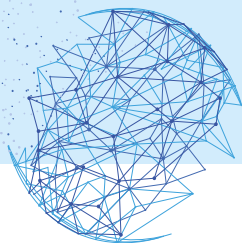


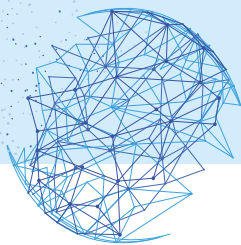
Venture into the future of giving: The potential of emerging technologies in the giving sector





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About this report

This report presents the key findings of a research programme on the potential impact of ten emerging technologies in the giving sector. The analysis and content of this report was finalised in May 2019. The research programme was undertaken by The Economist Intelligence Unit (The EIU) and supported financially by the Bill & Melinda Gates Foundation. The views and opinions expressed in this publication are those of The EIU and do not necessarily reflect the position of the Bill & Melinda Gates Foundation.

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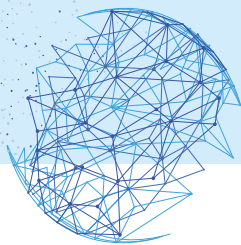
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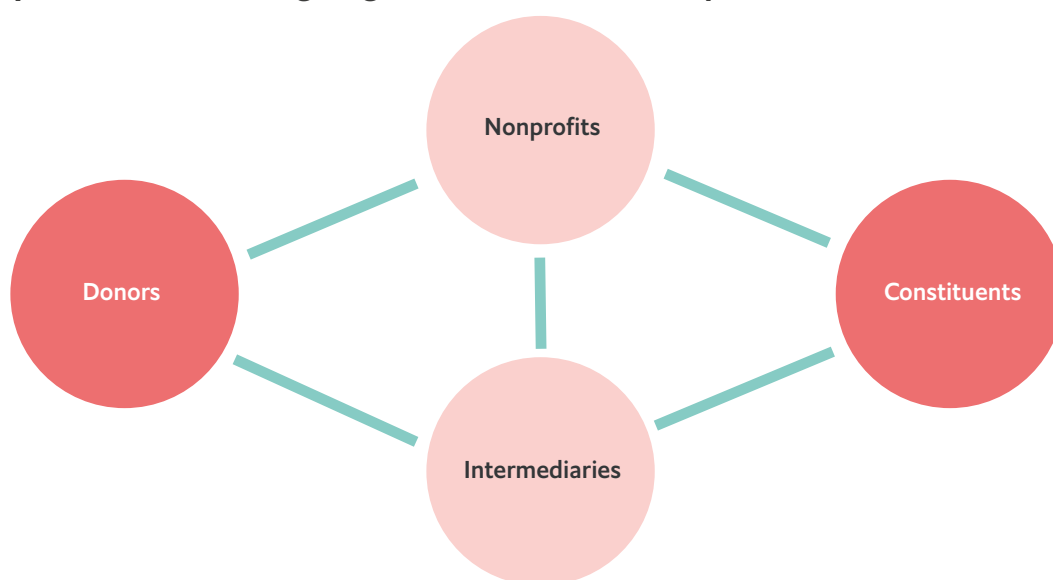
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Executive summary

Over the last two decades, philanthropy—the act of giving—has become a pillar of international development assistance, bringing financial capital, skills, innovation and thematic diversity to help address the most pressing challenges facing our world. Yet philanthropy is just one part of the overall *giving sector*. In this report, the giving sector is defined as the space where philanthropic donors, intermediaries such as giving platforms and donor-advised funds (DAFs), and the organisations that lead project execution (primarily nonprofits) interact.

Figure 1.
Key stakeholders in the giving sector and feedback loops from constituents



Note. For the purpose of this study we will not focus on the donor to constituent (P2P) solutions and assume certain intermediation
Source: Authors' analysis.

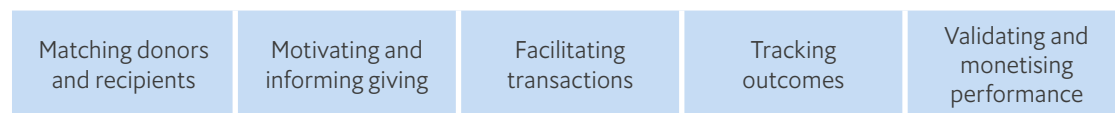
Within the giving sector, donors, intermediaries and implementing organisations operate in a complex *global giving supply chain*, which encompasses a wide variety of stakeholders including corporations, academic institutions, watchdogs and governments, among others. Each participant in the supply chain faces both unique challenges and challenges that are common across the sector. For the purposes of this report, we focus on three of the sector's most noteworthy shared challenges:

1) building and sustaining trust, 2) increasing efficiency, and 3) measuring and maximising impact.

The giving sector has a demonstrated capacity to embrace change and innovation. It is therefore important to ask whether and how the giving sector might address these three shared challenges through the use of Fourth Industrial Revolution technologies such as artificial intelligence (AI), blockchain and the Internet of Things (IoT). These technologies



Figure 2.
Key links in the global giving chain



have the potential to help the giving sector tackle problems such as high transaction costs, donor engagement costs, financial sustainability and accountability. However, it is unclear how actively stakeholders—donors, intermediaries and nonprofits—are using these new emerging technologies in the five key links of the global giving supply chain we explore: Matching donors and recipients; Motivating and informing giving; Facilitating transactions; Tracking outcomes; Validating performance.

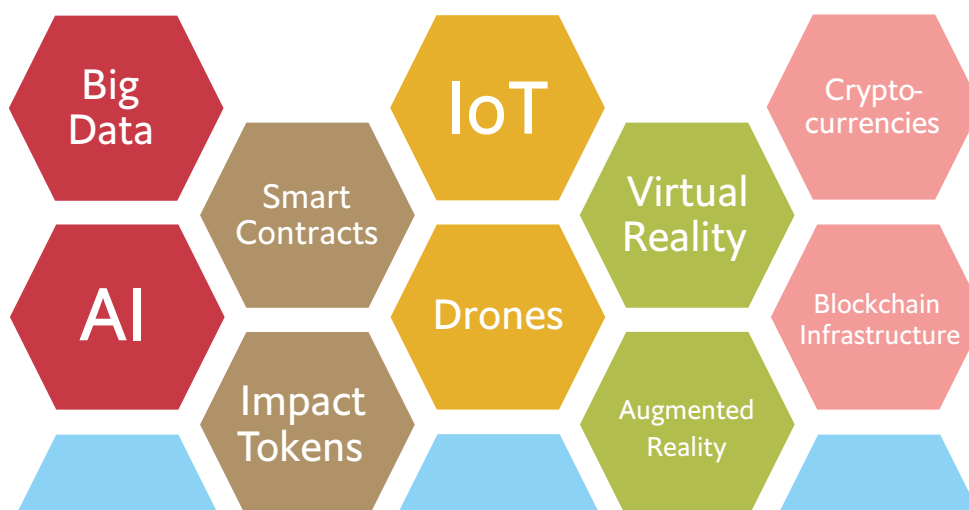
Seeking answers, the Bill & Melinda Gates Foundation commissioned The Economist Intelligence Unit (The EIU) to conduct a study

of emerging technologies in the giving sector, examining current applications, opportunities and potential challenges.

Key findings

There are ten key emerging technology applications that have the potential to enhance the workings of the giving supply chain: **big data, AI analytics, virtual reality (VR), augmented reality (AR), cryptocurrencies, blockchain payment infrastructure, the IoT, drones, smart contracts and impact tokens.** All of these applications are powered by four

Figure 3.
Ten key emerging technology applications that have the potential to enhance the workings of the giving supply chain



Source: Authors' analysis.

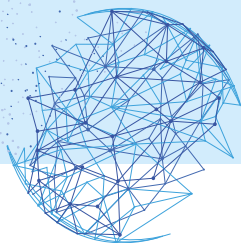


Figure 4.
Technologies in the giving chain

Links in the giving supply chain	Matching donors and recipients	Motivating and informing giving	Facilitating transactions	Tracking outcomes	Validating and monetising performance
Technology applications	Big Data and AI analytics	Virtual Reality and Augmented Reality	Cryptocurrencies and Blockchain	Internet of Things and Drones	Smart Contracts and Tokens

core technologies: AI, virtual intelligence (VI), blockchain and the IoT.

These technologies can be applied to five key links in the giving supply chain: **matching donors and recipients, motivating and informing giving, facilitating transactions, tracking outcomes and validating performance.**

Matching donors and recipients

Big data and AI analytics have the potential to improve the efficiency of donor-recipient matching, but privacy and ethical concerns, as well as high costs, may be barriers.

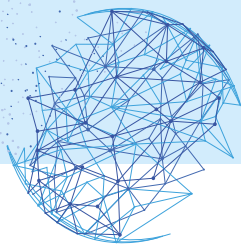
Today's donors are faced with a wide array of causes and implementing organisations that need their support. However, this has not led to greater alignment between donor preferences and their donations, partly because donors often lack full information about their options. From the perspectives of nonprofits and intermediaries, information about donors is also incomplete. Efforts to match donors with nonprofits and intermediaries can be improved by applying big data and AI analytics to structured data such as historical donor transactions, unstructured data such as social media and search engine content, and web-scraping tools. AI is the technology with the greatest *potential for reinvention*, having been successfully commercialised and used profitably in a wide variety of industries. However, the

benefits of AI must be balanced against its risks, which mainly relate to privacy issues and “data hygiene”, including biases and faulty predictive models. Partnering with the right provider is key to the successful implementation of AI analytics. While the technology itself is relatively inexpensive, the overall service cost rises after taking into consideration the costs of providers’ technical and legal expertise. For this reason, successful implementation and scaling of this technology in the giving sector might require similar organisations to pool their resources to purchase services from qualified providers and create shared databases.

Motivating and informing giving

Virtual reality and augmented reality can motivate and inform giving by generating empathy among donors, helping them to better understand the future, and reinforcing behavioural change. However, their track record must be balanced against the risk of abuse and donor deception.

Donors need to feel that their donations are making a genuine impact. Immersive VR experiences can help people to visualise how their donations might change future outcomes, which could in turn encourage them to donate in the present. Indeed, there is already evidence (albeit limited) that VR can increase the effectiveness of fundraising. Portable AR experiences, meanwhile, can help to reinforce behavioural changes over time, such as reducing



carbon emissions. The cost of producing lower-end VR experiences has already fallen, thanks to the production of commercial video games and VR headsets. However, fully immersive, high-end experiences remain expensive and impractical. To optimise the use of AR and VR, stakeholders must be mindful of unethical behaviours and take into consideration existing challenges facing the sector, including the use of extreme poverty imagery, which can be offensive to intended beneficiaries.

Facilitating transactions

Although cryptocurrencies have become an emerging source of funds for nonprofits, the more sustainable, long-term impacts of blockchain technology are likely to be reduced cross-border settlement transaction costs and increased interoperability. Cryptocurrencies have already entered the nonprofit sector as crypto investors seek to donate their newly acquired wealth. However, crypto donations introduce important risks. For example, it is hard to verify the origins of these virtual currencies, which increases the risk of money laundering and makes it harder to cash donations in and out. Blockchain shows more promise in facilitating regulated financial transactions. Giving and payment systems can be fragmented globally and across regions, which makes it difficult for donors to give. It can also be challenging for nonprofits and individual recipients to verify their legitimacy to banks, particularly in conflict zones or very low-income geographies. Emerging financial institutions are using blockchain to address both of these concerns, creating a global system that stitches together disparate networks. As regulatory hurdles are cleared, blockchain-based payment systems should achieve the scale necessary to lower

costs, which could have a significant impact on the giving sector. Blockchain payment infrastructure may also support the growth of specialised niche financial institutions focused on the nonprofit sector, once scalability and regulatory challenges are addressed.

Tracking outcomes

The IoT and drones can increase the efficiency and scale of output and project monitoring, but some technological challenges may prove overwhelming for smaller organisations. Current labour-intensive data collection methods make project monitoring a slow and costly process, affecting the feedback offered to donors. Organisations around the world are already using automation tools like the IoT and drones to improve their processes for monitoring programme outcomes. For instance, IoT sensors can capture carbon emissions reductions or measure outputs invisible to the human eye, such as the density of insect life. Drones—which have become crucial for work in the environmental space—can also monitor impact in places that humans cannot easily reach. However, the effectiveness of these technologies is highly dependent on a clear understanding of specific terrain characteristics, presenting challenges to both scaling and replication. IoT systems can also be complex to build or acquire. These technologies hold particular promise in areas such as environmental monitoring. Our research suggests that pairing data collection tools with more efficient verification systems such as tokens could help to unlock the full potential of these technologies.



Validating performance

Smart contracts and impact tokens can theoretically offer donors a more accurate, transparent, philanthropic “return on investment”, but there are numerous risks, including technological and regulatory challenges, as well as potentially harmful sector distortions resulting from a clinical focus on outcomes. Smart contracts can give donors control over how and when their money is spent, and can help to increase transparency in the impact verification process by creating permanent, public, tamper-proof records of impact metrics. Impact tokens can also have a direct impact on donors’ experience by providing them with certified proof of impact for their donations, opening up impact fundraising to individual donors. However, these technologies are difficult to develop and require significant technical expertise, as well as regulatory oversight to protect against abuse. A deeper concern is that any large-scale focus on outcome-based payments could weaken nonprofits’ ability to fund long-term projects as they veer towards quick wins, project-based work (as opposed to general support) and easier-to-solve social issues.

While this study focuses on the giving sector in China, India and the United States, our research highlighted that innovation is occurring across the globe, from European countries like the United Kingdom, Switzerland, the Netherlands and Finland to African countries like Kenya, Nigeria and Rwanda. The structured analysis of technologies undertaken in this study seeks to provide a guide for groups that are willing to experiment and invest to support the growth of the giving sector’s contribution to economic and social development. While no single technology can overcome all the challenges inherent to the

giving process, our research found that smart investment in appropriate solutions can help to build and sustain trust among stakeholders, increase resource efficiency, and measure and maximise the impact of giving.

Introduction



Over the last two decades, philanthropy—the act of giving—has become a pillar of international development assistance, bringing financial capital, skills, innovation and thematic diversity to help address the most pressing challenges facing our world. It has also assumed a critical role in helping countries achieve their Sustainable Development Goals (SDGs) by 2030, the social and economic targets agreed at the United Nations (UN) Summit in 2015.¹ However, philanthropy is just one component of a much broader *giving sector*, where philanthropic donors, intermediaries such as giving platforms and donor-advised funds (DAFs), and the implementing organisations that lead project execution (primarily nonprofits) interact.

The growth of philanthropy has been driven by multiple related trends, including rising wealth in emerging economies, a new generation of donors with fresh ideas and perspectives, and the power of new technologies. In China, India and the United States—the three major economies examined in this report—the dynamics of giving are also changing quickly. In China, the giving sector is relatively new but is growing fast. The number of family foundations has tripled over the past eight years, and aggregate individual donations are increasing at a rapid pace (with 74% annual growth in 2016).² Giving is dominated by corporate donors and public foundations, but the integration of giving opportunities on platforms such as Tencent Charity, Taobao and Ant Financial has rapidly increased the number of individual donors, transforming the charitable landscape.

India has a long history of philanthropic giving but the formal giving infrastructure—which includes registered nonprofits and intermediaries—is underdeveloped.³ According to CAF India's annual Giving India survey, 72% of people report that they have given money to charity in the past 12 months.⁴ There is a strong tradition of informal giving, which is largely donated in cash to religious and community circles.⁵ India has the highest number of people donating money in the world (191 million people) and digital channels but a recent study estimates that about

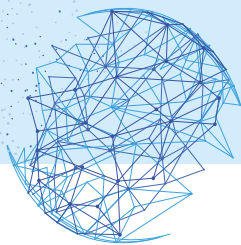
1 Council on Foundations. 2016. "From Global Goals to Local Impact: How Philanthropy Can Help Achieve the U.N. Sustainable Development Goals". [<https://www.cof.org/sites/default/files/documents/files/Global-Goals-Local-Impact-SDGs-and-Philanthropy-2016.pdf>].

2 China Global Philanthropy Institute. 2016. "Analysis Report on Top 100 Philanthropic Families". [http://en.cgpi.org.cn/content/details64_903.html].

3 Srinath, Ingrith. Director at the Centre for Social Impact and Philanthropy in Ashoka University. 14 December 2018.

4 CAF India. 2019. "India Giving" [https://www.cafonline.org/docs/default-source/about-us-publications/caf-india-report-2019.pdf?sfvrsn=1e39b40_0].

5 Sattva. 2019. "Everyday Giving in India Report" [https://archive.rohininilekani.org/wp-content/uploads/2019/05/RNP_Sattva_EverydayGivinginIndiaReport_Full-report.pdf].



90% of that money is distributed through informal channels.⁶ However new digital channels like #GivingTuesdayIndia and Daan Utsav have grown significantly in the last two years.⁷ The formal giving sector is also growing, thanks to donations from philanthropists and family foundations. Giving from individual philanthropists increased by 44% between 2011 and 2016.⁸

The United States has the largest and one of the most mature giving sectors in the world. According to a recent survey, 90% of high-net-worth donors give to charity, which has kept total donations on an upward trajectory. However, although overall philanthropy has grown, Giving USA (the longest running, most comprehensive report on philanthropy in the country) notes that the total number of households that give has declined in recent years. This suggests that philanthropy is increasingly concentrated among the wealthier segments of society.⁹

Across all three countries, the giving sector is also becoming increasingly globalised, with donors and recipients often located all over the world. As a result, donors, intermediaries and implementing organisations operate in a complex *global giving supply chain*. Within this supply chain, each participant faces both unique challenges and challenges that are common across the sector. Among these shared challenges, three are particularly noteworthy:

- **Building and sustaining trust.** Donors want to know that their contributions will be spent wisely and will have an impact. Trust must flow from donors to intermediaries, and especially to the implementing organisations on the ground, which usually possess the necessary know-how and local knowledge to conduct successful charitable projects.
- **Increasing efficiency.** Development goals are ambitious, and nonprofits would benefit from working within a sector that uses scarce resources efficiently, without compromising the sector's values.
- **Measuring and maximising impact.** Organisations that implement charitable projects face increasing pressures to conduct evaluation, performance-tracking and compliance activities to ensure they are achieving their goals, and to report on their performance to donors. However, a lack of co-ordination and consensus among donors, intermediaries and implementing organisations about adequate comparable metrics limits the ability of any one actor to understand which areas are well served and which are being neglected.

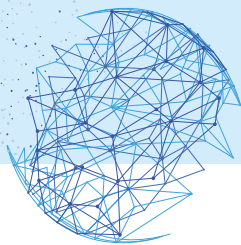
These challenges are not new, nor are they insurmountable. Like other industries, the giving sector's productivity has been buoyed over the past two decades by digital transformation, and it is now increasing its reliance on online intermediaries. In light of the sector's demonstrated capacity to embrace change and innovation, it is important to interrogate if and how it will respond to the emerging technologies that have come to define the incipient Fourth Industrial Revolution, and the opportunities and challenges those technologies will bring.

6 Sattva. 2019. "Everyday Giving in India Report" [https://archive.rohininilekani.org/wp-content/uploads/2019/05/RNP_Sattva_EverydayGivinginIndiaReport_Full-report.pdf].

7 Sattva. 2019. "Everyday Giving in India Report" [https://archive.rohininilekani.org/wp-content/uploads/2019/05/RNP_Sattva_EverydayGivinginIndiaReport_Full-report.pdf].

8 Bain & Company. 2017. "India Philanthropy Report 2017". [<https://www.bain.com/insights/india-philanthropy-report-2017/>].

9 Rooney, Patrick M. 2018. "The Growth in Total Household Giving Is Camouflaging a Decline in Giving by Small and Medium Donors: What Can We Do About It?" Nonprofit Quarterly. [<https://non-profitquarterly.org/2018/11/21/total-household-growth-decline-small-medium-donors/>].



The Fourth Industrial Revolution is characterised by the fusing of physical, biological and digital spheres and encompasses technologies such as artificial intelligence (AI), machine learning, automation, robotics and blockchain. These technologies are already supporting the work of the development aid sector, across the thematic areas encoded in the SDGs. AI tools are providing information and support to refugees via chatbots, modelling climate and environmental change, and helping to diagnose diseases.¹⁰ Drones and other forms of robotics are helping to deliver medical supplies and blood transfusions, and are being used to maintain facilities and equipment (such as hospital equipment) on site in remote areas. Digital identity systems are improving the efficacy of welfare payments and voting systems, and distributed ledgers are being piloted in diverse fields, from electronic health records to property rights.

Fourth Industrial Revolution technology holds similar promise for the giving sector, offering opportunities to tackle problems such as high transaction costs, donor engagement costs, financial sustainability and accountability. However, it is unclear how actively the three key types of stakeholder in the giving ecosystem—donors, intermediaries and implementing organisations—are using these emerging technologies in the global giving chain. Seeking answers, the Bill & Melinda Gates Foundation commissioned The Economist Intelligence Unit (The EIU) to conduct a study on current applications, opportunities and potential challenges of emerging technologies in the giving sector.

While the study focuses on the giving sector in China, India and the United States, an initial landscape assessment guided our research and identified a wide variety of places where innovation is occurring, including European countries like the United Kingdom, Switzerland, the Netherlands and Finland, as well as African countries such as Kenya, Nigeria and Rwanda. The study ultimately aims to capture the state of emerging technologies in the giving sector, and to provide a structured assessment of their potential impact. Drawing on a literature review and interviews with sector experts and technologists, as well as a qualitative assessment based on E. M. Rogers' Theory of Diffusion of Innovation, this report examines the potential impact of ten key technology applications on the giving sector.

¹⁰ Lancaster, Charlotte. 2018. "Can Artificial Intelligence Improve Humanitarian Responses?" UNOPS. [<https://www.unops.org/news-and-stories/insights/can-artificial-intelligence-improve-humanitarian-responses>].

1.

The global giving chain



The giving sector is a diverse and fragmented ecosystem where three key types of stakeholder interact: donors, intermediaries and implementing organisations. In the *supply chain of global giving*, these stakeholders collectively aim to distribute resources (both monetary and in kind) to a wide variety of recipients and beneficiaries. At first glance, the process of giving may appear simple: if an individual wishes to donate to education, for example—the leading philanthropic cause in the United States—the donor identifies and locates a recipient, sends resources to the desired beneficiaries and (ideally) receives proof that the donation was spent as intended. In reality, however, the process is infinitely more complex due to the sheer numbers of donors and causes. This creates a set of challenges and operational complexities that need to be tackled by donors, intermediaries and implementing organisations in a co-ordinated manner.

1.1 Global giving challenges

Build and sustain trust

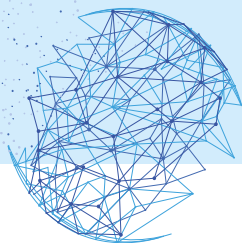
A 2015 Chronicle of Philanthropy poll found that one-third of Americans do not trust how charities spend their funds, and over two-thirds believe that it is very important that these organisations show evidence of their effectiveness.¹¹ Donors' concerns about trustworthiness are not completely unfounded: experts suggest that fraud is one of the largest challenges facing philanthropy globally.¹² For philanthropy to work effectively, trust must flow from donors to intermediaries, and especially to the implementing organisations on the ground.

In response to this challenge, direct transfers from donors to recipients are on the rise, as are other forms of direct, person-to-person giving. However, global giving still requires a certain level of intermediation, as the nonprofits and intermediaries that conduct complex operations around the world have know-how and local knowledge that individual donors cannot easily acquire, from sending money legally across borders to building infrastructure. Taking steps to build trust in these nonprofits and intermediaries has tangible benefits: GuideStar (now Candid¹³), a charity data provider, found that charities that transition from receiving

¹¹ Perry, Suzanne. 2015. "1 in 3 Americans Lacks Faith in Charities, Chronicle Poll Finds". The Chronicle of Philanthropy. [https://www.philanthropy.com/article/1-in-3-Americans-Lacks-Faith/233613].

¹² Tillemann, Tomica. 2018. "Break Corruption With Bitcoin's Backbone". Foreign Policy. [https://foreignpolicy.com/2018/01/16/the-answers-are-out-there-natural-disasters-china-north-korea-corruption-economy/#corruption].

¹³ Guidestar and the Foundation Center merged in February 2019 to form Candid.



“non-transparent” to “transparent” ratings gain an average of 53% in contributions one year after their rating has been updated.¹⁴

Increase efficiency

The second challenge in the giving supply chain is ensuring that resources are spent efficiently. Development goals are incredibly ambitious and the issues they are attempting to tackle are urgent. From fundraising to programme delivery and stakeholder communication, donors, intermediaries and nonprofits will benefit from working within a more efficient sector.

Measure and maximise impact

There are two broad categories of metrics that measure the success of nonprofits: operational metrics, and performance or impact metrics. Financial performance is typically measured using financial statements. Historically, these statements have been an important source of metrics for the sector, as government regulations generally require global nonprofits to disclose financial details of their operations. In the United States, for example, all registered nonprofits must disclose financial statements to the US Department of Treasury to qualify as a 501(c)(3) organisation, which allows for federal tax exemption.¹⁵ Similar disclosure requirements apply to nonprofits in India following changes to the Foreign Contribution Regulation Act in 2015.¹⁶ In China, calls for greater transparency around nonprofits’ financial performance have grown louder since the passage of new laws in 2015 and 2016 that changed the compliance requirements and governance around overseas

non-governmental organisations (NGOs).¹⁷ However, several voices have criticised the use of financial metrics to assess nonprofits’ success, particularly the emphasis on low overheads, which is thought to starve the operational core of nonprofits.¹⁸ Unlike corporate financial reports, nonprofits do not have an obligation to report outcomes or earnings, so most organisations that present financial reports for tax purposes document their spending but do not necessarily assess their impact.¹⁹ Financial disclosure requirements are also particularly burdensome for many nonprofits. According to a study conducted by the American Productivity and Quality Centre in 2013, global NGOs ended up spending proportionally more on financial accounting than global for-profit companies.²⁰ Accounting expenditures represent a trade-off for organisations with limited resources, which might have to sacrifice investments in technology, project delivery and/or skill development.

The second category of metrics measures programme impact, using monitoring and evaluation data. Organisations that are responsible for implementing charitable projects on the ground face growing pressure to strengthen project evaluation efforts, particularly from large institutional government donors like the United States Agency for International Development (USAID) and the United Kingdom’s Department for International Development (DFID). Impact investors have also introduced evaluation requirements for implementing organisations that represent a

14 Harris, Erika E., and Daniel Neely. 2018. “Determinants and Consequences of Nonprofit Transparency”. *Journal of Accounting, Auditing and Finance*. [https://journals.sagepub.com/doi/abs/10.1177/0148558X18814134?journalCode=jafa].

15 Foundation Group. “What Is a 501(c)(3)?” [https://www.501c3.org/what-is-a-501c3/].

16 International Center for Not-for-Profit Law. “China Philanthropy Law Report” [http://www.icnl.org/research/Philanthropy/China%20Philanthropy%20Law%20Report%20final%202018.pdf].

17 International Center for Not-for-Profit Law. “China Philanthropy Law Report” [http://www.icnl.org/research/Philanthropy/China%20Philanthropy%20Law%20Report%2031%20Aug%202018%20update.pdf].

18 Eckhart Queenan, Jeri. 2013. “Global NGOs Spend More on Accounting Than Multinationals”. *Harvard Business Review*. [https://hbr.org/2013/04/the-efficiency-trap-of-global].

19 Garcia, Jake. Vicepresident for Data and Technology Strategy, Candid. 15 February 2019.

20 Eckhart Queenan, Jeri. 2013. “Global NGOs Spend More on Accounting Than Multinationals”. *Harvard Business Review*. [https://hbr.org/2013/04/the-efficiency-trap-of-global].

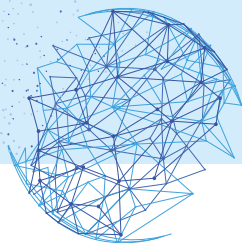


Figure 5.
Key links in the global giving chain

Matching donors and recipients	Motivating and informing giving	Facilitating transactions	Tracking outcomes	Validating and monetising performance
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significant portion of total project cost.²¹ As the global giving chain matures and donors become more sophisticated, stakeholders in the giving sector are also under pressure to increase transparency and efficiency. These demands are understandable, but they should not limit the ability of nonprofits to operate and deliver goods and services to beneficiaries. Instead, all stakeholders should focus on finding the best way to navigate the complex operations of global giving.

1.2 Global giving operations

Based on a literature review and the insights of 28 experts in the giving sector, we identified five key operations in which stakeholders interact as part of the giving chain: matching donors and recipients, motivating and informing giving, facilitating transactions, tracking outcomes and validating and monetising performance. These operations are important because they can function as either bottlenecks or levers in the giving chain and can therefore be targeted to increase both the quantity and quality of giving.

Matching donors and recipients

The growth and diversification of causes and implementing organisations in the giving sector means that donors now have a wide of variety

of options when considering where to direct their funds. However, evidence suggests that this increase in choice has not led to greater alignment between donor preferences and their donations.²² While donors would like to donate to organisations that are effective and to the causes they care about the most, these goals are often not met.²³ This mismatch can indicate that an asymmetry of information exists between charities and donors, with donors lacking complete information about charities they could support.

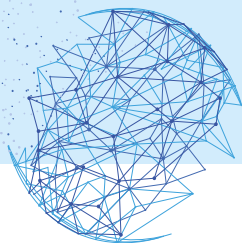
For nonprofits and intermediaries, information about donors is also incomplete. For these organisations, it is important to understand what the pool of future donors may look like, and who they are and how they think, in order to engage and communicate effectively with them. However, marketing efforts often rely on (potentially incorrect) assumptions about target audiences, or may only target donors with giving histories. Donor data management has already been highlighted as an issue in the giving supply chain literature. One industry survey found that 36% of respondents at nonprofits thought their organisations were not collecting enough data, and 46% reported that their data was not kept in one place.²⁴ Only 45% of surveyed nonprofits used customer relationship manager (CRM) software to track donations and manage

²¹ Wang, Fennie. ixo Foundation. 10 January 2019. At the time of publication ixo Foundation is currently not operating but the repository is still available on Github: <https://github.com/ixofoundation/>

²² Ideas 42. 2016. "Behaviour and Charitable Giving". [https://www.ideas42.org/wp-content/uploads/2016/06/Behavior-and-Charitable-Giving_ideas42.pdf].

²³ Ideas 42. 2016. "Behaviour and Charitable Giving". [https://www.ideas42.org/wp-content/uploads/2016/06/Behavior-and-Charitable-Giving_ideas42.pdf].

²⁴ EveryAction and Nonprofit Hub. "The State of Data in the Nonprofit Sector". [http://cdn2.hubspot.net/hubfs/433841/The_State_of_Data_in_The_Nonprofit_Sector.pdf].



communications.²⁵ Industry surveys also reveal that only 5% of nonprofits use data to inform every decision they make, 46% report that they do not consistently use data in decision-making, and 42% report that their organisation lacks the necessary tools to analyse the data.²⁶

Motivating and informing giving

Donors need to feel that their donations are having a genuine impact on the ground. Every dollar spent on one cause is a dollar not spent on another, and the extraordinary array of choices can overwhelm donor decision-making processes. It can also prompt donors to preference well-known philanthropic organisations over lesser-known groups, regardless of impact. Many people also need a “nudge” to encourage them to part with their money. Academic research has shown that people are overly optimistic about their future giving²⁷ and tend to overestimate their own propensity for altruism—that is, their own *likelihood* of donating.

To help motivate giving by present and future donors, groups have long relied on marketing and media campaigns, but people can become desensitised to messaging over time. Balancing the need to advocate and raise money with the risk of deterring donors through excessive communications is a difficult task.

Facilitating transactions

Giving and payment ecosystems can be fragmented globally and across regions, making it difficult for donors to give, especially if the process requires extensive information and

paperwork, or the sharing of credit card details. International donations may also require copies of donors’ passports as verification. Information then needs to be processed across multiple financial institutions and intermediaries. Cross-border transactions can also incur high costs. The current cross-border infrastructure emerged 45 years ago, and transactions can be expensive and slow (a wire transfer can take days).²⁸ An average cross-border transaction costs US\$25, including transaction fees, exchange rate fees and operational costs, such as compliance costs.²⁹

Nonprofits and individual recipients face additional barriers if they wish to open bank accounts and receive payments. The nonprofit sector may be perceived as risky,³⁰ and it can be difficult for nonprofits and individual recipients to verify their legitimacy for banks, particularly in conflict zones or very low-income geographies. For this reason, the costs of due diligence in the giving sector are very high, compared to transactions in other sectors.

Tracking outcomes

Impact monitoring and evaluation is a costly and technical process and represents a significant challenge for organisations in all areas of the development space. Monitoring requires significant data collection, which is often conducted by individuals who spend weeks or months in the field, before, during and after programme implementation. Multiple rounds of data collection may be required, and the participants from whom data is collected may be geographically dispersed. Finally, impact can

25 Nonprofit Tech for Good. 2018. “2018 Global NGO Technology Report”. [<http://techreport.ngo/wp-content/uploads/2018-Tech-Report-English.pdf>].

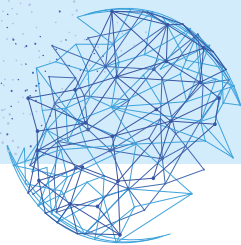
26 Nonprofit Tech for Good. 2018. “2018 Global NGO Technology Report”. [<http://techreport.ngo/wp-content/uploads/2018-Tech-Report-English.pdf>].

27 Balcetis, Emily, and David A. Dunning. 2008. “A Mile in Moccasins: How Situational Experience Diminishes Dispositionism in Social Inference”. [<https://nyuscholars.nyu.edu/en/publications/a-mile-in-moccasins-how-situational-experience-diminishes-disposi>].

28 Cate, Reinhard. 2018. “Down With Disco (–era Money Movement Technologies)”. [<https://ripple.com/insights/features/disco-era-money-movement-technologies/>].

29 McKinsey & Company. 2018. “A Vision for the Future of Cross-Border Payments”. [<https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/A%20vision%20for%20the%20future%20of%20cross%20border%20payments%20final/A-vision-for-the-future-of-cross-border-payments-web-final.ashx>].

30 Pisa, Mike. Policy Fellow, Centre for Global Development. 3 January 2019.



be difficult to monitor in remote, dangerous or inhospitable places, where conservation, wildlife and environmental projects are often located.

Validating performance

Validated performance information has value for donors as well as the broader community. However, even if data is successfully collected, there is a risk that verification processes can be siloed, which means that impact results may not be shared beyond decision-makers or project participants. According to a Global Impact Investing Network survey, 40% of impact investment funders identify access to performance data as a “significant” or “very significant” challenge.³¹ One mechanism for increased transparency (which has produced mixed results) is the social impact bond, which offers conditional repayment to investors based on the achievement of pre-agreed project goals. These bonds can finance social programmes through investment sources other than governments, although the minimum investment requirements are usually too high for retail investors.³²

Each of these operational complexities presents an opportunity to improve the giving supply chain, and leading donors, intermediaries and nonprofits are already innovating and investing in potential solutions in each of these spaces. The following chapter explores how stakeholders are using technology—and in particular, emerging technologies—to build and sustain trust, increase efficiency, and measure and maximise impact throughout their operations.

³¹ Global Impact Investing Network. 2017. “Annual Impact Investor Survey 2017”. [https://thegiin.org/assets/GIIN_AnnualImpactInvestorSurvey_2017_Web_Final.pdf].

³² Bergfeld, Nicholas, David Klausner and Matus Samel. 2016. “Improving Social Impact Bonds: Assessing Alternative Financial Models to Scale Pay-for-Success”. Harvard Kennedy School, Mossavar-Rahmani Centre for Business and Government. [https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/Final_AWP65.pdf].

2

Using technology to improve the global giving supply chain



Technology has already changed the way people give. Online platforms have increased donors' interactions with causes by creating digital marketplaces that house a wide variety of donation opportunities.³³ Social media networks have made communication between donors and organisations more fluid, and have facilitated and encouraged donors to socialise their giving habits through campaigns such as Giving Tuesday in the United States, #DaanUtsav in India and WeChat giving campaigns in China. The commercialisation of digital payment solutions like credit card readers and quick response (QR) codes has also connected millions of users and organisations around the world to global payment networks.

Fourth Industrial Revolution technologies, including AI and blockchain, have the potential to improve efficiencies in the giving experience. Some predict that blockchain will allow donors at any level to instantly send micro-donations to targeted causes anywhere, and that drones, sensors and AI-powered automation will make it possible to observe highly specific impact outcomes—such as the acreage of Amazonian rainforest preserved—in almost real time from across the world. Put simply, these technologies have the potential to virtually compress the world, reducing the cognitive distance between benefactor and recipient.

We conducted a landscape assessment to identify technology applications that are being used or could be used to strengthen each of the five key operational links in the global giving supply chain. Through this assessment, we identified ten key technology applications that have the potential to build and sustain trust, increase efficiency, and measure and maximise impact. We then conducted an in-depth and structured qualitative analysis to assess the potential impact of these ten technologies. The remainder of this report discusses these technologies and their potential impacts—both positive and negative—on the giving supply chain.

³³ Intentional Futures, "Ways We Give: An Overview of Major Charitable Channels".



2.1 Fourth Industrial Revolution technologies

Based on a landscape analysis and expert insight, we identified ten emerging technology applications that have the potential to enhance the workings of the giving supply chain: big data, AI analytics, virtual reality (VR), augmented reality (AR), cryptocurrencies, blockchain payment infrastructure, the Internet of Things (IoT), drones, smart contracts and tokens. All of these applications are powered by four core technologies: AI, virtual intelligence (VI), blockchain and the IoT.

Artificial intelligence

The origins of AI hark back to the 1940s, when Norbert Wiener proposed that intelligence could be modelled using feedback loops: an action stimulates a response, which is used to determine the next action. This idea was to find its ideal companion in “thinking machines”, which were initially developed in the 1950s. Alan Turing, a British codebreaker, coined the term artificial intelligence when he published a landmark study in which he speculated about the possibility of creating machines that could think.³⁴ Since then, the concept and the technology that enable AI have advanced significantly, and multiple commercial applications have been developed. In this report, we focus on three applications of AI: big data, AI analytics and drones.

Virtual intelligence

Unlike AI, VI only simulates decision-making based on a set of inputs in a controlled environment; it cannot adjust its own outputs as conditions change.³⁵ In this report, we focus on two VI applications: VR and AR.

Blockchain

Blockchain is a distributed ledger that allows participants to create a digital record of agreed transactions and information history.³⁶ A consensus mechanism validates everything that is built into the ledger.³⁷ Once information has been entered into the blockchain, an encryption process makes this record permanent and incorruptible. This eliminates the need for trusted third parties to validate information, leading this technology to be dubbed “the Trust Machine”.³⁸ In this report, we focus on four blockchain applications: cryptocurrencies, blockchain payment infrastructures, smart contracts and tokens.

The Internet of Things

The IoT refers to the connection of everyday objects to the Internet. Physical devices use sensors to gather information and interact within the cloud. The IoT is used to collect data, automate monitoring and assist with remote operations. However, unlike blockchain, this technology does not validate a system’s inputs or outputs. In this report, we focus on use of the IoT coupled with AI tools.

34 Turing, Alan M. 1950. “Computing Machinery and Intelligence”. *Mind* 49:433 - 460 [https://www.csee.umbc.edu/courses/471/papers/turing.pdf]

35 Terence Mills. 2018. “Virtual Intelligence Vs. Artificial Intelligence: What’s the Difference?” *Forbes* [https://www.forbes.com/sites/forbestechcouncil/2018/03/27/virtual-intelligence-vs-artificial-intelligence-whats-the-difference/#197d891b1cc0].

36 Mas, Ignacio. 2016. “Identity”. Lecture for the Digital Money Certificate, Digital Frontiers Institute.

37 Norton, Steven. 2016. “CIO Explainer: What Is Blockchain?” *The Wall Street Journal*. [http://blogs.wsj.com/cio/2016/02/02/cio-explainer-what-is-blockchain/].

38 The Economist. 2015. “The Trust Machine”. [http://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine].



Figure 6.
Technologies in the giving chain

Links in the giving supply chain	Matching donors and recipients	Motivating and informing giving	Facilitating transactions	Tracking outcomes	Validating and monetising performance
Technology applications	Big Data and AI analytics	Virtual Reality and Augmented Reality	Cryptocurrencies and Blockchain	Internet of Things and Drones	Smart Contracts and Tokens

2.2 Technology applications in the giving sector

Most technology applications do not offer stand-alone solutions, and there is no single technology that can help to tackle all of the challenges in the giving supply chain. For this reason, we analysed technology combinations that can help each application fulfil its potential.

Big data and AI analytics: Matching donors and recipients

When Amazon recommends an item or an airline varies ticket prices by the hour, it is using past information to make predictions about future outcomes—the essence of predictive analytics.³⁹ The science behind predictive analytics (a form of AI) is as old as the original computational models developed in the 1940s.⁴⁰ However, over the past decade AI analytics have been supercharged by the exponential growth of data (i.e. big data), cheaper and more ubiquitous computing power and more user-friendly software. For example, marketing firms are now able to use big unstructured data from social media platforms like Twitter and Facebook and search engine data from Google or Alibaba to understand users' attitudes and behaviours.

These developments in AI analytics are relevant to the giving sector because they can help stakeholders match the right donors with the right causes. Nonprofits and intermediaries need to understand current and future donors—their priorities, their perceptions and their areas of interest. Understanding and communicating effectively with donors requires data on who they are and how they think. Donors, meanwhile, need to be able to easily distinguish between causes. By using insights derived from AI analytics, fundraising organisations can engage audiences on issues they care about through personalised marketing. Research has already demonstrated the value of this approach: according to one survey, 71% of donors feel more engaged when they receive personalised content.⁴¹ Nonprofits and intermediaries also need to understand what the pool of future donors might look like. At present, marketing efforts often rely on assumptions about target audiences (which may be incorrect) rather than data, or they may be limited to donors with giving histories.

Donor data management has already been highlighted as a challenge for the giving sector

39 MacLaughlin, Steve. Vice President of Data and Analytics, Blackbaud. 19 December 2018.

40 Fair Isaac Corporation. "The Analytics Big Bang". [https://visual.ly/community/infographic/technology/look-history-and-future-predictive-analytics-and-big-data?utm_source=visually_embed].

41 Dietz, Richard, and Brandy Keller. 2016. "Donor Loyalty Study: A Deep Dive Into Donor Behaviours and Attitudes". Abila. [http://www.thenonprofitimes.com/wp-content/uploads/2016/04/Donor-Loyalty-Study.pdf].



in the literature.^{42,43,44} In this context, AI analytics tools could support organisations in their efforts to connect effectively with givers.

Applications in the giving sector

Structured donor data analytic tools can help to match donors and the recipients of their present or future donations. CRM providers that specialise in the giving sector, such as Blackbaud, have large amounts of data about existing and historical donor transactions. Blackbaud, for instance, has data on approximately 3bn philanthropic gifts, as well as demographic, membership and other kinds of transactional data from more than 75m households.⁴⁵ This allows it to provide analytics tools to nonprofits, giving its clients access to new or broader donor acquisition lists based on these proprietary data sets. Nonprofits can then build weighted rankings and scores that pinpoint the best donor prospects with precision.⁴⁶ One of the limitations of structured data is that it can only provide information about groups of people who donate money, or who have donated money in the past. While this data is valuable and increases the efficiency of the giving process, it does not allow organisations to tap into new sources of funding.

AI analytics can unveil important insights about existing and potential untapped donors, especially when coupled with big unstructured data. Aggregated data from social media and Internet searches provides useful insights into the thoughts

and views of a wide variety of communities, which philanthropic groups can use to target donors. Firms like Quilt.AI and Torch AI are pioneering the use of AI analytics coupled with big unstructured data in the sector. Quilt.AI, for example, uses data purchased from search engines and social media platforms in the United States, China and India to develop cultural intelligence models that allow it to understand patterns in people's behaviours and attitudes. The company—which is a for-profit enterprise, but which aims to “stitch the fragments” that technology has created in society back together—serves both for-profit and nonprofit clients.⁴⁷ Among the challenges its projects aim to tackle are teenage pregnancy and suicide.⁴⁸ Quilt.AI is a good example of a company that is striving to use unstructured data in an ethical way. However, there is currently no law to hold such companies accountable, particularly on a global scale. One of the key challenges of this technology application is that its alignment with the giving sector's values depends almost entirely on the ethics of third-party AI firms.

In-house web-scraping tools can help to analyse the news and social media cycle to anticipate giving behaviours. CRM providers and AI analytics firms are often third-party vendors who bring their technical expertise and proprietary data sources to clients in exchange for a fee. Some organisations—like Candid, which helps to connect organisations and donors—are developing in-house data-

42 EveryAction and Nonprofit Hub. “The State of Data in the Nonprofit Sector”. [http://cdn2.hubspot.net/hubfs/433841/The_State_of_Data_in_The_Nonprofit_Sector.pdf].

43 Nonprofit Tech for Good. 2018. “2018 Global NGO Technology Report”. [<http://techreport.ngo/wp-content/uploads/2018-Tech-Report-English.pdf>].

44 EveryAction and Nonprofit Hub. “The State of Data in the Nonprofit Sector”. [http://cdn2.hubspot.net/hubfs/433841/The_State_of_Data_in_The_Nonprofit_Sector.pdf].

45 Blackbaud. 2011. “Maximise Giving by Identifying Your Most Likely Donors. Fundraising Models: Overview”. [https://www.blackbaud.com/files/resources/downloads/Datasheet_TargetAnalytics_FundraisingModels.pdf].

46 Blackbaud. 2014. “Analytics-Driven Fundraising”. [https://www.blackbaud.com/files/resources/downloads/10517_CORP_Analytics_eBook_2015.pdf].

47 Banerjee, Anurag. Founder, Quilt.AI. 5 February 2019.

48 Stine, Steve. “Anurag Banerjee: The Social Impact of Artificial Intelligence”. [<http://www.insideasiapodcast.com/anurag-banerjee-the-social-impact-of-artificial-intelligence/>].



scraping capabilities to extract data from news and other web sources more efficiently in order to help anticipate behaviour and better understand donor preferences. Web scraping is a rapidly growing industry and is used across sectors,⁴⁹ and it can be a cost-efficient way of gathering information.⁵⁰ However, in addition to the necessary technical expertise, successful implementation of these tools requires additional capabilities including legal expertise and specialised analytics teams to ensure that data scraped from the web is used ethically and efficiently.

Virtual reality and augmented reality: Motivating and informing giving

VR creates interactive, fully digitally simulated experiences. It transports users to immersive, computer-generated environments and can help people to visualise and experience completely different situations. The release of mass-market, off-the-shelf hardware and VR kits revolutionised the industry. These devices included Oculus Rift and HTC Vive in 2016, and perhaps more impactful, the recent wave of standalone headsets starting with Oculus Go in 2018.⁵¹ AR creates a part-virtual, part-real-world experience. A simplified version of VR, it overlays digital content on to the real world. Pokémon GO is a useful example of a portable AR game which in 2016 allowed over 164m users to integrate digital creatures into real-world environments in their day-to-day lives.

Virtual immersive experiences like VR and AR are relevant to the giving sector because they can be used to generate empathy and build trust, and because they can enable donors to feel that their donations are having a genuine impact on the ground.

Applications in the giving sector

Immersive VR experiences can generate empathy and/or make donors feel their impact. Research shows that focusing attention can shape the mood and initial thoughts of a donor when provided with an opportunity to help others.^{52,53} Several organisations—including Oculus, Pencils for Promise and Charity:Water—are already experimenting with the use of VR to motivate donors. Charity:Water, for example, used VR to create immersive storytelling that allowed users to experience a week in the life of a family that was getting clean drinking water for the first time.⁵⁴ The United Nations Virtual Reality (UNVR) lab pioneered the use of VR for both large fundraisers and face-to-face engagements, with encouraging results. In a pilot experience for face-to-face engagement, with a sample of 5,000 people in a commercial street, the UN saw an increase in people's willingness to engage (the stop rate increased by 50%) and their propensity to donate (the sign-up rate increased by 40%), as well as an increase in the value of their donations (which increased by 8%).⁵⁵

49 PromptCloud. 2017. "7 Key Takeaways From the Web Scraping Industry Trends Report". [<https://www.slideshare.net/promptcloud/7-key-takeaways-from-the-web-scraping-industry-trends-report>].

50 Datahut. 2018. "The Economy of the Web Scraping Industry". [<https://blog.datahut.co/the-economy-of-the-web-scraping-industry/>].

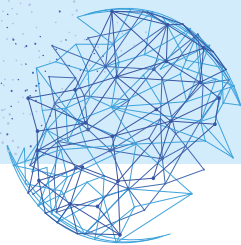
51 Parsons, Lucien. Director, Mixed/Augmented/Virtual Reality Innovation Centre (MAVRIC). 17 June 2018.

52 Huber, Michelle, Leaf Van Boven, A. Peter McGraw and Laura Johnson-Graham. 2011. Organisational Behaviour and Human Decision Processes 115: 283-293. [<http://leeds-faculty.colorado.edu/mcgraw/pdfs/huber.vanboven.mcgraw.johnsongraham.2011.pdf>].

53 Salovey, Peter, and David L. Rosenham. 1989. "Mood States and Prosocial Behaviour". In H. Wagner and A. Manstead, eds., Handbook of Social Psychophysiology. Oxford: John Wiley & Sons. [http://ei.yale.edu/wp-content/uploads/2014/06/pub194_Salovey_Rosenhan_1989.pdf].

54 Pangburn, D. J. 2016. "Experience an Ethiopian Clean Water Project in Virtual Reality". [<https://www.good.is/articles/charity-water-vrse-works-northern-ethiopia-selam>].

55 United Nations SDG Action Campaign. 2017. "How the United Nations Is Using Virtual Reality". [<https://sdgactioncampaign.org/2017/07/07/how-the-united-nations-is-using-virtual-reality/>].



Source: Geng Geng, 2018. "A Green Movement With 300 Million Participants and 13 Million Trees". Pandaily. [https://pandaily.com/ant-forest-allowed-more-than-a-quarter-of-chinese-netizens-to-participate-in-charity-programs-through-the-mobile-internet/].

To date 300m people have signed up for the Ant Forest app which has resulted in 13m trees planted in the Mongolian desert.



VR could help donors connect with the future. VR experiences can help people visualise how their donations might change future outcomes, which can in turn incentivise them to donate in the present. According to a study by Ideas42, Americans believe that their peers should donate 6% of their income annually, which is more than double households' actual donations.⁵⁶ One behavioural explanation for this is people's tendency to overestimate future performance, which means that their expected levels of altruism outpace reality.⁵⁷ This same bias deters people from saving for retirement and taking action on climate change. To address this bias, social psychologists at Stanford University have been experimenting with VR to help people emotionally connect with their future selves. For example, after showing people virtual images of their older selves,

study subjects doubled their retirement fund contributions.⁵⁸ Based on this evidence, Bank of America developed an application in 2014 called "Face Retirement", which used 3D age progression techniques to encourage users to work towards reaching their retirement goals.⁵⁹

Portable AR experiences could help reinforce behavioural changes. AR games and experiences are able to engage participants on a regular basis. This makes them ideal for reinforcing behavioural change. Ant Forest provides an instructive example. The scheme, introduced by Alibaba, is reportedly the world's first large-scale, bottom-up pilot in greening citizens' consumption behaviour.⁶⁰ As app users engage in carbon-reducing activities, such as paying bills online or walking to work, they are rewarded with green energy points. When

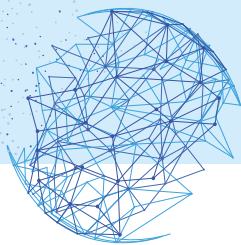
56 Parbhoo, Omar, Katy Davis, Robert Reynolds, Piyush Tantia, Pranav Trewn and Sarah Welch. 2018. "Best of Intentions: Using Behavioural Design to Unlock Charitable Giving". Ideas42. [http://www.ideas42.org/wp-content/uploads/2018/08/Ideas42-Best-of-Intentions_Charitable-Giving-1.pdf].

57 Parbhoo, Omar, Katy Davis, Robert Reynolds, Piyush Tantia, Pranav Trewn and Sarah Welch. 2018. "Best of Intentions: Using Behavioural Design to Unlock Charitable Giving". Ideas42. [http://www.ideas42.org/wp-content/uploads/2018/08/Ideas42-Best-of-Intentions_Charitable-Giving-1.pdf].

58 Hershfield, Hal. 2013. "You Make Better Decisions if You 'See' Your Senior Self". Harvard Business Review. [https://hbr.org/2013/06/you-make-better-decisions-if-you-see-your-senior-self].

59 Lee, Cynthia. 2015. "Connecting With Our Future Selves". UCLA. [https://www.universityofcalifornia.edu/news/stranger-within-connecting-our-future-selves].

60 Wu, Phylcia. 2018. "Ant Financial and the Greening of Fintech". The Diplomat. [https://thediplomat.com/2018/01/ant-financial-and-the-greening-of-fintech/].



enough points have been accumulated, a tree is planted. To date, 300m people have signed up for this app and Ant Forest has planted 13m trees in the Mongolian desert.⁶¹

Cryptocurrencies and blockchain payments: Facilitating transactions

In 2009 Satoshi Nakamoto, whose real identity remains a mystery, published a paper that laid the grounds for the creation of Bitcoin—a decentralised virtual asset that relies on cryptography to regulate currencies.⁶² Bitcoin became the first of several cryptocurrencies to run on distributed and decentralised networks, where transfers can be verified and validated without the need for a third party. Blockchains are the networks where these transactions are triggered and recorded. Central banks and financial institutions are currently experimenting with different blockchain applications that can increase the efficiency and transparency of banking transactions, particularly cross-border payments.

Applications in the giving sector

Cryptocurrencies have become an important source of funds due to the large amount of wealth they have generated over the past two years. Donor-advised funds have seen a significant increase in donations from holders of cryptocurrencies who are looking for alternative ways to eliminate growing capital gains taxes and maximise the market value of their donations.⁶³ Cryptocurrency contributions to Fidelity Charitable increased from US\$7m in 2016 to US\$69m in 2017.⁶⁴ Individual donors have also launched philanthropic projects

such as the Pineapple Fund, created in 2017 by an anonymous investor, which committed 5,104 BTC (valued at US\$55m at the time) to benefit 60 charities.⁶⁵ Cryptocurrencies have introduced new challenges for intermediaries and nonprofits that seek to use these funds, including a lack of cash-in and cash-out infrastructure, volatility, and the need to comply with Anti-Money Laundering/Combating the Financing of Terrorism (AML/CFT) regulation. However, promising blockchain payment applications are being pioneered in the sector.

Blockchain cross-border settlement systems can reduce transactions costs.

Ripple Net and Stellar, for instance, are blockchain systems that aggregate financial providers across borders. Several major banks are part of RippleNet's network, which allows them to process payments in real time and expand to markets that are expensive to reach.⁶⁶ Stellar works in a similar manner but services financial institutions that target unbanked populations. One of the main goals of the Stellar network is to increase interoperability by enabling better and faster communication between financial providers across the globe.⁶⁷ Stellar can connect a donor, a mobile wallet and online banking apps and services with the wider world of financial infrastructure, helping people to move easily between fiat currencies, cryptocurrencies, mobile phone minutes or other stores of value.

Niche financial institutions can specialise in banking the nonprofit sector. Disberse is a financial institution that uses blockchain to provide cross-border services to the aid and humanitarian sectors, with the goal of providing

61 Geng Geng. 2018. "A Green Movement With 300 Million Participants and 13 Million Trees". Pandaily. [<https://pandaily.com/ant-forest-allowed-more-than-a-quarter-of-chinese-netizens-to-participate-in-charity-programs-through-the-mobile-internet/>].

62 Nakamoto, Satoshi. 2009. "Bitcoin: A Peer-to-Peer Electronic Cash System" [<https://bitcoin.org/bitcoin.pdf>].

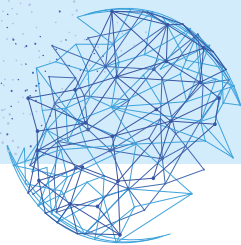
63 Fidelity Charitable. 2018. "2018 Giving Report". [<https://www.fidelitycharitable.org/docs/giving-report-2018.pdf>].

64 Fidelity Charitable. 2018. "2018 Giving Report". [<https://www.fidelitycharitable.org/docs/giving-report-2018.pdf>].

65 Pineapple Fund. [<https://pineapplefund.org/>].

66 RippleNet [<https://ripple.com/rippletnet/>].

67 Nestor, Lisa. Director of Partnerships, Stellar. January 16 2019.



StoveTrace is collecting data about carbon emissions from cook stoves through IoT sensors



lower costs and increased transparency. It has been piloted by multinational nonprofits from Western Europe to Albania, Rwanda and Ukraine. In one pilot programme, it was able to send €5,000 from the Netherlands to Albania at no cost—a transaction that would normally cost €57 in bank fees. In another pilot programme, it transferred €10,000 from Ireland to Rwanda at no cost—a transaction that would have cost €35 in bank fees.⁶⁸ Like most blockchain applications, Disberse is still in the proof-of-concept phase and its commercial success will depend on its ability to scale the volume of transactions while still offering below-market fees.

Internet of Things and drones: Tracking outcomes

The IoT and drones are automation tools that can help to conduct certain processes with minimal human intervention. IoT systems connect physical devices through sensors to gather information from them and allow their interaction through the cloud. They are used to collect data and manage remote operations. In the health sector, several innovations have made it possible to connect medical devices like pacemakers to the Internet, providing doctors with real-time updates on a patient's health. Drones are another type of automation tool. These unmanned and typically airborne vehicles are used to deliver supplies, monitor conditions and efficiently collect data in places that are difficult to reach.

Automation tools like the IoT and drones are being used by some nonprofits, governments and international organisations (IOs) around the

68 Disberse. "Learning Notes". [<https://disberse.com/our-work>].

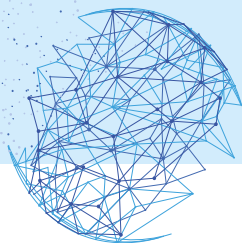
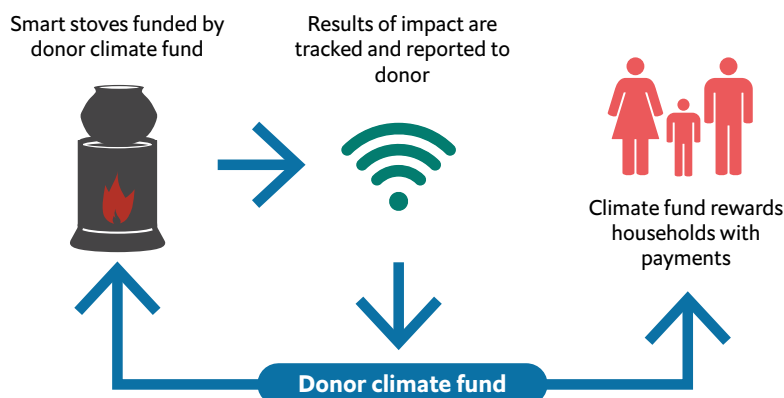


Figure 7.

Tracking impact on carbon emissions with IoT technology



world to improve the processes used to monitor programme outcomes. This is particularly relevant to the giving sector, as labour-intensive data collection methods make monitoring impact a slow and costly process. This affects the feedback that nonprofits give to donors on the impact of their donations and can easily discourage donors who do not know if their money is making a difference.

Applications in the giving sector

IoT sensors capture carbon emissions reductions.

The IoT links sensors to Internet services in ways that dramatically increase data capture. For example, sensors can gather data on carbon emissions and pollution, which can, in turn, be fed into an analytics system to track progress. Nexleaf and Gold Standard are two nonprofits that are currently using sensor technology for data-gathering purposes in rural India.⁶⁹ Environmentally friendly cookstoves, which reduce indoor smoke (a major health

threat), are kitted with sensors that track usage to calculate the cookstoves' impact on carbon emissions and air quality in the home.⁷⁰ Based on carbon mitigation data, rural households can receive usage-based payments from a climate fund.⁷¹ This data-driven disbursement model would be impossible to use if the data had to be collected by humans. Not only would the task of manual collection and analysis of data be arduous, but Nexleaf also found that self-reported data was inconsistent with sensor-gathered data.⁷²

Drones can monitor impact in places humans cannot reach.

Environmental degradation is increasingly inseparable from the SDG agenda, given how heavily developing countries are being affected by drought and extreme weather events. Drones are becoming a crucial tool in all aspects of environmental work. WeRobotics, for instance, has used underwater drone technology to monitor the health of marine life in the South Pacific. Aerial drones are used to efficiently collect geographic images, capturing much greater detail than satellites.⁷³ For example, they have been used to survey and monitor crop yields in Tanzania's rural areas and monitor flood risks in Tanzania's dense urban areas.⁷⁴

Sensors can measure outputs invisible to the human eye, such as the density of insect life.

As part of a conservation effort in Africa, the ixo Foundation and Seneca Park Zoo used mass spectrometers to measure the density of insect life in forests. This measurement device is designed to function as an "oracle" (verifying claims made by service providers) so that smart

69 IT-Online. 2018. "New Model for Development Funding Launched". [https://it-online.co.za/2018/12/11/new-model-for-development-funding-launched/].

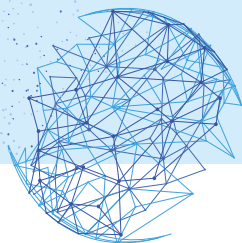
70 Nexleaf Analytics. "What Is StoveTrace?" [http://nexleaf.org/cookstoves/#what-is-stovetrace].

71 Nexleaf Analytics. "Nature Climate Change Highlights the Power of Nexleaf Data".

72 Nexleaf Analytics, correspondence on 18 June 2019.

73 Meier, Patrick. Founder, WeRobotics. 8 January 2019.

74 WeRobotics. 2018. "Tanzania Drone Pilots Team Up With IFPRI and Local Smallholder Farms". [https://blog.werobotics.org/2018/04/10/tanzania-drone-pilots-team-up-with-ifpri-and-local-smallholder-farms/].



contracts can keep track of whether conditions are satisfied and can upload proof of impact directly to the cloud and issue impact tokens.^{75,76} Other examples include IoT-connected sensors that can be used to track water purity in wells or air pollution in cities.

Smart contracts and impact tokens: Validating performance

Smart contracts are automated contracts that are executed on a blockchain without the need for third-party validation. Smart contracts can be used to conduct financial transactions, but this is not the only or the most promising use case for this technology. For example, the health industry is already using smart contracts to enable transferrable, permissioned access to medical records, and some governments are experimenting with applications to create self-governing IDs.^{77,78} Tokens are blockchain-based digital assets.⁷⁹ Like checks, coins or bonds, tokens store value and represent the ownership of a utility.⁸⁰

Social impact bonds are a promising mechanism for increasing transparency. These bonds offer conditional repayment to investors based on the achievement of pre-agreed project goals. Finding ways to widen access to social impact bonds through technological innovation could help to expand their contribution to social policy. Our analysis of these interlinked issues—transparency and control—and scaling-

up approaches indicates that smart contracts and impact tokens hold promise for the giving sector.

Applications in the giving sector

Smart contracts can give donors control over how and when their money is spent. They are designed to achieve a similar goal to impact bonds, only releasing donor funds to charities once specific goals have been achieved. Alice is one organisation working in this space. Its platform creates a contract between donors and charity organisations, providing a way for donors to pledge their money towards a charity or a cause, with funds paid out if the charity successfully achieves its objectives. Once proof of success has been uploaded to the blockchain, the smart contract automatically releases the money to the charity. This system gives donors greater confidence that their money is being used effectively and creates incentives for organisations to spend wisely and be transparent about their impact.^{81,82}

Decentralised tokens can open impact fundraising to individual donors. Impact funding has typically been the domain of institutional investors, but decentralised technologies like blockchain can give retail donors the opportunity to engage in impact fundraising. Organisations like the ixo Foundation have created platforms to offer individual givers the opportunity to

75 SmartAustin. 2018. "Blockchain for Impact Suggests New Pathway for Urban Innovation: An Interview With a Trailblazer". [<http://www.smartaustin.org/blog/2018/5/9/blockchain-for-impact-suggests-new-pathway-for-urban-innovation-an-interview-with-a-trailblazer>].

76 Wang, Fennie. ixo Foundation. 7 June 2019. At the time of publication ixo Foundation was currently not operating but the repository is still available on Github: <https://github.com/ixofoundation/>

77 Dubovitskaya, Alevtina, Zhigang Xu, Samuel Ryu, Michael Schumacher and Fusheng Wang. 2017. "Secure and Trustable Electronic Medical Records Sharing Using Blockchain". AMIA Annual Symposium Proceedings Archive 2017: 650-659. [<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5977675/>].

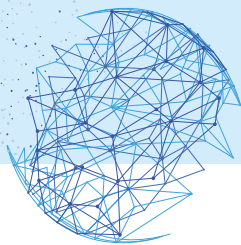
78 MedRec. "What Is Medrec?" [<https://medrec.media.mit.edu/>].

79 Investopedia. "Crypto Token". [<https://www.investopedia.com/terms/c/crypto-token.asp>].

80 Blockchain Hub. "Cryptographic Tokens". [<https://blockchainhub.net/tokens/>].

81 Mazet, Raphaël. CEO, Alice. 11 January 2019.

82 Mazet, Raphaël, and Jakub Wojciechowski. "Alice White Paper, Version 9." GitHub. [<https://github.com/alice-si/whitepaper/blob/master/Alice%20white%20paper%20-%20FV%200.9.pdf>].



contribute based on impact. When a charity organisation achieves an outcome, this creates value. A record of this outcome is uploaded to a distributed data store, access to which is mediated through a blockchain ledger, where it becomes part of a trusted, verifiable record. The platform then generates corresponding “impact tokens” that represent the value of that impact created by the charity. This enables funders thousands of miles away to verify the legitimacy of their donation and track that claim of impact.^{83, 84} This process is unique because impact tokens can have a market value and be traded (for example, by corporates buying tokens as part of CSR programs), helping to create a more efficient marketplace for giving.⁸⁵

Smart contract platforms could create a public global impact registry. If a platform is able to scale up to encompass a wide variety of organisations and records, or if several platforms agree to collaborate and create a joint registry, smart contract technologies have the potential to put together a transparent, secure, comparable record of impact. This information would be incredibly valuable to: 1) donors, who could make donations (monetary or in kind) towards a particular cause; 2) nonprofits, which could measure themselves against similar organisations based on performance metrics; and 3) governments, which could more accurately account for the value of contributions towards development goals.

The promise of emerging technologies is infinite, but as with any new set of technologies a healthy dose of scepticism is in order. History has also taught us that the ultimate productive uses of technologies may be quite different from

what was envisioned at the outset. A common criticism of the literature on the impact of technology in the development sector is that too much attention is given to the technologies and too little to the potential challenges and solutions these technologies introduce. Practitioners in the development space are particularly concerned that Fourth Industrial Revolution technologies like blockchain could become expensive solutions in search of a problem.⁸⁶

The current political climate around emerging technologies is also mixed; any enthusiasm about them is too often punctured by backlashes against perceived abuses and negative outcomes, from fake news to job losses and worsening inequalities. A cynic might wonder if these technologies need the giving sector more than the giving sector needs them. In order to assess the potential for uptake of emerging technologies in the giving sector, we developed a framework based on key variables that have influenced the adoption of new ideas and tools, according to the literature on innovation. This framework is presented in the following chapter.

⁸³ Wang, Fennie. ixo Foundation. 10 January 2019. At the time of publication ixo Foundation was currently not operating but the repository is still available on Github: <https://github.com/ixofoundation/>

⁸⁴ Schiller, Ben. 2018. “This New Blockchain Protocol Wants to Create Accountability for Social Impact”. Fast Company. [<https://www.fastcompany.com/40513028/this-new-blockchain-protocol-wants-to-create-accountability-for-social-impact>].

⁸⁵ Wang, Fennie. ixo Foundation. 10 January 2019.

⁸⁶ Bull, Greta. 2018. “Blockchain: A Solution in Search of a Problem?” CGAP. [<https://www.cgap.org/blog/blockchain-solution-search-problem>].

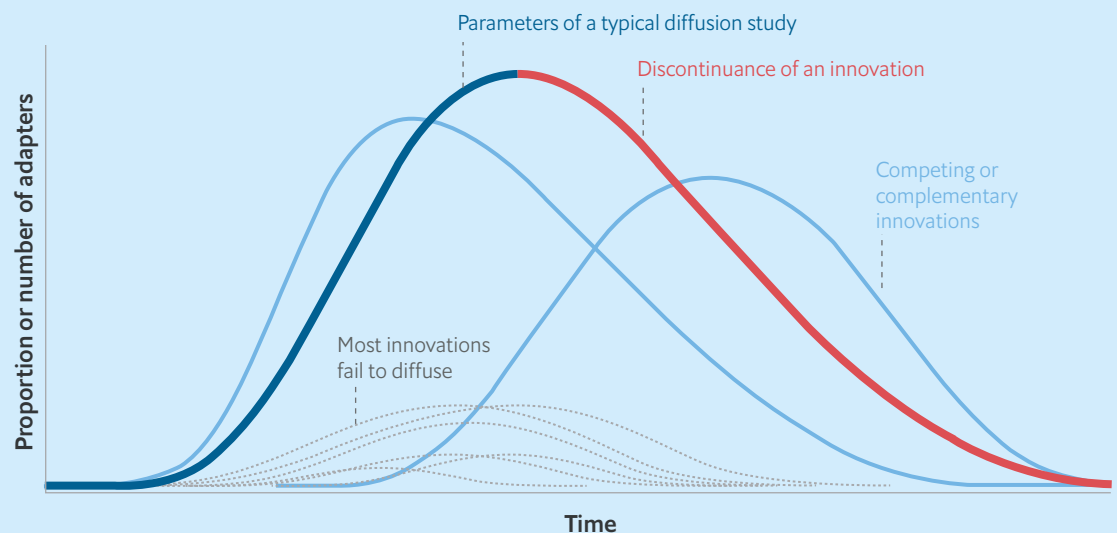
3.

Assessing emerging technologies



Diffusion of innovation is often explained by three general sets of variables: 1) each innovation's set of pros and cons, or attributes; 2) the characteristics of adopters; and 3) the larger social and political context, including the salience of issues, framing and timing.⁸⁷ The seminal work in the field of innovation is E. M. Rogers' Theory of Diffusion of Innovation, originally developed in 1962, which explains how an idea or product gains momentum and spreads through a specific population or system.⁸⁸ This theory underpins the adoption curve, which depicts the life cycle of innovations (see Figure 3). Rogers' Theory of Diffusion of Innovation is now over 50 years old and has been adapted in thousands of different ways, and one of the main criticisms of the theory is that there has been no cohesive effort to update it. Another criticism is that it focuses on a one-way flow of technology from the sender of innovation to the receiver, which does not capture how adopters influence innovation.⁸⁹

Figure 8
Innovation adoption curve⁹⁰. The context of diffusion



87 Dearing, James W., and Jeffrey G. Cox. 2018. "Diffusion of Innovations Theory, Principles, And Practice". Health Affairs 37, No. 2: 183-190. [https://www.researchgate.net/publication/322941167_Diffusion_Of_Innovations_Theory_Principles_And_Practice].

88 Rogers, Everett M. 1962. Diffusion of Innovations. New York: Free Press of Glencoe.

89 Ayodele, Afolayan Emmanuel. 2012. "A Critical Analysis of Diffusion of Innovation Theory". [https://odinakadotnet.wordpress.com/2012/09/22/a-critical-analysis-of-diffusion-of-innovation-theory/].

90 Dearing, James W., and Jeffrey G. Cox. 2018. "Diffusion of Innovations Theory, Principles, And Practice". Health Affairs 37, No. 2: 183-190. [https://www.researchgate.net/publication/322941167_Diffusion_Of_Innovations_Theory_Principles_And_Practice].

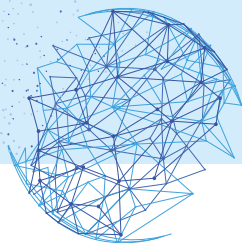


Figure 9.
Innovation assessment framework

	Assessment questions
Relative Advantage	Can the technology's implementation increase efficiency and effectiveness, compared to current processes?
Sector Alignment	Is the technology consistent with donors' attitudes and values regarding regulation and risk?
	Is it aligned with the sector's principles?
Complexity	How difficult is implementation and use of the technology?
Potential for reinvention	Are there examples of successful use in other industries?
	Are there several iterations/applications?
Proven results	Are there tangible results demonstrating the technology's success at increasing the efficiency and effectiveness of giving?

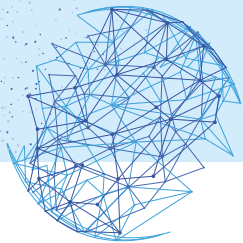
Based on our review of the literature, we developed a framework that uses five factors identified in the Theory of Diffusion of Innovation as the characteristics that influence the likelihood of technologies being adopted by individuals:⁹¹

- 1 Relative advantage:** The degree to which an innovation is seen as better than the idea, programme or product it replaces
- 2 Compatibility:** How consistent the innovation is with the values, experiences and needs of the potential adopters
- 3 Complexity:** How difficult the innovation is to understand and/or use
- 4 Triability** (and the potential for reinvention): The extent to which the innovation can be tested or experimented with before a commitment to adopt is made
- 5 Observability:** The extent to which the innovation provides tangible results

We adapted this framework to reflect the most pressing questions and relevant terminology for the giving sector (see Figure 4). To facilitate a comparison of potential impacts across the sector, we asked the same questions about each of the ten technology applications discussed in this report.

In addition to this framework analysis, our research looked at the characteristics of the adopters—in this case, the stakeholders in the giving chain. This analysis takes into consideration both the (often lengthy) period of time between a technology's invention and its application in real-world scenarios, and the unpredictable ways in which technologies play out in the real world, with unforeseen use cases and repurposed innovations. Blockchain, for instance, began as a libertarian project in 2008 to free money from the control of central banks, yet today it is being deployed in diverse areas, from property titling to healthcare records. Our research also takes into consideration the very limited extent to which these technologies are currently being used in the giving sector.

⁹¹ Boston University School of Public Health. "Diffusion of Innovation Theory". [<http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories4.html>].



Given the complexity and subjectivity of some of these assessments, we have not ranked the technologies. Instead, we present the main promises and risks for each technology application, based on the needs of the stakeholders in the giving chain. Donors, intermediaries and nonprofits will all be influenced by emerging technologies, but it is likely that these stakeholders will alter the course of these technologies as well. The next chapter presents the key findings from our analysis.

4.

Potential impact of emerging technology applications in the giving sector



Based on our assessment of the Diffusion of Innovation framework and our landscape analysis of current technology applications in the giving sector, this chapter presents some of the key findings from the Venture into the Future of Giving research programme.

4.1 Big data and AI analytics: Matching donors and recipients

AI analytics can increase the efficiency of information processing and can help to build and sustain trust in the giving sector. It can also help to generate new metrics that will help organisations and intermediaries to better understand donors' motivations and behaviours. However, ethical and privacy considerations require careful consideration. The legal implications of privacy laws already weigh heavily on stakeholders in the global giving chain. Nonprofits and intermediaries must comply with the European Union's General Data Protection Regulation (GDPR; a strict legal privacy framework) if they serve European donors.⁹² In India, a recent decision by the Indian Supreme Court limits the use of biometric information by private-sector providers, signalling an increase in privacy regulation.⁹³ In China, a new national standard on personal information protection is likely to become the most far-reaching privacy regulation in the world.⁹⁴ All stakeholders in the giving sector must conduct a careful analysis of the promises and risks of this technology to ensure that privacy concerns do not outweigh the benefits of introducing the technology to the sector.

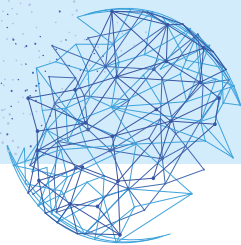
The promise

Currently, the *relative advantage* of AI analytics is significant as the technology could increase the effectiveness of fundraising by providing in-depth insights into current and potential donors' preferences. Of all the technology applications analysed in this report, AI analytics has the greatest *potential for reinvention*, having been successfully

⁹² Fluskey, Daniel. 2017. "GDPR: How charities should prepare for data protection changes" [<https://www.theguardian.com/voluntary-sector-network/2017/may/05/gdpr-charities-prepare-eu-data-protection-changes-consent-fundraising>]

⁹³ India Times. 2019. "Lok Sabha passes bill to amend Aadhaar act" [<https://economictimes.indiatimes.com/news/politics-and-nation/lok-sabha-passes-bill-to-amend-aadhaar-act/articleshow/67385990.cms>]

⁹⁴ Sacks, Sam. 2018. "New China Data Privacy Standard Looks More Far-Reaching than GDPR" [<https://www.csis.org/analysis/new-china-data-privacy-standard-looks-more-far-reaching-gdpr>]



commercialised and used profitably in a wide variety of industries already. For example, some organisations already use structured historical data from CRM providers. The use of unstructured data from online sources—which could allow organisations to reach untapped donors—is less pervasive in the giving sector.

The risks

There are valid and growing concerns about data privacy and the ethical use of individual data, which complicates the application of practices like web scraping and the use of social media sources to profile potential donors. Privacy laws and legally mandated disclosure requirements are becoming stricter across the globe, following the lead of the GDPR. While more stringent data privacy regulations can help to ensure that these technology applications are *aligned* with the giving sector's values, they may also increase the cost and *complexity* of implementation. This might lead to greater fragmentation in the data available to nonprofits, widening the gap between nonprofits that can afford data and those that cannot. This could affect the efficient allocation of resources from donors to nonprofits and skew performance metrics towards nonprofits with more resources and greater access to data.

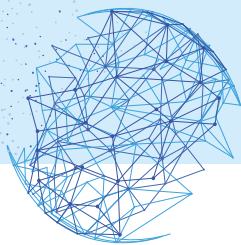
On balance

Big data and AI analytics can greatly improve the effectiveness of fundraising campaigns by helping to more accurately identify giving opportunities and untapped donors. The benefits must be balanced against the risks, however, which mainly relate to privacy issues and “data hygiene”, including biases and faulty predictive models. Partnering with the right provider is key to successfully implementing AI analytics. Providers should prioritise respect for privacy, as well as the ethical and bias-

conscious use of data, without compromising the efficiency of the process.

Our landscape assessment revealed that a few providers are already serving the giving sector. It also found that these services come at a cost to nonprofits. While the technology itself is inexpensive, the overall service cost rises after taking into consideration the costs of providers' technical and legal expertise. For this reason, successfully implementing and scaling this technology in the giving sector may require similar organisations to pool their resources to purchase services from qualified providers and create common databases that they can share. This could also be a valuable investment for large donors that are looking to improve and would greatly benefit from the use of data by nonprofits.

Lastly, third-party providers have a responsibility to offer tailored products that add value to the sector. Providers should view nonprofits as partners, rather than clients. Nonprofits can help to generate data that these providers can benefit from and are essential to ensuring providers' commercial success.



4.2 Virtual reality and augmented reality: Motivating and informing giving

“VR/AR experiences are coming from a huge range of creators. This creates enormous opportunity to diversify and bring collaborative solutions in the giving space as they can foster joint problem solving, where both donors and recipients take a more active role.”

Lucien Parsons, Director of the Mixed/Augmented/
Virtual Reality Innovation Centre

Laboratory experiments have demonstrated that fully immersive VR experiences have the potential to unlock empathy, which is a powerful driver of trust.⁹⁵ They can also increase the efficiency of storytelling, which is a useful tool for heightening altruism.⁹⁶ However, the promise of this technology also represents its greatest risk, as it can be used to manipulate donors. In the giving sector, there are already examples of images and stories being curated to make recipients look poorer than they are.⁹⁷ This exploitation of poverty, which could become an exponentially larger risk with the use of VR technologies, can have negative implications for recipients and reduce trust among donors. AR is a less immersive but more portable technology, which makes its potential for uptake different from immersive VR experiences. The portability of this application could promote behavioural change by reminding users to incorporate giving into their daily lives. The lack of immersion can also make the impact on donors’ cognitive responses less pronounced.

⁹⁵ Jeremy Bailenson. 2018. “Experience on Demand” Ted Talks at Google [https://www.youtube.com/watch?v=HZKGdeg1Xfs]

⁹⁶ Lok, Benjamin. Co-Director of VR for Social Good at University of Florida. December, 14, 2018

⁹⁷ Parsons, Lucien. Director of the Mixed/Augmented/Virtual Reality Innovation Centre. December 18, 2018.

The promise

The *relative advantage* of AR and VR depends on their quality and portability. High-end VR is particularly effective in eliciting cognitive change through fully immersive experiences. Portable AR applications might be less powerful emotionally, but they are more effective at reinforcing behavioural change through nudges. Unlike the other technologies we assessed, our landscape analysis uncovered some evidence (albeit limited) of VR increasing the effectiveness of fundraising.⁹⁸

VR and AR are also some of the few applications evaluated in this report that have been commercialised with varying degrees of success. Producing and consuming lower-end VR experiences is no longer expensive, thanks to commercial video game design engines and VR headsets.⁹⁹ According to Benjamin Lok, co-director of the VR for the Social Good Initiative at the University of Florida, students learn to produce a VR experience to impact the social good in less than five weeks. Lucien Parsons, the director of the Mixed/Augmented/Virtual Reality Innovation Center at the University of Maryland, argues that this creates “enormous opportunity to diversify and bring collaborative solutions in the giving space as they can foster joint problem solving, where both donors and recipients take a more active role.”¹⁰⁰

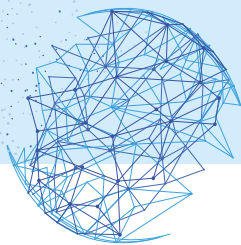
The risks

As the *complexity* of developing VR and AR experiences decreases and the technology becomes democratised, the risk of manipulation increases. More people will have the power to create alternative realities, and the technology

⁹⁸ United Nations SDG Action Campaign. 2017. “How the United Nations Is Using Virtual Reality”. [https://sdgactioncampaign.org/2017/07/07/how-the-united-nations-is-using-virtual-reality/].

⁹⁹ Lok, Benjamin. Co-Director of VR for Social Good at University of Florida. December, 14, 2018

¹⁰⁰ Parsons, Lucien. Director of the Mixed/Augment/Virtual Reality Innovation Centre. December 18, 2018



could be used to deceive donors rather than to increase transparency. However, fully immersive, high-end experiences remain expensive and impractical. Lower-end solutions, such as cardboard headsets, are cheaper but provide lower quality experiences.

On balance

VR and AR have tangibly increased the effectiveness of fundraising, generating empathy and encouraging behavioural change, and increasing the likelihood of donors committing their resources (or increasing their donations) to good causes. As they exist today in the sector, VR and AR cannot provide donors with tangible evidence of the impact of their investment, but they can make them feel this impact.

To optimally deploy AR and VR, stakeholders must be careful not to unethically manipulate users, and they should be mindful of existing challenges facing the giving sector, including the use of extreme poverty imagery, which can be offensive to intended beneficiaries. Currently, fully immersive experiences are limited to well-resourced fundraiser groups, due to the technical complexity of creating and delivering high-quality VR. The broader sector will likely be more affected by lower-end solutions and commercial applications, including portable AR. Portable VR and AR experiences will reach wider audiences, and while they might not be fully immersive they have the potential to impact donors' everyday lives as they can be accessed from their mobile phones. Evidence about the impact of games and/or AR experiences suggests there is room for the development of tailored content for retail donors that can access and continuously donation platforms through well curated virtual experiences.

4.3 Cryptocurrencies and blockchain payments: Facilitating transactions

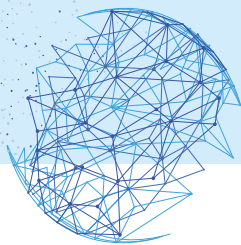
"Moving money more quickly, more cheaply and with greater transparency can help organisations serve other vital needs, especially in the aid industry."

Ben Joakim, Founder of Disperse

Cryptocurrencies have become an important source of funds for the giving sector due to the large amount of wealth they have generated over the past two years. However, in their current state the risks associated with cryptocurrencies appear to outweigh any potential they have to build trust, increase efficiency or generate better metrics of impact. By contrast, blockchain payment solutions, coupled with innovative regulated financial institutions, have the potential to reduce the frictions that make it so difficult for individual donors and small organisations to transact, particularly across borders.

The promise

The *relative advantage* of blockchain solutions is high when compared to the transactions currently performed within the global banking industry. The technology has the potential to increase the speed and reduce the cost of payments, which are particularly challenging for nonprofits. Blockchain can also generate trust among financial intermediaries. This is critical in cross-border payments, where networks are highly fragmented and compliance risks increase. Lastly, blockchain can provide immutable proof of transactions, which could help to reduce fraud.



The risks

The use of regulated financial intermediaries like banks or e-money issuers on the blockchain can decrease the risk associated with the use of cryptocurrencies. However, these regulated financial institutions are still responsible for compliance and liquidity costs, and these additional regulatory requirements can increase the *complexity* and cost of this technology application. There does not seem to be a clear *relative advantage* for cryptocurrencies in the giving space; indeed, the use of cryptocurrencies as payment mechanisms is currently in decline.¹⁰¹ Moreover, volatility, regulatory uncertainty and technological *complexity* suggest that they may not be able to quickly replace the use of fiat currencies. Cryptocurrencies are also loosely regulated, presenting financial risk at a systemic level, and they cannot comply with obligations related to money laundering, terrorism financing or provider liquidity thresholds to protect assets.

On balance

Cryptocurrencies can be a source of funds for the sector, but their associated risks—including the volatility of the cryptocurrency market, the lack of regulation and their exposure to illegal industries—probably prevent integration into the giving space at present. Blockchain-based payment solutions can facilitate payments from donors, but they face scalability challenges despite large investment in the financial services industry. Niche financial institutions such as e-money and mobile providers may be able to tailor products for the giving sector if they can attain a critical mass of users. Blockchain can create a global ecosystem that stitches together disparate networks.

¹⁰¹ Rauchs, Michel, Apolline Blandin, Kristina Klein, Gina Pieters, Martino Recanatini and Bryan Zhang. 2018. "Second Global Cryptoasset Benchmarking Study". Judge Business School, University of Cambridge. [https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/alternative-finance/downloads/2019-01-ccaf-2nd-global-cryptoasset-benchmarking.pdf].

4.4 Internet of Things and drones: Tracking outcomes

"The effectiveness of these technologies is highly dependent on a clear understanding of local terrain, local language, knowledge, customs and partnerships."

Patrick Meier, Founder of WeRobotics

Emerging technologies like the IoT, drones and robotics can help to automate data collection of tangible outputs like carbon emissions. As a result, technological tools may soon automate programme audits, even in the tiniest kitchens, as in Nexleaf's StoveTrace project. This is just one piece of the broader programme monitoring and evaluation puzzle, but it is a significant piece, given the amount of resources that nonprofits must spend to comply with evaluation demands from institutional donors and impact investors. The automation of data collection could trigger a move towards the use of impact metrics as a measure of nonprofits' success.

The promise

The *relative advantage* of recording and reporting technologies is that they can increase trust, increase the efficiency of data collection and enable outcome data to be recorded and shared. The IoT and drones have great potential to increase the efficiency and scale of data collection and reduce the costs of measuring outputs, especially in environmental applications. Drones are especially useful in cases where it is too time-consuming or difficult for humans to certify results, such as monitoring environmental efforts or reaching



remote locations.¹⁰² The *complexity* and cost of implementing drone solutions has also fallen,¹⁰³ and the commercialisation of these technologies makes their potential uptake more likely. While the individual cost of automation technologies might seem prohibitive for some organisations, reductions in other costs as a result of implementing more efficient monitoring processes might outweigh the capital investment.

The challenges

The effectiveness of these technologies is highly dependent on a clear understanding of specific local characteristics. For example, Patrick Meier, founder of WERobotics, emphasises the need for a clear understanding of local terrain, local language, knowledge, customs and partnerships. As a result, he suggests that “Western technology providers should not be applying these technologies in developing countries without strong local partnerships that include knowledge transfer and technology transfer to local experts, so that the latter take the leadership role in applying these technologies in their own countries.”¹⁰⁴ These collaborations might affect the pace at which these technologies can be scaled and replicated, but they ensure that the introduction of these technologies does not replicate what Mr Meier describes as “the same old top-down, Western-centric model”. Similar challenges exist for IoT and sensor technology. These technologies are highly sensitive to local geographic and climate conditions, are not appropriate for all project-monitoring efforts and are best applied to physical-world monitoring.

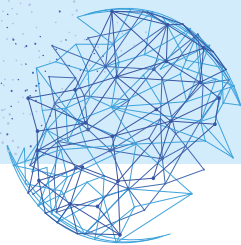
On balance

Drones and the IoT can increase the efficiency and scale of outcome and project monitoring. They hold particular promise in areas such as environmental monitoring, which often require sensor technology and aerial or underwater images. However, this only covers a small portion of the giving supply chain. There is also a distinction between evaluating projects and measuring impact on end-user beneficiaries. Pairing data collection tools with more efficient verification systems, such as smart contracts, could help to unlock the full potential of these technologies. Smart contracts, which are discussed in the next section of this report, can help to digitise verification—another aspect of the monitoring and evaluation process that can impose high costs on organisations. Automating verification processes can enhance the efficiency of these processes and help to reduce leakage of donations.

¹⁰² WeRobotics. 2018. “Tanzania Drone Pilots Team Up with IFPRI and Local Smallholder Farms”. [<https://blog.werobotics.org/2018/04/10/tanzania-drone-pilots-team-up-with-ifpri-and-local-smallholder-farms/>].

¹⁰³ World Bank. 2017. “Tapping the Potential of Drones for Development”. [<http://www.worldbank.org/en/topic/transport/brief/drones-for-development>].

¹⁰⁴ Meier, Patrick. Founder, WERobotics. 8 January 2019.



4.5 Smart contracts and impact tokens: Validating and monetising performance

“Traditional impact bonds mostly cater to high-net-worth donors and foundations. The fundraising process is very closed. But in the future, using decentralised technologies, you can open the pool of funding more broadly, while keeping the administration costs associated with small donations.”

Fennie Wang, Regulatory Advisor

Automated verification procedures like smart contracts can enhance both the efficiency and the reliability of impact tracking. Instead of human certifiers, technologies can be used to monitor impact directly and reliably. Impact tokens can incentivise donors and funders to contribute to high-impact causes by assigning monetary value to a metric.

The promise

The *relative advantage* of smart contracts is high, as they can help to increase the transparency of the impact verification process and create permanent, public, tamper-proof, record-of-impact metrics. Impact tokens can have a direct impact on donors' experience by providing them with certified proof of impact for their donations. Compared to other assets such as impact bonds, impact tokens also enable more robust systems of impact tracking, providing transparency to potential funders. Finally, by creating a new impact-based asset class, impact tokens could enable trading by donors within specialised token markets. The *alignment* of these technologies with the interests of individual donors is high, as donors

seek more information and greater control over how their money is spent.

The challenges

The *risk* of giving donors too much control over how their money is spent is also high. Donors have limited awareness of operational realities in the nonprofit sector, and NGOs need working capital to be able to deliver projects; a focus on outcome-based payments could, at scale, weaken the ability of nonprofits to fund actual projects. Implementation of these technologies is also highly *complex*. Widely accepted industry standards for measuring project success are lacking, which makes it difficult for donors to identify best performers. Outcome-based payments might also focus nonprofits on easier-to-solve social issues. Finally, tokens are subject to strict financial regulation in the United States and are banned in other countries, which means that these solutions cannot be implemented globally. In fact, some of the organisations that initiated projects in this space are no longer in operation due to the technical difficulties associated with implementation.

On balance

Impact tokens and smart contracts are highly efficient and powerful technologies, but they are difficult to develop, requiring significant technical expertise and regulatory oversight to protect against abuse. For those with the resources to scale these technologies despite the challenges, such platforms can deliver value for nonprofits. Third-party developers could also help the ecosystem by providing specialist technical skills to NGOs that seek to use these tools but lack the in-house capacity to do so.

Conclusion



Fourth Industrial Revolution technologies are transforming the development assistance and giving sectors, from using AI and machine learning to diagnose diseases to implementing drone-based humanitarian logistics. However, their potential impact on the *giving process* remains underappreciated to date.

This report has evaluated ten technology applications, based on their potential impact along five links in the giving chain: matching donors and recipients, motivating and informing giving, facilitating transactions, tracking outcomes and validating performance. The report focuses on three key challenges faced by stakeholders in the giving sector across these five links: building and sustaining trust, increasing efficiency, and measuring and maximising impact. The research has identified existing use cases for emerging technologies in the giving supply chain and assessed the possibilities and risks these applications might introduce to the giving sector.

To support **donor and recipient matching**, big data and AI are helping charitable organisations to understand more about the views, behaviours and opinions of current and future donors, and about trends in the giving sector. A key challenge is determining how to take advantage of the benefits of analytics in a way that does not impinge on privacy and is compliant with relevant regulations like the GDPR.

To **motivate and inform giving**, VR and AR are allowing donors to see the impact of their investments, overcoming the marketing and communications challenges faced by the sector in the past. A key challenge is the potential for misuse and manipulation when using a powerful tool to unlock empathy.

To **facilitate transactions**, blockchain and cryptocurrency can add a new rail to financial infrastructure, with tech companies using these facilities to reduce transactions costs.

To improve **outcome tracking**, sensors, drones and the IoT can be used to gather data that humans cannot, including on environmental and pollution challenges.

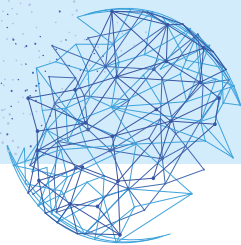
To **validate performance**, impact evaluation can be facilitated by smart contracts, which promote transparency and enable automated pay-outs when a social programme reaches a performance threshold. This gives donors greater control over performance-related disbursements. Tokens



can also help to monetise measures of impact and create new economic incentives for donors beyond tax exemptions.

With the exception of individual use cases, our research has found that all of the evaluated technology applications are nascent in terms of active use in the giving sector. This is to be expected for the technologies that are still being developed and are yet to reach their full potential. Predictive analytics, automation and VR have only recently been commercialised, and blockchain remains largely limited to pilot projects (although it is being adopted across industries including trade, legal services and healthcare, suggesting significant operational potential). As a result, there is limited evidence of sustained success in the giving sector for these applications, but history shows that development cycles for an available technology can often be long. For this reason it is important to keep track of the course these technologies take in the sector and other industries.

While no single technology can overcome the challenges inherent to the giving process, smart investment in appropriate solutions can ensure that all participants in the ecosystem make optimal use of their resources. The structured analysis of technologies undertaken in this study seeks to provide a guide for groups that are willing to experiment and invest to ensure that the sector's sizeable contribution to economic and social development can be deepened and sustained in the years to come.



Methodology

The research and analysis for this report was undertaken by The Economist Intelligence Unit and finalised in May 2019. The objective of the research initiative was to examine current applications, opportunities and challenges of emerging technologies in the giving sector. During the research programme, The EIU developed a landscape analysis of key technologies and players in the giving sector, interviewed leading technology and philanthropy experts, conducted supplemental secondary research, developed a custom framework to assess the application and impact of ten key technologies and provided an overall analysis and report of the programme's findings. The research focused primarily on the giving sectors of the United States, China and India, as well as on cross-border charitable giving.

Landscape analysis and technology selection

During the first stage of the programme, The EIU constructed a landscape analysis of key technologies and players in the giving sectors of these countries. This analysis revealed a wide range of technologies (both new and established) being explored by organizations and stakeholders. In order to give structure to this collection, we organised the giving sector into a "chain" of five areas where these technology solutions could be applied:

- 1 matching donors and recipients,
- 2 motivating and informing giving,
- 3 facilitating transactions,
- 4 tracking outcomes, and
- 5 validating and monetising performance.

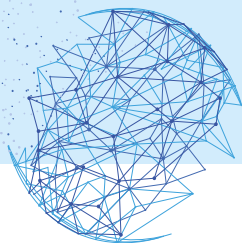
Using this framework, we narrowed the focus of our subsequent research to a core of ten "emerging technology" applications (two in each part of the chain). Emerging technologies were defined as those that had been in the market for less than five years, had one or two dominant players and were not yet found in all three countries' giving sectors.

Expert interviews

The next stage of our research encompassed in-depth interviews with 28 technology and philanthropy experts. These individuals were selected based on their knowledge of and experience with one of the ten technology applications, or their understanding of the unique dynamics of the giving sectors in the United States, China, or India. Interviews were conducted with the intent of drawing insights into how emerging technologies might impact the future of charitable giving in each of these countries and the future of charitable giving across borders. Interview topics included the background, implementation, drivers and risks of these technologies, as well as the future evolution of the sector.

Secondary research

Following the expert interviews, we conducted further secondary research on each of these technologies in order to more fully understand their application to the giving sector. This included research into specific use-cases among charitable organizations as well as research into the broader maturity of these technologies beyond the giving sector. Our research also focused on identifying the unique promises and risks associated with each technology's implementation and adoption in the giving sector.



Innovation assessment framework

	Assessment questions
Relative Advantage	Can the technology's implementation increase efficiency and effectiveness, compared to current processes?
Sector Alignment	Is the technology consistent with donors' attitudes and values regarding regulation and risk?
	Is it aligned with the sector's principles?
Complexity	How difficult is implementation and use of the technology?
Potential for reinvention	Are there examples of successful use in other industries?
	Are there several iterations/applications?
Proven results	Are there tangible results demonstrating the technology's success at increasing the efficiency and effectiveness of giving?

Assessment framework

In this stage of the programme, our team developed a custom assessment framework, which was used to evaluate each of the ten technologies for their potential impact across the giving sector and their likelihood of successful adoption. This framework was developed after a review of the literature on innovation adoption and was adapted from E.M. Rogers' Theory of Diffusion of Innovation to reflect the most pressing questions and relevant terminology for the giving sector. The framework uses five primary factors to rate a technology's potential for impact and adoption:

To facilitate a comparison of potential impacts across the sector, we asked these same questions about each of the ten technology applications discussed in this report. Furthermore, our assessment also looked at the characteristics of adopters in the giving

sector, taking into consideration the time between invention and application, as well as the unpredictable ways that technological evolution can play out in the real world. Given the complexity and subjectivity of some of these factors, we did not rank the technologies upon conclusion of our assessment. Rather, the findings were presented qualitatively, with the unique contexts of each part of the giving chain taken into consideration.

Final analysis and report

This final report represents the culmination of our research programme on the potential impact of ten emerging technologies on the giving sector. The information presented herein consolidates the key findings from each stage of our research and provides a comprehensive overview of our assessment of each technology. The analysis and content of this report was finalised in May 2019.



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