Briefing

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Policy pointers

If designed and governed effectively, digital technologies could address power imbalances, reduce costs and increase the efficiency of climate and development finance. More finance could be delivered to the people and places who need it most and best understand its potential impact.

Tech developers, donors and aid agencies must apply digital technologies to support good governance practices and harness local knowledge, while providing the technical and climate expertise to co-produce solutions.

New capabilities are needed to support exchanges between tech developers, governments and those experiencing climate change impacts. Mutually agreed principles could help communities shape digital technologies that support ecologically and socially sound decision making.

Innovation in digital tech could start by strengthening established mechanisms with track records of empowering communities to tackle poverty, environmental degradation and climate change, as these already have experience of climate finance governance.

Reimagining the climate finance system with digital technology

Local communities and enterprises must be at the heart of just responses to reducing poverty, conserving and restoring nature, and avoiding catastrophic climate change. However, local actors are inadequately supported to shape responses to this triple challenge, as development actors face difficulties delivering finance to the local level. Innovations in digital technology could help channel more funds directly to the people and places that need it most, as well as having the potential to disrupt prevailing power dynamics for fairer resource governance. But without careful consideration, innovations could entrench existing inequalities and create unjust and ineffective development solutions. This briefing considers the opportunities and risks for tech developers and development contributors of applying digital technologies to support a reimagined climate finance system — one that gets money where it matters — and suggests a framework to support good practice.

Thriving, equitable societies can only be realised if vulnerable and marginalised people are central to efforts to address the triple challenge of reducing poverty, conserving and restoring nature, and avoiding catastrophic climate change. However, too little climate finance reaches the local level, while too much is delivered through international intermediaries that make investment decisions far from affected communities and enterprises, missing out on local knowledge, ideas and experience.

At IIED, we have reimagined the climate finance system to be fairer and more effective.[1] By delivering more funds directly to vulnerable and marginalised communities, with fewer losses to intermediaries' preferred solutions and administrative costs, activities on the ground would receive more and better targeted funds that can achieve maximum benefit. In this system, investment decisions would be more inclusive, giving weight to local people's

priorities and preferred solutions, leading to better, tailor-made responses.

However, there are challenges to delivering this vision. Donors and aid agencies face transaction costs of: disbursing funds to multiple local climate action projects; perceived risks; poor enabling environments; and limited local capabilities. To support change, our 'Money where it matters' framework sets out principles to overcome these challenges (see Box 1). Innovations in digital technologies could help deliver the framework's local finance building blocks and assist in building widespread, nuanced and context-appropriate responses to the triple challenge.[2] As with any technological revolution, understanding power dynamics and who controls the direction of innovation, and recognising that there will be winners and losers, is critical for a just outcome that disrupts top-down development approaches.

This briefing considers how well digital technologies can deliver a more effective,

reimagined climate finance system by investigating four types of innovation being applied to climate and development initiatives.

Tech innovations could help build a reimagined climate finance system

Digital technologies in action

Geographic information systems (GIS). GIS is a system for gathering, managing and analysing geographic data, helping to visualise locations of value, resources, infrastructure and ongoing processes necessary to enable more informed decisions.[3] GIS innovations can enhance transparency and enable greater participation in decision making; this builds trust and shapes incentives to invest in more effective climate and development activities.

One innovation is 'geotagging': adding accurate global positioning information to photos and other media. Using a smartphone, anyone can create a public record of the status of local investments, for example about water or energy infrastructure. This makes tracking, reporting and maintaining multiple, dispersed local projects easier and cheaper. The public nature of data offers communities a crowdsourced accountability tool.

GIS can also be used for 'ground-up' mapping of housing and basic services to support communities in claiming their rights. For example, participatory digital resource mapping is being trialled in Kenya, Tanzania and Mali to support adaptation planning.[4] It enables communities to pinpoint the location and quality of resources

while using the mapping process to explain how local knowledge can build on local infrastructure to underpin sustainable landscape management. Digital maps are easy to update, can be owned and monitored by the community, and can inform government decision making to reflect local priorities as well as existing customary planning.

A risk of GIS is that without community validation, they can prioritise data deemed important by powerful decision makers over local knowledge. The value of GIS is as a platform for developing a shared knowledge system across stakeholders. Another risk is that more literate stakeholders with access to mobile phones or the internet (men over women, younger generations over older ones, urban over rural and so on) will exert greater influence. Explicitly ensuring information can be received and shared by marginalised groups in locally appropriate terms is critical.

Information-sharing applications. Attempts to secure funding for local projects can be undermined by investor perceptions of limited capacity at local level to use climate finance effectively. Some perceptions are rooted in the lack of information available to smallholders or local institutions, limiting capabilities to make responsive decisions, scale up interventions and enhance their impact. But expanding cellular networks and smartphone use have enabled web-based learning, information sharing and networking in and between large communities, potentially linking different types of expertise and enabling movements of like-minded people with shared vulnerabilities to form around key issues.

FarmerLine, an information-sharing enterprise, is one example: it offers a platform for farmers to access market prices and climate information, learn about certification standards and sustainability practices, as well as order agricultural inputs — all through a smartphone.

But there are risks associated with these applications. Not all areas have widespread cellular networks, and in poorer areas it is typically men who have smartphones or access to cash to pay subscription fees. There is a risk that disseminated farming advice does not reflect variable local conditions or overstates the certainty of weather information, inadvertently superseding indigenous knowledge rather than integrating the two. Furthermore, the farmer may receive data and advice that encourages decisions with environmental and livelihood trade-offs without highlighting possible risks.

Machine learning. Machine learning, a subset of artificial intelligence, uses computer-based algorithms to find patterns across data sets. Machine learning programmes analyse large

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Box 1. Building blocks for effective local finance[6]

These represent the key ingredients for resourcing effective local finance mechanisms that can deliver finance to local institutions and shift incentives in favour of climate-resilient development.

1. **Aggregating local action.** Applying aggregation to 'bundle' numerous small investments delivers economies of scale and diversified risks that are more cost effective for donors and private investors.

2. **Building trust and a shared understanding of risk.** Finance delivery systems should build and maintain trust between donors and recipients, overcoming long distances to accurately represent local situations and enable a shared understanding of risk.

3. **Shifting incentives.** Incentives that encourage or discourage local action are set by the policy and regulatory environment, governance arrangements, citizens' and environmental rights, and access to information and knowledge; aggregated local action programmes make reform easier for citizens and governments.

4. **Long-term capabilities.** Aggregation mechanisms can support building capabilities and skills to manage local financial resources efficiently at scale and respond to the complexities and uncertainties tied to the triple challenge of reducing poverty, conserving and restoring nature.

quantities of data and predict behaviour based on past experience or track and analyse changes. This technology could offer decision-making tools in considering how to deliver local level climate priorities — particularly useful considering the complexity and uncertainty that must be factored into decisions around climate change. It could also be used to capture results from investments.

As machine learning processes data from multiple sources (satellites, mobile phones, weather stations and more) it could offer improved options for crop choices and planting methods, through to assessing real-time options to respond to climate risks. Machine learning can also review 'alternative data', such as household electricity payments, satellite data or phone charging times, to make more climate-smart decisions or offer climate-informed credit.

FarmDrive is a company using data analytics to assign credit scores to Kenyan farmers, based on revenue and yield data submitted by text message. To make effective risk assessments, algorithms search data for patterns, comparing the characteristics of applicants with those of previously successful recipients. FarmDrive allows farmers to access credit without the burden of supplying evidence of land ownership or collateral.

However, machine learning applications pose risks to vulnerable communities. Algorithms' ability to make useful assessments depends on the quality and type of data provided. Many datasets, for example documenting the characteristics of failed loan repayments, reflect existing systemic bias that contributed to failure; algorithms may not be designed to identify this, and so risk incorporating and reinforcing that bias. In this example, the replacement of traditional face-to-face evaluations and use of collateral to secure loans might also incentivise potential borrowers to try to 'cheat' the algorithm.

Analysis of the underlying data must be undertaken with a good understanding of the nature of poverty and the assets of the poor, so machine learning does not reproduce the socioeconomic inequalities that typically exclude low-income groups. Given this risk, regulatory responses or public accountability are necessary.

Distributed ledger technology (DLT). DLT — which encompasses blockchain — decentralises the process of accounting for and verifying changes in financial information, or anything else of value, across a network of computers. All changes to the ledger are recorded and verified across multiple 'nodes' in the network. The records have no single verification point and are hard to alter or erase, making DLT less susceptible to corruption.

Figure 1. IIED's 15 good governance practices for effective local finance
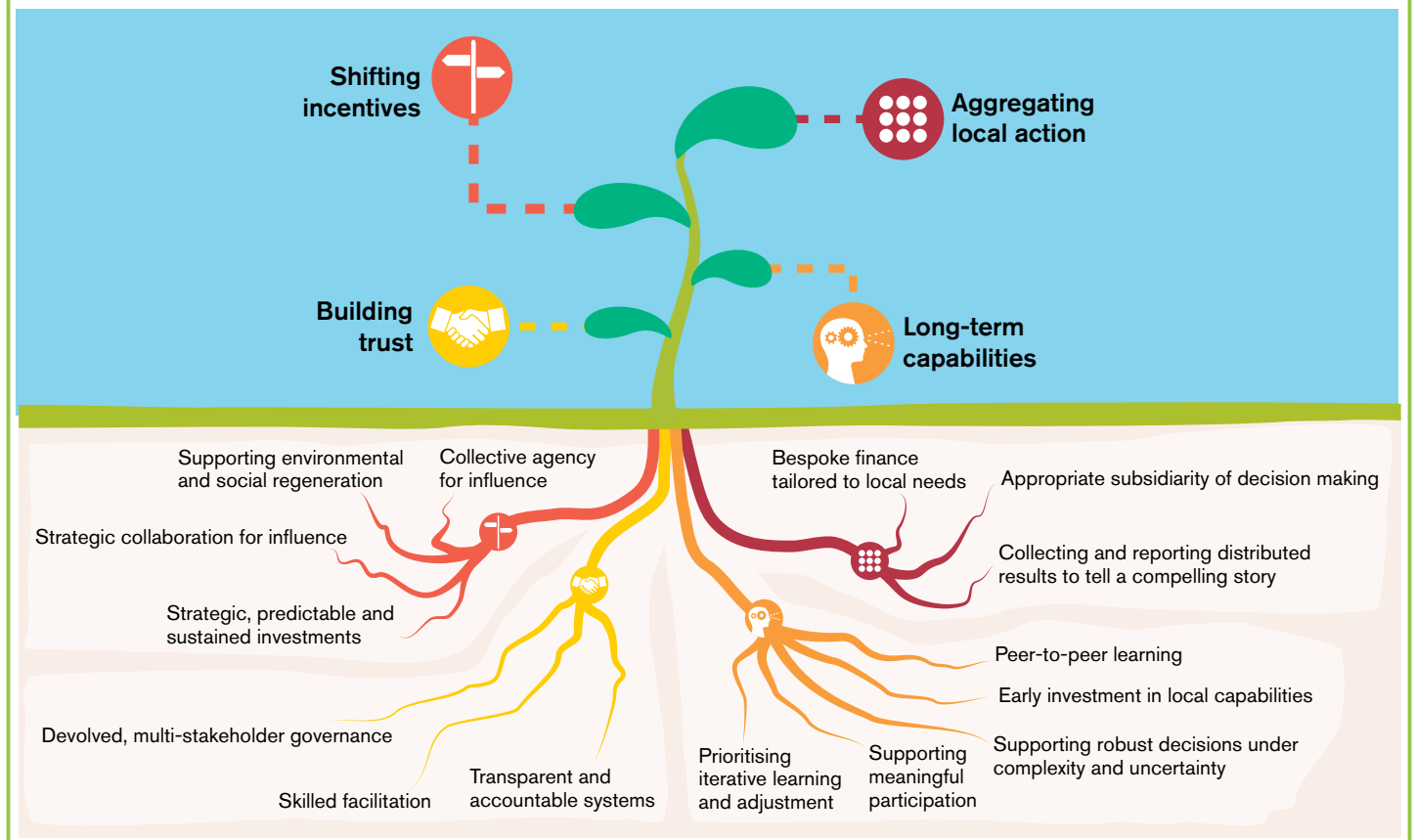
DLT can be coupled with 'smart' (self-executing) contracts, programmed to automatically enforce contractual conditions. For example, smart contracts can automatically and cheaply execute payments to many different recipients at once based on a range of triggers, including geotagged datasets, machine learning reviews of satellite data, or events recorded by communities on the ground; this removes the need for costly intermediaries. Smart contracts could also force institutions to seek permission from many community members to approve funding decisions and facilitate greater consultative behaviour from donors and investors while reducing corruption, all at a lower cost. DLT can change power dynamics by democratising decision making, enforcing transparency and enabling communities to monitor spending in real time.

Disberse is a fund-management platform using DLT's cost-effective, transparent and immutable trust characteristics to aggregate local action — in this case, humanitarian responses — and deliver development finance directly from donors to local actors. This reduces both the need for financial intermediaries and administration costs, as multiple currencies can be managed without bank charges or the risk of currency exchange fluctuations. Disberse aims to build a system capable of distributing US$50 million of donor funding directly to a network of 42 humanitarian agencies.

However, DLT faces technical hurdles before it will be ready for use at scale. A second challenge is dealing with the complexity of real-world situations, including local political economies and inequalities. These realities include a lack of good data (suggesting the need for regular review and appeal mechanisms) and the risk of reinforcing inequalities. To avoid the latter, DLT must incorporate or enhance, rather than supersede, existing local networks and be aware of unequal access to technology and limited tech literacy among men and women living in poverty.

As with all development interventions, it is vital that DLT approaches include feedback mechanisms and transparent accountability systems for both donors and communities; for example, digital contracts must be responsive to change or unforeseen circumstances.

Design and implementation

If designed and implemented effectively, tech innovations could help build a reimagined climate finance system by strengthening the building blocks for effective local finance (see Box 1). However, the four examples given earlier show that digital technologies must build on and inform local knowledge and experience, not undermine it. This will require meaningful community engagement in the co-production of digital technology applications and their shared governance. To be effective, funders of digital innovation must invest in local capabilities to understand and manipulate technologies, allowing people in marginalised communities to shape and take advantage of new technologies. It is especially important to validate the data and indicators underpinning new approaches, such as the algorithms within machine learning. Governments also need training and support to set regulations that ensure the application of digital technologies is ecologically sound and socially just.

Our 'Money where it matters' framework provides 15 good governance practices for local finance that tech developers, donors and aid agencies should embed into digital innovation (see Figure 1). By framing digital innovation in support of good governance, development contributors can address the unequal power dynamics within and between communities that entrench climate vulnerability. Digital solutions would then move us towards a climate finance system that enables local actors to tackle the triple challenge of poverty, environmental degradation and climate change. This innovation in digital tech could usefully start by strengthening mechanisms that already have strong track records of empowering communities to tackle the triple challenge, as they have sufficient experience in the governance of climate finance to innovate in supporting technologies. Examples of mechanisms include the Devolved Climate Funds in West and East Africa,[5] Slum Dwellers International's Urban Poor Fund and the Amazonian Babaçu and Dema Funds.[6]

There remains much to explore around the potential for and risks of using digital technologies to support a reimagined climate finance system. We look forward to continuing this thinking and dialogue with tech developers, donors, aid agencies and governments.

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Notes

[1] Soanes, M (2019) Financing local responses to poverty, climate and nature. IIED, London. https://pubs.iied.org/17711IIED / [2] www.weforum.org/agenda/2019/09/technology-global-goals-sustainable-development-sdgs / [3] www.esri.com/en-us/what-is-gis/overview / [4] www.adaconsortium.org/index.php/component/k2/item/333-resource-atlas-of-isiolo-county-kenya-community-based-mapping-of-pastoralist-resources-and-their-attributes / [5] DCF Alliance (2019) The devolved climate finance mechanisms: principles, implementation and lessons from four semi-arid countries. https://pubs.iied.org/G04424 / [6] Soanes, M, Shakya, C, Walnycki, A and Greene, S (2019) Money where it matters: designing funds for the frontier. IIED, London. https://pubs.iied.org/10199IIED

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