TWELVE

Unleashing Meaningful Breakthroughs

Ann Mei Chang

As Bitcoin prices spiked and speculation in cryptocurrencies reached new heights in 2017, the blockchain (the distributed ledger technology underlying Bitcoin) was riding its own hype cycle that permeated the far reaches of tackling global poverty. The World Bank established a Blockchain Lab; fifteen United Nations entities had blockchain initiatives; the U.S. Agency for International Development (USAID) published a primer; and it seemed as if just about every international NGO was looking for a way to join the party. The breathtaking possibilities seemed endless—whether supporting financial inclusion, improving access to energy, tracing supply chains, protecting the environment, providing legal identity, or improving aid effectiveness.

By 2018, the luster had already begun to wear off. A survey of forty-three widely publicized blockchain-based development pilots "found a proliferation of press releases, white papers, and persuasively written articles," but "no documentation or evidence of the results blockchain was purported to have achieved in these claims."[1] All too many organizations sought to incorporate blockchain into their projects to appear on the cutting edge. Yet, more often than not, they got bogged down with a still nascent technology that introduced unnecessary complexity when a simple database would do.

The lesson? Adopting technology for technology's sake can be a dangerous trap. At the same time, many of the breakthroughs that are desperately needed to reach the Sustainable Development Goals (SDGs) may, in fact, be enabled by frontier technologies. But if we are to realize that promise, we must employ

1. Burg, Murphy, and Pétraud.

proven design methodologies, consider older technological advances that have yet to reach billions who could benefit, and vastly increase financing for both the smart risk-taking and shared technology platforms that hold the potential to accelerate progress. The breakthrough we most need is a new approach to innovation, not yet another new technology.

Breaking through with Better Design

The tendency to herd toward frontier technologies is not new. As mobile phones proliferated across Africa earlier this century, so did the enthusiasm to harness these devices to improve health, education, agriculture, and beyond. In Uganda alone, dozens of mobile health (mHealth) pilots were deployed; for the most part, without regard to duplication of effort, integration with government systems, or a pathway to scale. The situation became such a drain on the health ministry that it took the unprecedented step of issuing a moratorium on further mHealth projects in 2012, so they could institute consistent policies and ensure better coordination.[2] Sadly, the global development landscape is littered with flashy tech solutions that never lived up to their promise. In a well-known example, Nicholas Negroponte's heralded One-Laptop-per-Child initiative garnered a lot of press when it launched in 2005, but never delivered on its goal to transform education and lift millions out of poverty. Costs were too high, elements of the design were impractical, tech support was nonexistent, and the practicalities of training teachers and incorporating devices into the classroom were ignored.[3]

It's tempting to believe these well documented examples are outliers, but the tendency toward the shiny and new versus the boring and pragmatic remains commonplace today. To quote Kentaro Toyamo, "Technology is never the main driver of social progress. Technology is only an amplifier of human conditions." After a decade of designing technologies for humanitarian causes, Toyama found that no technology, however dazzling, could drive social change on its own.[4] Many other luminaries in the technology for development arena, such as Tim Unwin, have drawn similar conclusions.[5] In other words, before we plow ahead and conclude that "there's an app for that," we must take the time to understand the context and concerns of the affected communities. Frontier technologies can only realize their potential if we stay grounded in real problems, have the humility to recognize and validate uncertainties, and design for the scale that will be needed from the start.

2. McCann.
3. Wooster.
4. Toyama.
5. Unwin.

An important mantra among entrepreneurs is to "fall in love with the problem, not the solution." Alas, given the pressures on global development practitioners to differentiate themselves and their organizations, there's been a tendency to look for quick wins that give the *perception* of being on the cutting edge rather than invest in the painstaking work of listening to affected communities, questioning assumptions, and continually learning and adapting to find a solution that works. Not surprisingly, this rarely results in meaningful impact that can be both scaled and sustained.

To address this and other predictable and preventable mistakes that have caused digitally enabled programs to fail over and over again, a community-driven effort codified learnings over the years to create the Principles for Digital Development in 2014.[6] These nine living guidelines have now been endorsed by over two hundred global development organizations and capture best practices for using information and communication technologies (ICT) in development projects, based on the practical experiences and learnings of hundreds of development practitioners. In 2015, the International Development Innovation Alliance (IDIA, a collaboration among leading global development donors and agencies) committed to six principles for innovation along similar lines.[7] They were later expanded to eight in 2018 and endorsed by the G7 as the Whistler Principles to Accelerate Innovation for Development Impact. These sets of principles represent an important start and articulate a consistent view on the best practices for innovation: user-centered design, the importance of understanding context, smart risk-taking, fast iteration, building for scale and sustainability, and collaboration. Unfortunately, when it comes to action, the sector still falls far short of its rhetoric.

If we are truly committed to accelerating progress toward the SDGs, we must start, first, by understanding the realities of the participants, communities, and ecosystems that will be affected, so that any solution is designed appropriately for the context. Second, it's important to approach any intervention with deep humility, be explicit about the risks, and validate our assumptions. Third, the most basic technologies can simplify data collection and enable us to more quickly learn, iterate, and adapt. Finally, initiatives should not start and end with a pilot. To move the needle meaningfully on the SDGs, we must design for scale and sustainability from the start.

6. Principles for Digital Development.
7. The International Development Innovation Alliance.

Understand Context

Perhaps the biggest source of failure for technology-based solutions in global development is simply a lack of understanding and appreciation for the local context—whether that be individual capacity, social norms, or community dynamics. Witness the innumerable attempts to set up computer labs that fall into disrepair, smartphone apps designed for people who do not have smartphones, and lauded inventions like the PlayPump (a children's merry-go-round that pumps water)[8] and Soccket (a soccer ball that generates electricity)[9] that were impractical and quickly fell into disuse.

To make matters worse, digital solutions may only serve to further marginalize millions of women. With the mobile internet usage gender gap at approximately 30 percent in developing countries, well-meaning digital resources can be out of reach and risk further entrenching existing inequities. Even efforts deliberately targeted at bringing women online have largely failed. Digital skills training can only go so far when areas in the Sahel and northern India ban women from using mobile phones outright. And for women living on under a dollar a day, initiatives to promote digital activism can seem disconnected from their realities.[10]

These and so many other instances where heady promises crashed into disappointing reality should serve as an important caution when deploying technology that will directly touch individuals and communities (in contrast to a disaster prediction system that is used by experts). Here, we must start with a deep understanding and appreciation of the context and underlying drivers of the problem we aim to address—through ethnographic research, social science, and a lot of listening. The first of the Principles for Digital Development, "design with the user" and human-centered design approaches, offer valuable guidance for cocreating with intended customers throughout the project lifecycle to ensure any technology is introduced in a way that truly enhances lives.

Test Assumptions

Even when the initial design is strongly rooted in the local culture and context, there is inherent uncertainty in any new intervention. This is where a healthy dose of humility is needed. One of the wonderful aspects of mission-driven work is the collegial and supportive environment, built on a sense of shared purpose. The downside is that mutual encouragement can quickly devolve into groupthink.

8. Stellar.
9. Starr.
10. Sterling.

Who has the heart to shoot down the plans of an enthusiastic coworker who has been working long hours and making financial sacrifices for the cause? Thus, it can take an intentional effort to take a step back, play devil's advocate, and ask the tough questions about what might go wrong. But doing so is necessary to surface risks, create a proactive learning agenda, and target lightweight experiments for validation before a larger investment is made.

The real needs of real people must come before any frontier technology, however exciting. Once we have gained a deep understanding of the problems and have identified a successful approach to drive change, technological advances hold unrivaled potential to reduce costs, increase reach, and improve targeting and analysis. For example, before investing in a digital agriculture solution, we might start by validating the key elements with an in-person service to confirm that recommended farming techniques are adopted, loans are repaid, and farm yields are increased. Based on these learnings, technologies such as mobile money and video tutorials could enable us to affordably reach a far wider audience with the proven practices. In contrast, many mobile-enabled agriculture apps have been launched with much hoopla, only to fall far short of the hoped-for adoption and impact.[11] Similarly, before driving massive publicity and investing large sums, a prototype PlayPump could have been placed in a village to observe whether children's natural play patterns would turn the roundabout enough cycles each day to generate the energy needed to pump a sufficient quantity of water for a village.

How we measure success matters. Most global development programs tend to focus on activities performed, such as the number of people reached, then hold implementers accountable for delivering to those numbers. In reality, providing digital skills training for a thousand women is not particularly meaningful if at the end they still cannot afford a data plan or are prohibited from accessing the internet at home. Instead, when testing new solutions, unit-level metrics (such as the adoption rate, engagement rate, retention rate, success rate, and unit costs) are a far more meaningful indicator of success. If we are using cryptocurrency to try and make cash transfers more secure, it matters less how many people received a deposit and matters more what percentage of them were able to easily access and use those funds. For more mature interventions, shifting measurements to focus on outcomes rather than activity better aligns the interests of all parties toward delivering more cost-effective results.

11. Emeana, Trenchard, and Dehnen-Schmutz.

Accelerate Progress

While digital development initiatives typically focus on how technology can be directly applied to improve lives, the potential to drive faster feedback loops for interventions of all stripes may, in aggregate, have an even more profound impact. Mobile-enabled digital tools can facilitate a near real-time two-way stream of communication to provide visibility into how a service is being received by those who use it, track operational data, and gather indicators of effectiveness. This data, in turn, can unleash the possibility for the rapid adaptation and improvement needed to amplify impact by responding to user needs, addressing service inefficiencies or disruptions, and continually optimizing to increase effectiveness.

In simplest form, pure Short Message Service (SMS) or Interactive Voice Response (IVR) systems can create a direct line to the people we aim to serve. Feedback can be solicited immediately to assess customer satisfaction, or even years later, as Harambee Youth Accelerator in South Africa does to keep their fingers on the pulse of the employment trajectory for their participating youth long after their direct engagement. Feedback systems can also be used to track broader trends, such as with UNICEF's U-Report, which surfaces the voices of over 10 million young people in sixty-eight countries to give policymakers insight into their opinions, concerns, and attitudes.[12] In Uganda, a study found that over half of U-Reporters interviewed saw at least some changes made in their district as a result.[13] Multiple platforms have emerged to facilitate such direct community engagement, including UNICEF's RapidPro (which powers U-Report), Ushahidi (based on open source software developed in Kenya), FrontlineSMS, CommCare, and Premise (which crowdsources data from a network of hundreds of thousands of people around the world).

More sophisticated smartphone apps, particularly in the hands of intermediaries such as agricultural extension workers, community health workers, or teachers, can both increase productivity and accelerate feedback. For example, the Smart Health app, developed by Living Goods and Medic Mobile, includes a clinical decision support system to help community health workers make consistent and accurate diagnoses and develop treatment plans. At the same time, patient health data is captured in digital form (enabling real-time monitoring of health worker performance) and integrated with government systems (providing immediate visibility into any concerning trends).

Given the constraints arising from lockdowns imposed during COVID-19, many development organizations were forced to rapidly transition from in-person and often paper-based monitoring to some form of digital data collection.

12. Rehman.
13. Peixoto and Sifry.

This not only enabled programs to continue operations, but also revealed that in many situations meaningful data can be gathered more quickly and at lower cost, digitally. As a result, these new tools will hopefully continue to persist in large degree far beyond the pandemic, expanding the timeliness, frequency, and accuracy of feedback from communities.

Design for Scale

Many of the frontier technologies discussed in this book hold the potential to unleash massive scale by expanding reach, improving targeting, and minimizing incremental costs. For example, a remedial lesson effectively delivered by a teacher could be designed to be accessed by thousands through an app without incurring the additional cost and logistics of in-person lessons. Artificial intelligence could further identify and target students most in need of an additional boost based on their grades and attendance. Of course, we must be cognizant that any technology-based intervention runs the risk of further exacerbating inequity if it leaves out poorer and more rural populations by requiring a smartphone or internet access to participate.

At the same time, technology projects themselves must be designed for scale and sustainability from the start if they hope to have a breakthrough effect. A case study of AloWeather, a CARE Vietnam project to provide SMS-based weather forecasts to ethnic minority farmers, is emblematic of the common challenges that arise. While the team was able to demonstrate a significant increase in crop yields compared to the control site in the first year, bringing this promising service to scale was another matter. Many challenges stemmed from the structure of development projects that emphasize predictable delivery over rapid iteration and program management over business acumen. The model itself was also too complex, with costs far exceeding any willingness to pay. Thus, despite its promise, it was discontinued after the initial grant money was depleted.[14] This is an all-too-common scenario that plays out across the development sector.

The constraints imposed on typical grant-funded projects are fundamentally at odds with the flexibility, appetite for risk, and long-term horizon that frontier technology projects need to thrive. More often than not, they encourage short-term deliverables that result in projects like AloWeather and the dozens of mHealth pilots in Uganda that do not have a clear path forward. The cost is huge, in both opportunities lost and the disruption that comes from upending vulnerable people's lives with new tools constantly popping in and out of existence.

14. Phẩm.

The Power of Twentieth-Century Solutions

Over seven hundred years ago, a new technology was invented that has been proven to increase productivity, sustain earning potential, and enhance learning—corrective eyeglasses. Yet an estimated 2.7 billion people who need glasses still do not have them. VisionSpring, a nonprofit social enterprise, was founded with a mission to bridge this gap. To date, it has distributed almost 7 million pairs of eyeglasses and estimates that each US$1 invested can unlock US$43 in income earning potential.[15]

There's a tendency in the global development industry to rush toward the next shiny new thing, in search of a silver bullet that will be transformative. Yet, many game-changing advances have, in fact, already been identified, piloted, and shown to be effective. Nevertheless, they have not reached the vast majority of those who stand to benefit. The long, hard slog of scaling best practices for what may seem like last-generation technology is simply not sexy. But, in many cases, it can be the most prudent investment to drive progress.

While frontier technologies may capture the imagination, it is often seemingly prosaic technologies from the twentieth century that, in fact, hold the most potential for improving the lives of the poorest and most vulnerable. The first and overarching goal for the SDGs is to end poverty in all its forms everywhere. Yet, for the over 700 million people—or 10 percent of the world's population—living in extreme poverty on less than US$1.90 a day,[16] even the most basic technologies may be out of reach. In rich countries like the United States, a new app may be the best way to reach people and improve lives. But in places such as the remote areas of rural Africa, a technology that stretches as far back as the late nineteenth century may, in fact, hold more power.

Advantage: Low-Tech

When the COVID-19 outbreak began spreading across the world, UNESCO turned to community radio to provide lifesaving information to remote and marginalized communities in Ethiopia. Local journalists were kept informed about the latest updates and safety tips through the community radio network, and, in turn, educated their communities.[17] Community radio turned out to be the most effective means of educating the public and reaching millions who would not otherwise have been informed. With the adult literacy rate in Ethiopia estimated

15. VisionSpring.
16. World Bank Group (2020), figure 1.4.
17. UNESCO.

at just over 50 percent,[18] written messaging, whether traditional or digital, would have significantly limited reach and comprehension. The ability to broadcast in over thirty local languages through the voices of known and trusted community members made this channel particularly effective.

Despite the proliferation of digital technologies over the past decade, radio remains "by far the dominant mass medium in Africa."[19] Beyond moments of crisis, community radio has been successfully leveraged by numerous organizations as a channel to expand education, dispel dangerous rumors, empower women, discuss health issues, share farming techniques, and beyond—in a format that is broadly accessible to all.[20] Efforts to transform the lives of the most vulnerable must consider the real limitations and constraints of both individuals and infrastructure, which can often point toward low-tech options such as radio, TV, or voice calls.

Long-standing does not necessarily mean staid. Although radio broadcasting has been around for over a century, organizations like Farm Radio International are continuing to innovate with both new programming formats to better engage key audiences and multimodal services that leverage mobile phones to create a two-way communication channel. And traditional technologies can be combined with new advances to bring together the advantages of each. For example, to support households affected by COVID-19, GiveDirectly worked with the government of Togo to get the message out through radio broadcasts, enable signups via SMS, and target aid to the poorest recipients using machine learning analysis of satellite photos and cellphone data.[21]

The Explosion of Mobile Devices

Around the turn of the twenty-first century, mobile phones began to proliferate exponentially across developing countries. As of 2016, even among the poorest 20 percent of households, nearly 70 percent had a mobile phone—more than those who had toilets, clean water, or electricity.[22] This simple device continues to offer an unprecedented opportunity to directly reach the poorest and most disadvantaged with valuable information and services.

IVR, SMS, and Unstructured Supplementary Service Data (USSD) are available on even the most basic feature phones as channels for communications. While SMS campaigns may seem simpler and, in some cases, cheaper, IVR can

18. UNESCO Institute of Statistics.
19. Madomombe.
20. Ibid.
21. Simonite.
22. World Bank Group (2016), figure O.4.

hold substantial advantages when attempting to reach the most marginalized populations. To start, with literacy rates in the least developed countries estimated at under 70 percent,[23] text-based messages can leave out many of those in need, particularly women and girls. An audio format also allows for richer, more engaging messages, including music, intonation, and multiple voices. And, for two-way interactive services, studies have shown a higher overall response rate and lower cost per interaction for IVR compared to SMS.[24]

Numerous services have shown they can make a meaningful difference across most of the SDGs by leveraging basic feature phone technologies. Some examples include agriculture (SDG 2), where SMS and IVR have been shown to be effective as a more scalable way to improve fertilizer usage, relieving the pressure on overburdened agricultural extension workers.[25] In health (SDG 3), MomConnect has been integrated into South Africa's healthcare system and reaches over 3 million women, with participants more likely to participate in antenatal visits, postnatal visits, and recommended vaccinations.[26, 27] In education (SDG 4), Eneza Education supplements government curriculum with SMS-based access to tutorials, quizzes, and support from teachers—with students scoring 22 percent higher on national tests.[28] VIAMO's Calling All Women program is using IVR to improve digital and financial literacy for women (SDG 5) in Tanzania and Pakistan.[29] The list goes on. Yet, despite low costs, high accessibility, and evidence of impact, most reach only a small fraction of those who stand to benefit. Investments to scale such simple but effective solutions through broader government adoption or sustainable business models could likely make a bigger difference than launching yet another pilot based on cutting-edge technology that may be expensive, unproven, and difficult to access.

Expanding Internet Access

The COVID-19 pandemic shone a light on how crucial internet access has become in the digital age. During lockdowns, those who were not online were shut out from participation in online education, virtual work, telehealth, and the digital economy. The internet is no longer a luxury, and has become as essential to a thriving community as food, water, energy, healthcare, and education.

23. World Health Organization.
24. Hortinela.
25. Singh, Jalote, and Adlakha.
26. Coleman and others.
27. 1 World Connected.
28. Dalal.
29. USAID.

Expanding connectivity will not only help lift households out of poverty, but also drive economic growth. Progress toward nearly all of the SDGs could be significantly boosted by connecting far more of the global population.

Although the internet first came to life in 1983, it has yet to reach 40 percent of the world's population. This gap is by far the greatest in Africa, with an estimated 60 percent of the population still unconnected as of 2020.[30] A disproportionate number of the unconnected are poor, rural, women, or all of the above. The gender gap in mobile internet usage is 51 percent in South Asia and 37 percent in Sub-Saharan Africa.[31] For already marginalized populations, being cut off from the digital world only further exacerbates existing inequities.

While many of the most prominent initiatives to bridge the digital divide have focused on building new infrastructure to expand last-mile connectivity, the reality is that approximately 85 percent of the world's population is already covered by existing broadband networks.[32] Expanding coverage remains important, but the larger barrier is a "usage gap" driven by a lack of affordability, digital literacy, and relevant content. Addressing these gaps also happens to be far less expensive than digging trenches, laying cables, and erecting cellular towers.

Across Africa, 1 GB of data costs 7.12 percent of the average monthly salary.[33] While internet access has become increasingly affordable, in many low- and middle-income countries costs remain artificially inflated. This is often a result of poor policies and regulations that have allowed rent-seeking behavior due to weak market competition at various stages of service delivery. Other inefficiencies, such as limited sharing of infrastructure among telecom providers, result in higher than necessary operating costs. Encouraging host country governments to create a conducive enabling environment can make this foundational technology more accessible to all.

Beyond the supply side, weak demand is also a significant and underattended factor that limits connectivity. Those who are functionally illiterate or lack basic digital skills are unable to make effective use of many online resources, even where coverage exists. While numerous aid projects, including by tech corporations, have offered various training programs, they have generally amounted to subscale one-offs that are tackling an important need but reaching only a tiny fraction of the population. Digital literacy should be treated more holistically, in line with basic literacy, as part of the core education system. Finally, ability makes usage possible, but relevancy drives it. Content must be accessible and

30. Internet World Stats.
31. GSMA Connected Women.
32. International Telecommunications Union.
33. Alliance for Affordable Internet.

compelling, available in local languages, including local businesses and events, covering local news and interests. Despite well-meaning programs that aim to engage the unconnected with development-related content on health, education, or agriculture, it is social media platforms (such as WhatsApp, Facebook, and YouTube) that are by far the most powerful forces driving people online. No different from the historical trends for internet adoption in high-income countries, it is the core human desire to connect and be entertained that is, in fact, the most compelling "killer app."

Financing Breakthroughs

Funders—whether bilateral/multilateral aid agencies, foundations, impact investors, or governments themselves—play an outsized role in creating the incentives for what and how investments are made in global development. Their collective desire for immediate, tangible results can favor proven end-solutions over more ambitious innovations or invisible enabling infrastructure. Yet, given their potential to reward smart risk-taking as well as invest in public goods that can smooth the introduction of new technologies, donors are in a unique position to fuel breakthroughs.

Incentivize Smart Risks

To fully unleash the promise of frontier technologies for sustainable development, new funding mechanisms and modalities are needed. While the detailed designs, workplans, and budgets required by traditional grants are effective at ensuring predictability and compliance for well-understood interventions in a stable environment, they are simply not fit for purpose when seeking breakthroughs—which, by definition, requires stepping into the unknown. In fact, such funding encourages quick and shallow wins that are unlikely to meaningfully move the needle on the SDGs. The only way to potentially bridge the huge gaps that remain is with bolder, more ambitious efforts that will inherently entail some risk.

Effective funding for breakthroughs should do three things: encourage smart risk-taking, provide abundant flexibility to learn and adapt, and incentivize delivery of outsized results. At the USAID Global Development Lab, we piloted several grant mechanisms along these lines. Prize awards, such as the DESAL Prize and the Global LEAP Off-Grid Refrigerator Competition, specify predetermined performance criteria for a desired advancement. The incentive to explore beyond the limitations of existing solutions is a perfect opening to consider frontier technologies. Similarly, challenge competitions shine a light more broadly on

one or more areas of need in search of better solutions. To date, USAID and its partners have launched ten Grand Challenges for Development on issues ranging from education and agriculture to combating Ebola and Zika. Another approach to manage risk and reward success is tiered, evidence-based funding. Modeled after venture capital, Development Innovation Ventures (DIV) was envisioned by Nobel laureate Michael Kremer as a way to test and scale breakthrough solutions for global poverty.

The first organization to receive all three award tiers from DIV was Off Grid Electric (now ZOLA Electric), a home solar company in Tanzania that was among the pioneers of a pay-as-you-go business model powered by mobile money. An initial US$100,000 grant fueled its early tests of this innovative, and as yet unproven approach and technology. After successfully validating their model, a second-tier grant of US$1 million helped Zola build the infrastructure required to become fully operational. Finally, a US$5 million grant enabled it to scale by catalyzing US$40 million in private debt to serve as working capital. Where a traditional development program might have simply distributed a limited number of solar panels to those in need, the innovation-oriented nature of the DIV awards resulted in a valuable technological advance along with a sustainable and scalable business model. A 2020 survey of the burgeoning off-grid energy sector found that 88 percent of customers reported a positive difference in their families' lives, 20 percent have been able to generate additional income, and the overall use of polluting and dangerous fuels such as kerosene has dropped.[34]

The Tragedy of the Commons

In order for technological advances to fully realize their potential to address development challenges, investments are needed not only in the solutions themselves, but also the underlying infrastructure and platforms that can accelerate their development and adoption. Witness the breathtaking pace of progress in Silicon Valley, which is built on the back of powerful platforms that make creating a new, innovative solution far, far easier. Android and iOS include rich toolkits upon which a mobile app can be easily built. Facebook's social graph allows a new offering to plug into a thriving community. Google Maps powers many location-based services. And, with Amazon Web Services, a startup no longer has to set up and manage their own server cluster. The presence of such robust building blocks has lowered the barrier to entry for innovation and unleashed creativity by empowering anyone with a promising idea to spend the vast majority of time creating their unique value add, and a relatively small amount building

34. Harrison and others.

the underlying scaffolding. On top of that, market forces in the ecosystem are aligned with these benefits, richly rewarding successful platform providers.

In contrast, the vast majority of investments in digital development have been focused on building end-to-end solutions rather than enabling platforms. Donors and developers alike are motivated to seek immediate and tangible benefit to real people that will result in compelling stories of lives changed. Abstract concepts like "enabling infrastructure" generate neither financial returns nor easily attributable impact. To make matters worse, there is little incentive to build on top of the platforms that do exist—less work means a smaller grant and less overhead to keep the doors open. The result is that many technology-based projects end up spending much of their effort reinventing the wheel and only a small amount on their unique value add. The duplication of effort is astounding. In one major funder's recent call for proposals related to digital inclusion, half of the applications suggested building a custom IVR system as part of their program. When so much of the investment in frontier technologies is duplicative, the overall pace of progress suffers.

Prioritizing public goods is a challenge across the development sector, but holds particularly powerful upsides when it comes to technology. For instance, in 2002, a U.K. Department for International Development (DFID) £1 million matching grant led to the creation of M-Pesa, a mobile money service that now reaches 96 percent of households in Kenya. M-Pesa also underpins numerous transformative services such as low-cost digital savings, loans, insurance, and pay-as-you-go solar. Another powerful example is India's Aadhaar program, the world's largest biometric digital identity system, which has enrolled over 99 percent of the adult population. The existence of a unique ID has enabled many participants to access basic banking for the first time, companies and nonprofit organizations to roll out a vast array of new innovations, and the government to save over US$10 billion through better targeting and reduced waste.[35] Alas, these frequently cited platforms are the exception, not the rule.

We will be better positioned to capitalize on breakthroughs if collaboration and the commons are prioritized—particularly by funders. In recognition of this need, a number of major institutional donors came together to launch the Digital Impact Alliance (DIAL) in 2015. It has gone on to invest in open-source platforms, disseminating best practices, and research into burgeoning fields such as data analytics, responsible data, and innovative finance. Far greater investments in both developing and utilizing common infrastructure, platforms, and toolkits will be needed to lay the groundwork to unleash the potential of technology for development.

35. Perrigo.

Conclusion

The enormous potential for technology to accelerate our progress toward achieving the Sustainable Development Goals is indisputable. Technology is a powerful amplifier that can unlock impact, insights, and far greater reach. However, to achieve more meaningful breakthroughs, we need to focus more on the "how" than the "what," and avoid deploying the latest technology for technology's sake. This requires a shift in approach by both solution providers and funders to utilize sound design methodologies, leverage appropriate technology whether old or new, and take smart risks to seek out the transformative breakthroughs that are needed while remaining humble to the inherent uncertainties. Given the significant gap that remains between our current trajectory and our goals for 2030, we must quickly move beyond both traditional interventions and the hype of frontier technologies if we are to succeed in delivering real change.

References

1 World Connected. 2020. "MomConnect," September 1, http://1worldconnected.org/project/africa_health_momconnectsouthafrica/.

Alliance for Affordable Internet. 2019. *2019 Affordability Report*. http://a4ai.org/affordability-report/report/2019/.

Burg, John, Christine Murphy, and Jean Paul Pétraud. 2018. "Blockchain for International Development: Using a Learning Agenda to Address Knowledge Gaps," MERL Tech, September 7, 2018, http://merltech.org/blockchain-for-international-development-using-a-learning-agenda-to-address-knowledge-gaps/.

Coleman, Jesse, and others. 2020. "Evaluating the Effect of Maternal mHealth Text Messages on Uptake of Maternal and Child Health Care Services in South Africa: A Multicentre Cohort Intervention Study." *Reproductive Health,* vol. 17, no. 1, 160.

Dalal, Ami. 2019. "Why We Invested: Eneza Education," FINCA Ventures, March 18, https://medium.com/finca-ventures/why-we-invested-eneza-education-2089a9db4d43.

Emeana, Ezinne M., Liz Trenchard, and Katharina Dehnen-Schmutz. 2020. "The Revolution of Mobile Phone-Enabled Services for Agricultural Development (m-Agri Services) in Africa: The Challenges for Sustainability." *Sustainability,* vol. 12, no. 2, 485.

GSMA Connected Women. 2020. *The Mobile Gender Gap Report 2020*, GSM Association.

Harrison, Kat and others. 2020. "Why Off-Grid Energy Matters," 60 Decibels, February, https://60decibels.com/user/pages/energy-report/60%20Decibels%20-%20Why%20Off-Grid%20Energy%20Matters.pdf.

Hortinela, Christine. 2017. "Comparing the Benefits of Automated Phone Calls (IVR) versus SMS Campaigns," engageSpark blog, May 22, www.engagespark.com/blog/blogcomparing-benefits-automated-phone-calls-ivr-versus-sms-campaigns/.

International Development Innovation Alliance (IDIA). 2019. *Development Innovation Principles in Practice*. Report.
International Telecommunications Union. 2020. "Connecting Humanity: Assessing Investment Needs of Connecting Humanity to the Internet by 2030." ITU Publications.
Internet World Stats. 2021. www.internetworldstats.com/stats1.htm.
Madomombe, Itai. 2005. "Community Radio: A Voice for the Poor," Africa Renewal, July, www.un.org/africarenewal/magazine/july-2005/community-radio-voice-poor.
McCann, David. 2012. "A Ugandan mHealth Moratorium Is a Good Thing," ICTworks, February 22, www.ictworks.org/ugandan-mhealth-moratorium-good-thing/.
Peixoto, Tiago, and Micha L. Sifry. 2017. *Civic Tech in the Global South.* Washington, D.C.: World Bank and Personal Democracy Press.
Perrigo, Billy. 2018. "India Has Been Collecting Eye Scans and Fingerprint Records from Every Citizen. Here's What to Know," *TIME*, September 28.
Phẩm, Ấn. 2020. "Scale, Design, and Follow Through: Lessons on Moving from a Development Project to a Business in Vietnam's AloWeather Project," CARE International in Vietnam, www.care.org.vn/project/scale-design-and-follow-through-lessons-on-moving-from-a-development-project-to-a-business-in-vietnams-aloweather-project/.
Principles for Digital Development. 2017. http://digitalprinciples.org/.
Rehman, Hira Hafeez ur. 2020. "UNICEF's U-Report Reaches 10 Million Young People," UNICEF, March 27, www.unicef.org/innovation/stories/unicefs-u-report-reaches-10-million-young-people.
Simonite, Tom. 2020. "A Clever Strategy to Distribute COVID Aid—With Satellite Data," *Wired*, December 17.
Singh, Rupika, Sumedha Jalote, and Raghav Adlakha. 2019. "When Is the Best Time to Send IVR and SMS Messages to Farmers?" ICTworks, July 24, www.ictworks.org/send-ivr-sms-messages-farmers/.
Starr, Michelle. 2014. "Power-Generating Soccer Ball Fails Dismally," CNet, April 22, www.cnet.com/news/power-generating-soccer-ball-fails-dismally/.
Stellar, Daniel. 2010. "The PlayPump: What Went Wrong?" State of the Planet (Earth Institute, Columbia University), July 1, https://blogs.ei.columbia.edu/2010/07/01/the-playpump-what-went-wrong/.
Sterling, S. Revi. 2020. "Global Broadband and Innovations Alliance What's Next," NetHope, September, https://solutionscenter.nethope.org/assets/collaterals/Whats_Next_-_Closing_the_Gender_Digital_Divide.pdf.
Toyama, Kentaro. 2015. *Geek Heresy: Rescuing Social Change from the Cult of Technology*. PublicAffairs.
UNESCO. 2020. "Fostering Access to Health Information on COVID 19 through Community Radio," September 21, https://en.unesco.org/news/fostering-access-health-information-covid-19-through-community-radio.
UNESCO Institute of Statistics. 2021. http://uis.unesco.org/en/country/et.
Unwin, Tim. 2017. *Reclaiming Information and Communication Technologies for Development.* Oxford University Press.
USAID. 2020. "Viamo," February 12, www.usaid.gov/wcc/round-1/viamo.
VisionSpring. 2021. http://visionspring.org/why-eyeglasses.

Wooster, Martin Morse. 2018. "The Spectacular Failure of One Laptop Per Child," *Philanthropy Daily*, May 24.
World Bank Group. 2020. *Reversals of Fortune*. Poverty and Shared Prosperity.
———. 2016. *Digital Dividends*. World Development Report.
World Health Organization. 2017. *Least Developed Countries Health and WHO: Country Presence Profile*.