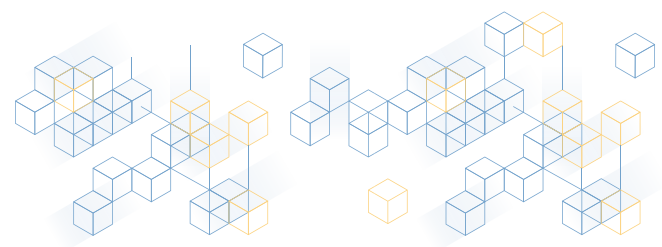
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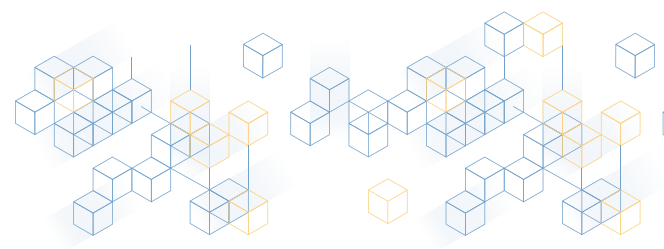
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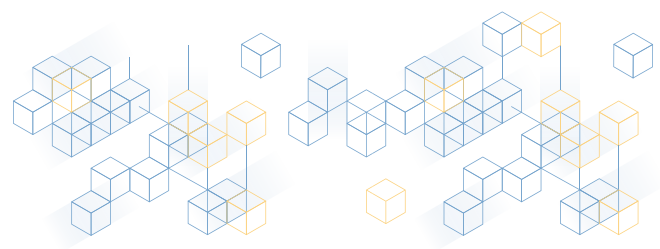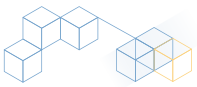
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