OXCHAIN

Smart Donations

A project with Oxfam Australia

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Smart Donations
by Oxfam Australia

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Executive summary

Emerging blockchain technologies promise to radically change the way we share, circulate and distribute value. Moreover, they offer a huge potential to disintermediate current business processes and provide means to establish new models of trust.

However, the possible benefits for the international development sector have only begun to be understood, and much research and innovation in the blockchain domain is presently limited to the financial and tech industries.

Through this collaboration with Oxfam Australia, we are exploring Smart Donations, a novel approach to giving, built on blockchain technology. Our Smart Donations platform allows donors to give to the issues they care most about by attaching real-world conditions to their pledges.

The platform works by creating secure digital vaults or 'escrows' – where donors can safely pledge funds, which will only be released to a charity if or when certain conditions are met. For example, a donor could pledge to support a 'Cyclone Insurance' and when a cyclone makes landfall, the funds are released for a disaster response. Crucially, these conditions are validated by trusted data sources, in partnership with a Non Government Organisation (NGO), and relate to the core reasons and needs that a donor might have for giving to charity. Driven by measurable real-world data, our approach supports a large variety of triggers, beneficiaries and data sources, thus it can be adapted to a variety of fundraising campaigns, projects and institutions.

Based on initial fieldwork and our partnership with Oxfam Australia, we ran a real-world trial of the Smart Donations platform from October to December 2019. We deployed Smart Donations as an Android and iOS mobile app with 86 participants, for up to 8 weeks. Our pilot was highly exploratory. We sought to test the platform, and identify

strong use cases and applications from real users and charitable donors. Participants were given limited funds to pledge as they saw fit, to five campaigns that were co-constructed with Oxfam Australia, and leveraging different data sources and conditions.

Earthquake Insurance allowed donors to pledge to donate whenever earthquakes of a specific magnitude and location were detected around the world. *Keep Families Together* invited donors to donate whenever a petition for government action on refugees was signed by others. *Shine a Light on Refugees* explored relating giving to politicians and activists discourse on Twitter about topics related to refugees. *Fight Climate Change* asked donors to pledge funds for climate change projects, whenever extreme temperatures were reached in Australian cities. And the *Cyclone Protector* contract responded to the emergence and threat of Pacific cyclones – as these were detected, funds could be pledged for disaster response and resilience.

During our short trial, we recorded how donors used the app, collected survey responses and interviewed a number of participants about their experiences. Our analysis of this data is still ongoing, but there are already some key findings. The app produced highly novel and compelling experiences for many donors, but also provided mixed emotions. Contracts were signed with anticipation and excitement, but then when they were triggered and funds were released at unexpected moments, participants reflected on why they were giving, and if this was the right time and the right way to support causes they cared about.

Our participants engaged with the app frequently, and across daily rhythms, often in between other activities as they were notified when their conditions have been met or were expired which meant their money was returned. Some envisaged Smart Donations as an investment platform, where priorities for donations could be set and forgotten, and then pledged funds would be automatically allocated over the course of the year. Others sought and enjoyed frequent engagement with even small donations, and valued an ongoing awareness of world events, and a sense of immediately responding to these events. These experiences were mediated by the conditions, triggers and Smart Donations themselves – with some triggering very frequently, while others were much slower and less active. It's therefore crucial that charities are able to understand, calibrate and communicate clearly to donors how different donations and contracts may play out over time.

The pilot in 2019 was the first real world exploration of a data-driven donation framework that leverages emerging blockchain technology and smart contract capabilities to support real-time, automated conditional donations. The Smart Donation pilot in 2019 was the first real-world exploration of a data-driven donation framework that leverages emerging blockchain technology and smart contract capabilities to support automated conditional giving. Through our research, we aim to gain a better understanding of the challenges, stakeholder's expectations and the technical requirements of such systems in particular. More broadly, our work explores the opportunities and implications of situating blockchain and data-driven technologies situated in the space of international aid and opens new directions for future research.

Who are we

OxChain research project

OxChain is a collaborative research project between the Universities of Edinburgh, Northumbria and Lancaster, and research partners Oxfam Australia, Oxfam UK, Zero Waste Scotland, Volunteer Scotland and WHALE Arts. By bringing together experts in digital design, informatics, cryptography, business and international development we are exploring the role of distributed ledger technologies in non-profit and charitable sectors.

Partnership with Oxfam Australia

This work is the result of a series of stakeholder engagement activities (i.e. co-design workshops, interviews) with donors, NGOs and domain experts (i.e. consultancy firms, market research, branding and design agencies, blockchain experts) between 2017 and 2020.

The Smart Donations platform has in particular been shaped through extensive engagements with Oxfam Australia's 'OxLabs' blockchain innovation group, Oxfam Australia's fundraising and innovation teams as well as Oxfam Australia's engagement in piloting the platform with their supporters.

Picture taken during field visit of the Oxchain team in Feb 2019 at the Oxfam AU headquarters in Melbourne. People from left: Ludwig Trotter, Josh Hallwright, Chris Elsden.

What are Smart Donations?

Smart Donations are a new and novel approach to giving we are exploring together with Oxfam Australia. With our Smart Donations app, donors can create their own conditional and data-driven donation.

A donor can pledge a donation, but this donation will only be released to a charity if certain conditions are met – and those conditions are determined using all kinds of different data sources. Crucially, these conditions relate to the core reasons and needs that a donor might have for giving to charity.

For example, a donor could set up a Smart Donation to protect people in Indonesia from an earthquake. If an earthquake above a certain impact strikes, their funds are automatically and immediately released. If not, the funds can be returned, or be pledged to another cause.

In this way, Smart Donations goes beyond measuring impact or tracking a donation. Instead, we offer a platform to make charitable donations programmable, and relate giving directly and immediately to real-world events, from natural disasters, to the local weather, or a politician's tweets.

Our user research suggests this conditional and data-driven approach could have a profound impact on the relationships between a donor and the charities they support. For example, with this platform, charitable giving can be configured to work more like a form of insurance or tax; or to co-ordinate and program giving to occur at specific impactful moments.

How does it actually work?

The Smart Donations platform leverages a specific application of blockchain technologies – creating an automated escrow. An escrow is like putting your money in a locked box before you give it to someone, and they can only open the box under certain conditions. With blockchain technology, we can program this box in some quite specific ways, and make individual, personalised boxes for every donation that is made.

In practice, individual donors can follow templates for a 'contract', and customise simple 'offers', to pledge a donation if certain conditions are met. If the conditions are met, your donation is automatically released. However, once a contract expires, the donations can be returned to the donor, or pledged to another cause. How exactly any contract works is up to the donor, who could decide:

- **How much to pledge**
- **Whether to give a larger one-off amount, or a small amount often**
- **How long a contract should last for**
- **The specific details and thresholds of any conditions (for example, the exact magnitude or location of an earthquake that would trigger their donation)**

Give

... $ up to ... $

Beneficiary

Select

Validator

Select

Condition 1

...... to ......

Condition 2

Select

Condition 3

Select

Building a Smart Donations Platform

To better understand NGO and donor perspectives towards condition-based giving, we have designed and deployed the Smart Donations, a blockchain-driven donation platform and mobile application. Smart Donations enables donors to pledge funds dependent on the occurrence of measurable real-world events, for example, natural disasters like wildfires or earthquakes. Driven by quantifiable real-world data, our approach supports a large variety of donation triggers that can be adapted to a variety of fundraising campaigns, projects and institutions.

Stakeholders

The Smart Donations platform is built around a set of stakeholder relationships between: NGOs (trustees), donors, beneficiaries, and external data-providers. Each of the stakeholders required specialised user and permission models to mediate the interactions between one another within the network. The goal being to create a secure and safe platform for all participants.

Trustees: Verified NGOs act as trustees within the Smart Donations platform. Trustees manage the decentralised network, in particular, offered Smart Donations campaigns. If required, trustees also manage off-chain infrastructure, for example, donor databases.
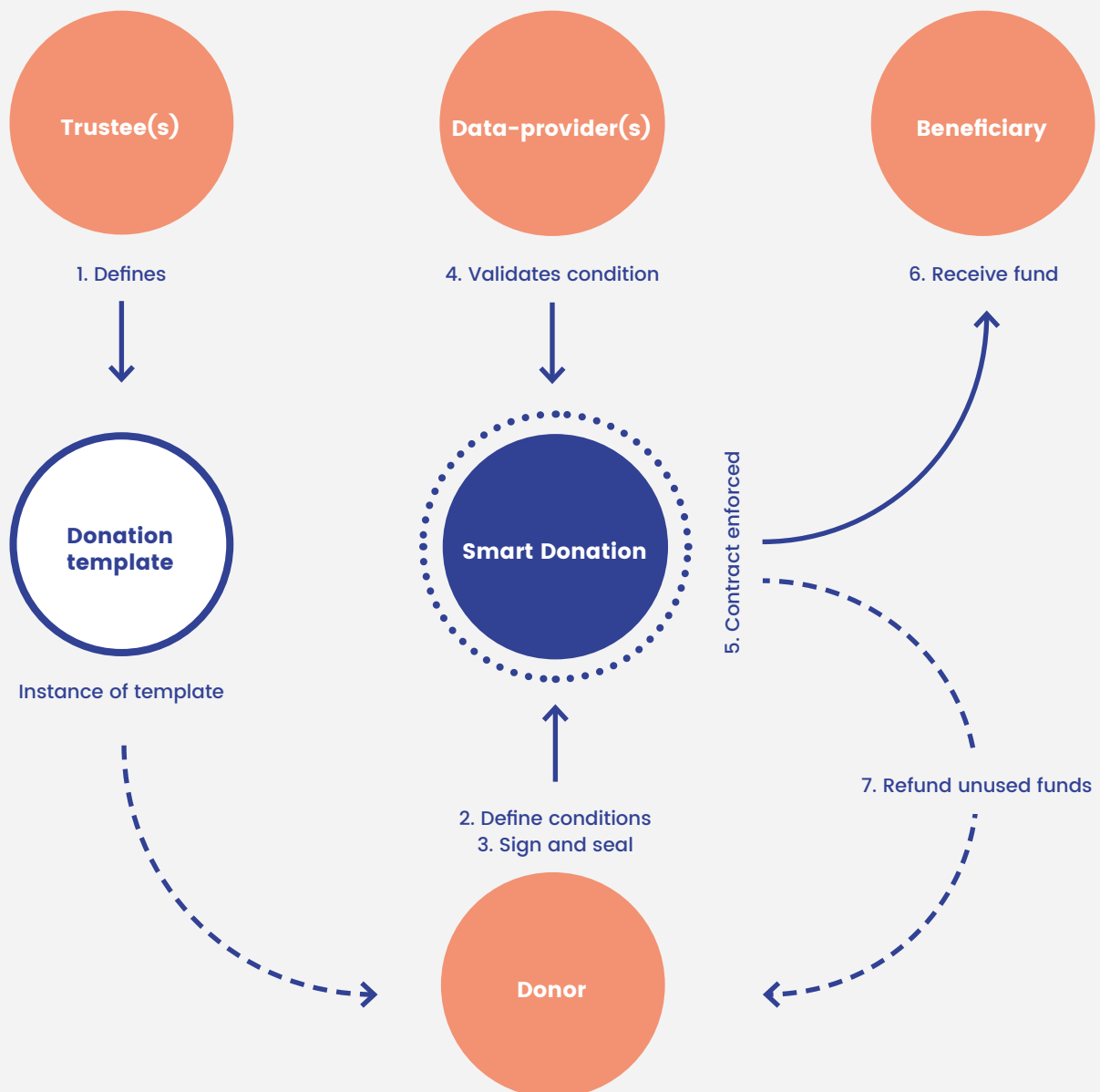
Donors: Regular users are acting on the platform with user permissions. Upon registration, donors are able to exchange funds, browse the Smart Contract catalogue, select, configure and sign pledges.

Beneficiary: Our architecture supports donations to individuals, organisations, charitable projects and funding pools. Upon review and approval through the trustees, beneficiary accounts can be assigned to specific Smart Donation templates.

Data-provider: Trusted data-providers and external data-sources play a crucial role in the verification process events, which lead to the transfer of funds pledged by donors. Third-party data-providers are therefore subject to a comprehensive vetting process and need to be approved by trustees.

Interaction flow

The flow diagram below provides an overview of stakeholder interactions to configure, sign and validate a Smart Donation. Trustees can (1) issue donation templates to define basic parameters (e.g. data-providers, beneficiaries, set of conditions), suitable for the affiliated project. Donors (2) personalise their donation by configuring instances of the donation templates (e.g. duration, amounts, conditions). Once signed (3) funds are sealed in an escrow on the ledger that neither the donor nor the charity can access. Smart donations (4) verified by a trusted data-provider or source are (5) programmatically enforced and (6) funds are transferred to the corresponding NGO project. Unused funds are (7) returned to the donor if his pledge expires.

Trustee(s)

1. Defines

Data-provider(s)

4. Validates condition

Beneficiary

6. Receive fund

Donation template

Instance of template

Smart Donation

5. Contract enforced

2. Define conditions
3. Sign and seal

7. Refund unused funds

Donor

A donor, for example, agrees to donate a certain amount to a disaster relief program in the event of a natural disaster. In order to tailor the donation more closely to the donors' needs, they may set conditions relating to the intensity or nature of the event, geographical boundaries (e.g. continents, countries) or the duration. Third-party organisations and agencies, for example the United Nations or the Global Disaster Alert and Coordination System can validate events which would trigger the release of funds in real-time, significantly reducing the time it takes for donations to reach beneficiaries.

By leveraging benefits of the underlying blockchain, Smart Donations enables donors to (i) personalise donations by defining conditions relating to real-world phenomena, (ii) store the pledged funds in a secure, transparent and decentralised escrow, and (iii) to automatically release funds to charitable organisations or projects once the donor's conditions have been met.

Templates for a data-driven future

Smart donations support a variety of trigger conditions, beneficiaries and data sources. Combined with tailored durations and monetary offers, there is an actual risk of over-diversification of donors pledges, that could lead to a plethora of funding pools that may be too small and too specific to deliver effective aid. In order to prevent fragmentation across donations and to ensure sufficient funds for the specific project or campaign, each Smart Donation is an instance of a template. Issued by a NGO or a group of NGOs, these Smart Donation templates define general parameters, for example, a set of conditions, the beneficiary, the validator, the maximum duration or the minimum or maximum amount a donor can give. We argue that templating facilitates a reasonable balance between the requirements of the NGOs and the demand for individualization by the donors. In addition, being framed around campaigns, templates help donors to find the causes and projects they care about the most.

Smart Donations architecture

The Smart Donation concept and architecture is the result of an interdisciplinary collaboration of researchers in the fields of Human-Computer Interaction, pervasive systems, international aid and cryptography since 2017. Developed through an iterative design process, it has been shaped by a series of stakeholder engagement activities (i.e. co-design workshops, interviews) with donors, NGOs, especially

Oxfam Australia's 'OxLabs' blockchain innovation group and Oxfam GB's fundraising and innovation teams as well as domain experts (i.e. consultancy firms, market research, blockchain experts).

A comprehensive assessment of technical and domain considerations, including trust, security and privacy as well as scalability and performance, has led to a hybrid design using Distributed Ledger Technology and traditional computing with relational databases.

Our conceptual architecture comprises three layers: (i) A smart contract compatible blockchain, (ii) off-chain components and (iii) a visualisation layer. This hybrid design aims to combine performance and efficiency while leveraging existing legal frameworks of conventional computer systems, without compromising on the advantages of Distributed Ledger Technologies, in particular, transparency, self-regulation and security. The distributed ledger (i.e. the blockchain) provides the run-time environment for smart contracts, containing the logic for the value exchange and escrow. The off-chain systems, for example, privacy sensitive user data of donors and beneficiaries, are hosted on traditional databases, distributed between participating NGOs and third-party service providers.

The Smart Donations platform also provides an Application Programming Interfaces (API) that allows data-providers and NGOs to connect to the platform. This enables NGOs to build additional services on top of Smart Donations, to feed data into their existing analytics and Customer Relationship Management (CRM) systems and to build custom web and mobile applications tailored to the needs of the charity and its donors.

Reference implementation

To validate our architectural model and to support our broader research, we built a reference implementation of the conceptual Smart Donations architecture. This reference or sample implementation helped us to verify our theoretical ideas in practice. It will allow other developers to learn from our development and deployments and help them to build their version of Smart Donations. Our implementation comprises of blockchain smart contracts for donations and fund management, off-chain functionalities and databases as well as a mobile application.

The Smart Donations architecture is generally agnostic to specific blockchain implementations and supports public and private networks. To evaluate the feasibility of our proposed design, we specifically considered it's operationalisation on a private, permissionless Ethereum instance. Ethereum provides a cryptographically sound, decentralised, tamper-proof protocol and features support for smart contracts. We implemented off-chain functionalities using a custom Python backend with an SQL database and built a cross-platform mobile application, supporting the two most frequently used operating systems iOS and Android.

This model implementation has been used for the Smart Donations trial with Oxfam Australia and will further be referred to as 'Smart Donations app'.
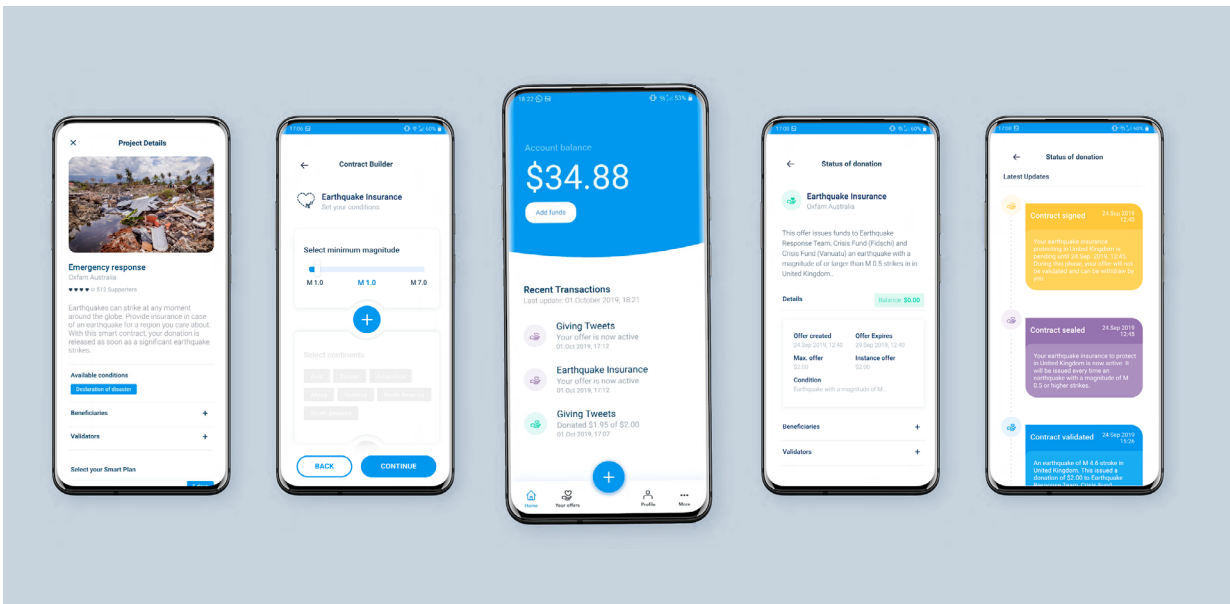
Screenshots of the Smart Donations app used during the trial in 2019.

Exchanging money to digital assets

The exchange of fiat money (i.e. AUD, USD, EUR or GBP) to some form of digital asset (i.e. a crypto currency or a crypto token) is crucial in order to manage, transfer and seal funds in self-governing digital trust funds underwritten by smart contracts on the blockchain. Within the scope of the Smart Donation pilot, all funds have been provided by the OxChain research project and were distributed through digital vouchers.

The OxChain project team took on the role of a 'crypto exchange' and settled (i.e. exchanged digital funds to AUD) with the charity. However, extending Smart Donations, we envision the exchange of funds through exchanges managed by NGOs. Such exchanges will allow donors to credit their account using various payment methods such as credit cards or direct debit, or through the purchase of vouchers in charity shops. The introduction of digital exchanges and the adoption of digital assets relying on blockchain technology more generally does raise interesting research questions, for example, concerning accountability and liability, creating a barrier for charities and NGOs that we aim to explore in further research.

Open source

We are committed to making the model underlying Smart Donations, its architecture, API, design documents as well as a reference implementation available to NGOs, charities and the general public under a free open source license. At this time, the evaluation and the development are not yet completed, hence we are not able to provide an exact timeline.

If you are interested, please contact us at:
oxchain@lancaster.ac.uk.

The Smart Donations trial

The Smart Donations platform and mobile app has been designed and developed between 2017 and 2019 by the OxChain Team (Ludwig Trotter, Chris Elsden, Mike Harding, Peter Shaw), and partners in Oxfam Australia: (Sadie Moore, Josh Hallwright and Kate Jeite-Delbridge).

The pilot ran between October and November 2019 was the first in-the-wild world exploration of a data-driven donation framework that leverages emerging blockchain technology and smart contract capabilities to support real-time, automated conditional donations.

All funds in the trial were provided by the OxChain research project, and transferred to participants through voucher codes emailed directly to trial participants. At the conclusion of the trial, all donations made by participants were accounted for and funds transferred to Oxfam Australia. Participants were not able to offer their own funds during this trial.
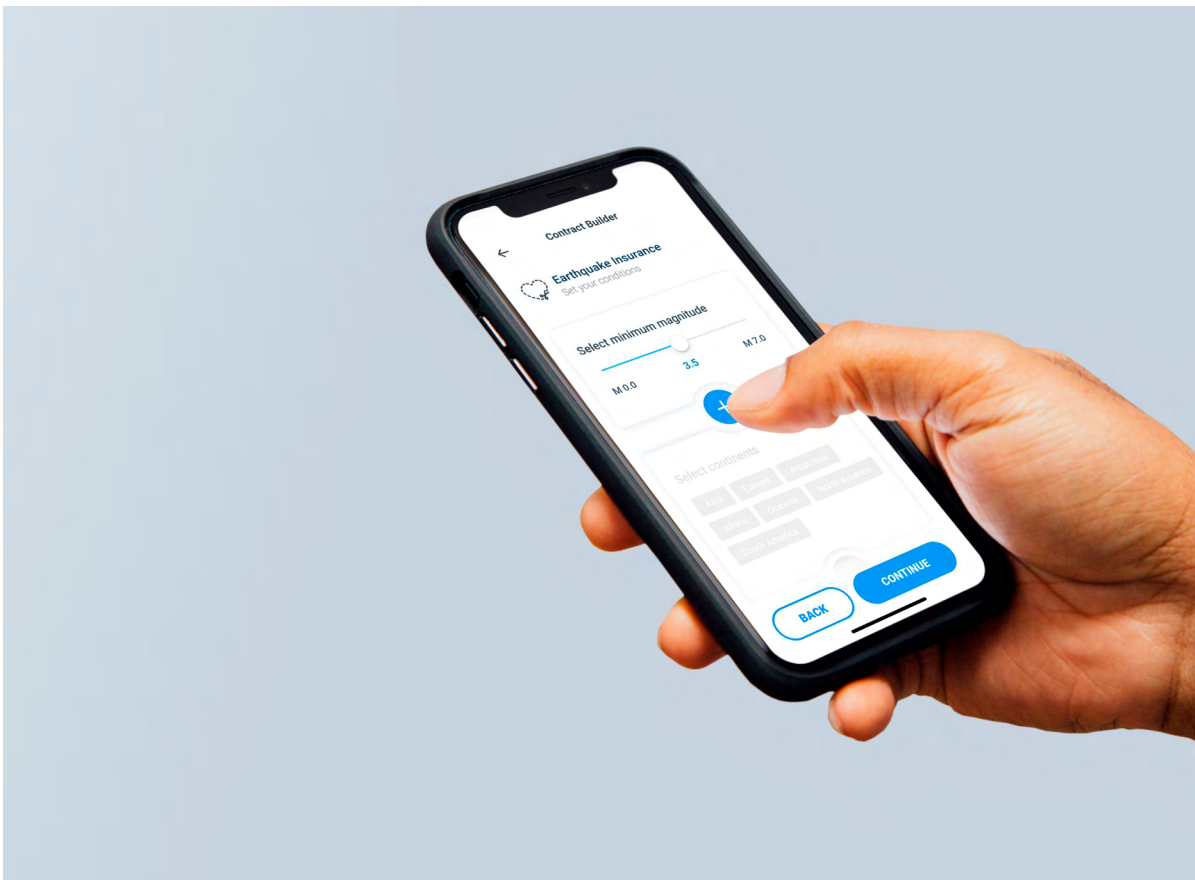
Available Smart Donations

We sought to develop and test a range of content and possible uses of the app. This meant developing a diverse range of 5 Smart Donation 'contracts' with varied data, causes conditions, and types of donations (single sum or smaller repeated donations).

For the trial each contract had a minimum of three pre-set plans for participants to choose from. Pre-set plans varied in duration from 5–14 days. Three of the available contracts (Cyclone Protector, Earthquake Insurance and Shine a Light on the Refugee debate) included a 'contract builder' where participants could create a personalised instance of a contract. Through the contract builder, shorter contracts of 1–7 days could be created.

We chose to configure contracts to raise donations for the following restricted Oxfam projects:

- Oxfam Australia International Crisis Fund

- Oxfam Australia Disaster Risk Reduction (DRR) projects

- Keep Families Together campaign

- Oxfam Australia Climate Change Projects

- Oxfam Australia Refugees projects
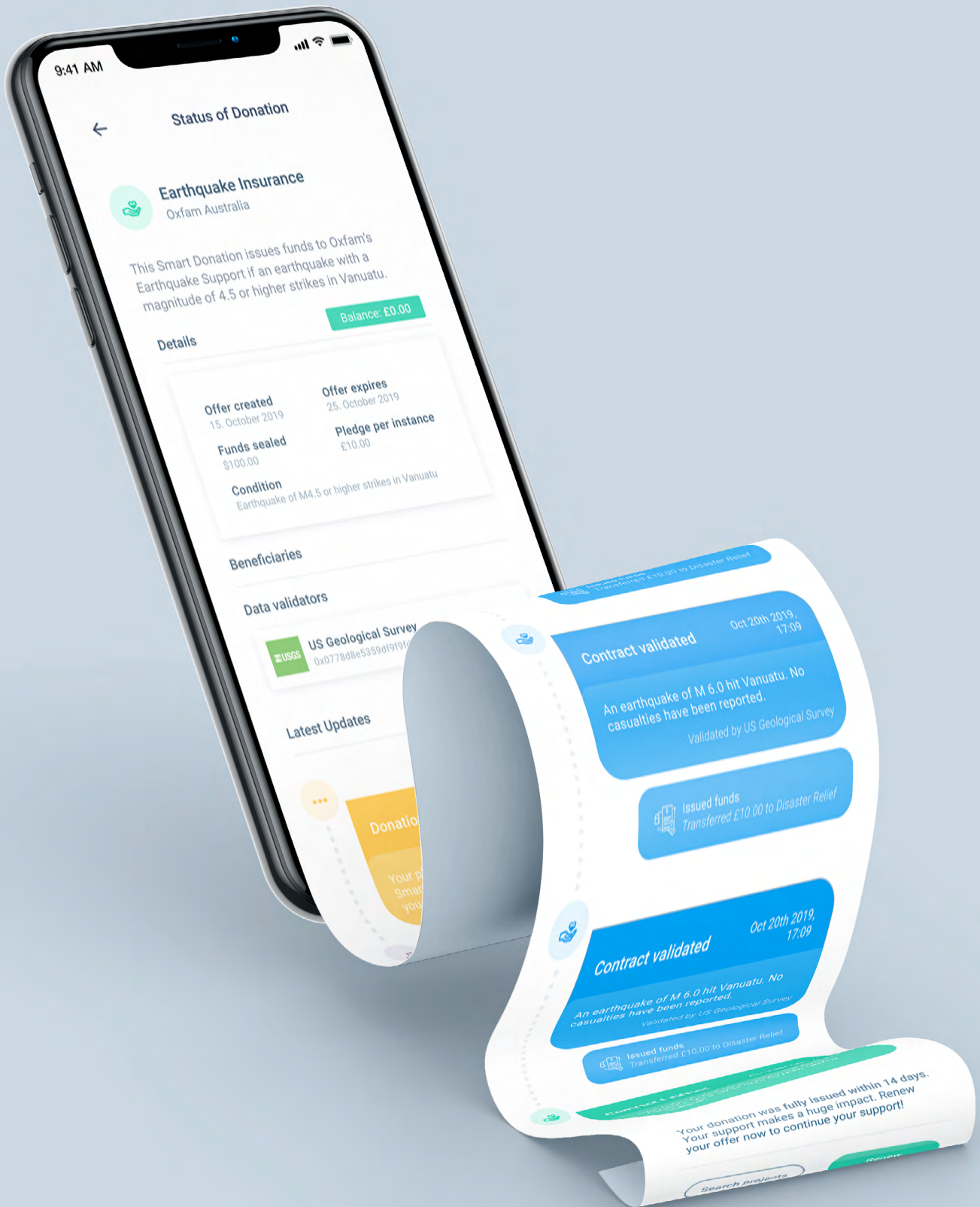
Earthquake Insurance

Earthquakes can strike at any moment. You can make sure communities have the support they need, quickly. Your donation will be released every time an earthquake hits in a region you care about.

What was this Smart Donation about?

This Smart Donation is about ensuring communities that are affected by an earthquake have the support they need, quickly. With this Smart Donation, we can use live earthquake data, to trigger donations to a pooled crisis fund that Oxfam can use to respond to natural disasters around the world. This Smart Donation works like a kind of insurance – donations will be released every time an earthquake above a certain strength occurs in a region a donor cares about. Those funds will then be used in the near future when and where they are needed most.

Beneficiary: International Crisis Fund

Oxfam responds rapidly and efficiently to natural or man-made emergencies around the globe, assessing the most vulnerable people affected and working in partnership with local and international organisations. The International Crisis Fund is a vital resource, which ensures that Oxfam can be on the ground when emergencies strike, providing food, clean water, shelter, hygiene kits and other essential items.

What data did we trust to validate these conditions?

To determine the magnitude and location of earthquakes we were using an open application program interface (API) provided by the US Geological Survey. This data endpoint aggregates data from the global sensor network and allows us to determine the location and the magnitude of an earthquake. The smart donation platform is requesting a new dataset every 5 minutes.

Conditions: What we used to trigger a donation?

In this Smart Donation, we use data on the magnitude of earthquakes and their geographical location.

- **Magnitude (threshold)**
  Donations could be pledged based on the magnitude of earthquakes. The magnitude of earthquakes (M) is typically measured using the Richter scale between M1.0 to M7.0.

- **Continent (multiple)**
  Donors were able to donate based on earthquakes occuring in specific continents.

- **Country (multiple)**
  Donors were further able to select one or a group of specific countries they wished to monitor.

Was the contract builder available?

Yes.

So how might these work?

Emily has spent time in Indonesia on holiday, and was moved to hear about the earthquakes and tsunamis that have struck since 2017. Emily wishes to set up a Smart Donation to donate to crisis funds if an earthquake strikes Indonesia again. To 'create her own' Smart Donation, she selects the continent of Asia, and specifies Indonesia. Then she slides the slider to select a minimum magnitude of 5.5 as this seems to be a big enough earthquake to get into the news. She decided to set the Smart Donation for two weeks.

This has been a longstanding example we have used to explain how Smart Donations could work. In designing this contract for the trial we sought to explore:

- The concept of pledging to insure against natural disasters.

- The use of trusted governmental data.

- A very objective data source (earthquake magnitude and location).

- The use of a very customisable contract builder.

- Supporting pooled disaster funds, even in the instance of smaller non-disaster events.

- Contracts related to specific regions.

- A very frequently triggered contract.

Keep Families Together

> **All families are equal and none should be forced to live apart. But we have a system that makes refugee families wait for years on end to reunite. Pledge your support for every 100 people who sign our petition to keep #FamiliesTogether.**

What was this Smart Donation about?
The contract sought to explore the use of Smart Donations to support activism and engagement in Oxfam campaigns. Donors could pledge to give as certain milestones during the campaign were reached, specifically the number of signatures to the petition, published alongside the petition. Notably, this contract was hence relying on Oxfam's own data in order to be validated.

Beneficiary: Oxfam Families Together Program
Oxfam believes that communities are healiter and people are happier when families stay together. Oxfam advocates for more opportunities to reunite people seeking refuge with their families who have found sanctuary in Australia and works with the public to show that simple changes can remove unreasonable red tapes.

What data did we trust to validate these conditions?
To determine the number of signatures, we used the official campaign website of Oxfam and parsed the number of signatures every 15 minutes. Donors could track the changes in real time on the official campaign website.

Conditions: What we used to trigger a donation?

In this Smart Donation, we use the number of new signatures, and total number of signatures to the campaign.

- **New signatures**
  From the time a donor signed the contract, we counted how many people signed the petition. Donors could choose to give for each new 100 or 500 signatures.

- **Total number/ A milestone**
  This condition was a set milestone (i.e. 10,000 signatures).

Was the contract builder available?
No.

So how might these work?

Jonathan was deeply moved about Lucy's story. Lucy was separated from her three-year-old daughter Susan for six years due to civil war in Sudan. He would like to support Oxfam's campaign beyond 'just' signing the petition. In order to keep the campaign running and to attract more signatures, he is supporting Oxfam's efforts by giving a little bit every time 100 people sign the petition.

This has been a more exploratory contract, which sought to explore the use of Smart Donations to support activism and engagement in Oxfam campaigns. Donors could pledge to give as certain milestones during the campaign were reached, specifically the number of signatures to the petition, published alongside the petition. In designing this contract for the trial we sought to explore:

- The use of user generate data e.g. from campaign websites.

- A very tangible data source, as users were able to go to the website and check the data at any time.

- A contract which was relying on data provided by Oxfam.

- The option to create less frequently triggered contracts.

- The option to create a contract that was only triggered once (i.e. if the milestone was archived).

Shine a Light on Refugees

> More than 65m people around the world are displaced from their homes by conflict, violence and persecution. Shine a light on the debate by donating to Oxfam's refugee projects each time prominent politicians tweet about refugees or migration.

What was this Smart Donation about?

The 'Shine a Light on Refugees' Smart Donation is about highlighting the issues facing refugees, and the role of online conversation. With this Smart Donation – whenever key politicians discuss refugees on Twitter, donors can take action and make a small donation to Oxfam's projects supporting refugees. In this way, while others are talking about refugees and migration, they can take an action that really makes a difference.

Beneficiary: Oxfam Refugee Projects

Funds from this Smart Donation will support Oxfam Australia's refugee projects. These projects protect people in crisis and advocate for systems and laws to protect and help people. Oxfam advocates for people's rights to asylum, to obtain assistance and be protected from abuse and that individual governments and the international community protect civilians from genocide, war crimes, ethnic cleansing and crimes against humanity.

What data did we trust to validate these conditions?

For this Smart Donation, we took data directly from specified public twitter accounts of prominent political figures across the political spectrum. We did not include retweets, only tweets authored by the accounts themselves. We automatically pulled tweets from Twitter around every 15 minutes and parsed the messages according to the keywords listed above.

Conditions: What we used to trigger a donation?

The trigger conditions for this Smart Donation were social media messages (i.e. tweets) from a chosen set of politicians and activists across the political spectrum along specific keywords related to refugees and migration.

- **Tweeting accounts (a single account)**
  Donors were able to 'follow' a public figure on Twitter:
  Peter Dutton @PeterDutton_MP;
  Kristina Kennelly @KKeneall;
  Nick McKim @NickMcKim;
  Rex Patrick @Senator_Patrick or
  Behrouz Boochani @BehrouzBoochani.

- **Keywords (multiple)**
  Donors were able to select one or multiple keywords: #letthemstay; #hometoBilo; refugees; migrants; Medevac; Border protection; Manus Island; Nauru.

Was the contract builder available?

Yes.

So how might these work?

Alya agrees with Oxfam's recent findings that lifting Australia's humanitarian intake will increase the Australian economy and the number of jobs and she would like other Australians to see the bigger picture, too. As someone who is pro-immigration, Alya decides she will make donations to counter the rhetoric of those who are generally anti-immigration. So, Alya uses the Smart Donation builder to make a pledge of $0.50 every time politicians with opposing views tweet the words 'refugees', 'migrants' or 'Medevac'.

We developed this contract with the motivation to explore the use of Social Media and public discourse as a trigger for charitable donations. In designing this contract we sought to explore:

- Contracts that would be 'counter-active', for example, respond to hateful speech from known far-right accounts.

- Data that reflects but maybe also stimulates public discourse.

- The use of more qualitative data instead of quantitative numbers (i.e. number of arrival of new refugees).

- The use of data that was not perceived as party political, but rather reflects opinions across the spectrum (which is why we identified a series of politicians and activists across the spectrum).

- The use of data that is broadly available and accessible.

Cyclone Protector

> **Become a Pacific Protector and pledge your support to protect islanders whenever cyclones develop and make landfall in the Pacific region. You will be helping communities prepare for disasters, and recover quickly when they strike.**

What was this Smart Donation about?

This contract is about protecting the Pacific Islands and helping them prepare for tropical cyclones. Some cyclones remain out in the ocean, and are low risk, but others can be devastating. We can monitor different kinds of cyclone events, from their formation to endangering populations in specific regions, and on this basis, you can pledge your support.

Beneficiary: International Crisis Fund, and Oxfam's Disaster Risk Reduction Program.

Donations to this contract will be split equally between two funds. The International Crisis Fund is a vital resource, which ensures that Oxfam can be on the ground when emergencies strike, providing food, clean water, shelter, hygiene kits and other essential items. The Oxfam Disaster Risk Reduction Program reduces people's risk and vulnerability before disaster strikes. It increases their resilience to adapt to change, stress and disruption.

What data did we trust to validate these conditions?

We used data from the Global Disaster Alert and Coordination System (GDACS), which is a cooperation framework between the United Nations, the European Commission and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters.

GDACS provides data on the formation and development of tropical cyclones around the world, and makes estimates about the number of people who may be affected by these storms. During this trial, we relied on data feeds that were evaluated every 12 hours.

Conditions: What we used to trigger a donation?

In this Smart Donation, we use data on the creation and movements of tropical cyclones, their geographical location and the number of affected people.

- **Type of event (a single selection)**
  Donations could be pledged based on whether a cyclone makes landfall or a cyclone forms.

- **Location (multiple)**
  Donors were able to donate based on a set of specific locations: Western Pacific Ocean, Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Naru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu.

- **Number of people affected (threshold)**
  Selecting the number of affected people between 0–100,000.

Was the contract builder available?
Yes.

So how might these work?

Eshan is following the daily news and was moved to hear about the impact of extreme weather on the Island of Vanuatu. He feels it is time to take action, so he set up a Smart Donation to donate to crisis and disaster preparedness funds if tropical cyclones form in the Asian Pacific. He uses the Smart Donations app and becomes a Pacific defender, by giving $5 for every cyclone that forms in the Asian Pacific area, capped to a maximum of $25.

We developed this contract with the motivation to not simply create a second disaster relief contract in designing this contract we sought to explore:

- A contract that supported two causes.

- Whether a emergency relief contract could be used to support fundraising for disaster preparedness, and not only disaster response.

- The users reactions to contracts that were less likely to occur as the trial occurred slightly before the main cyclone season.

- A data source that required manual management as we did not have a reliable way to automatically pull data.

Fight Climate Change

Since 2001, Australia has had numerous extreme heat records and rainfall shortages. With this contract, you can fight climate change by donating to Oxfam Australia's Climate Change projects worldwide, based on high temperatures close to home.

What was this Smart Donation about?

This contract is about fighting climate change when we see temperatures rise across Australia. Australia's climate has warmed since 1910, consistent with the warming of its surrounding oceans. Using this contract, you can donate to support Oxfam's fight against climate change whenever high temperatures are recorded in Australian cities.

Beneficiary: Oxfam Climate ChangeCampaign

Oxfam Australia are campaigning for the Australian Government to urgently increase its contribution to international climate action, in line with keeping the global temperature rise to within 1.5°C, beyond which many countries have said they will face unmanageable suffering and devastation.

What data did we trust to validate these conditions?

We draw the data for this contract from a data aggregating service that is based on data from the Bureau of Meteorology (Bureau of Meteorology). The Bureau of Meteorology is Australia's national weather, climate and water agency. The current temperature for the cities is monitored in real-time in intervals of 15 mins.

Conditions: What we used to trigger a donation?

For this contract we monitor the daily temperature in Australian cities, and can trigger donations based on daily or historic high temperatures.

- **Daily temperature** (one choice).

- **Daily temperatures in Brisbane, Melbourne and Sydney.**

- **Average reference temperature**
  Average temperature in November for Brisbane, Melbourne and Sydney
  Historic reference temperature
  Record high temperature Sydney.

Was the contract builder available?
No.

So how might these work?

Jonathan is worried about the impact of global climate change. Australia's climate is changing, with new temperature records broken every year. To demonstrate his demand for change and to support Oxfam Australia, he selects a contract where he is donating $1 up to $20 every time the temperature in Melbourne is 5°C above the average temperature for the time of year.

We developed this contract after much deliberation to focus on a topical issue. In designing this contract we sought to explore:

- The concept of pledging for a symbolic threshold (e.g. high temperatures in Melbourne do not represent an immediate need, but symbolise the challenges of climate change).

- The use of trusted governmental data.

- Data that would be relatable to local experience.

- Contracts related to specific regions.

Trial timeline

We had a flexible and rolling recruitment process for the trial. Participants were recruited through Expressions of Interest gathered through the Smart Donations website (https://oxchain.lancaster.ac.uk/). The trial and website were advertised through two email campaigns to Oxfam Australia supporters, Facebook advertising, and direct solicitation to other critical friends and supporters through mailing lists and word of mouth.

After completing an expression of interest, participants were provided a user ID and invited to complete a pre-survey (including a consent form) – providing primarily demographic information, their current attitudes and practices of giving to charity, and any experience of blockchain technologies.

Those who completed pre-survey were sent a link to download the app, provided with a user account login details, and an initial $10 voucher code of credit.

Of the **123** participants invited to install the app **95** downloaded the app and **86** were at least active for 2 sessions and **81** completed the trial.

Our website hosted tutorial and blog content to explain the key interactions in the app, and each of the contracts.

Throughout the trial, we provided regular email updates to cohorts to update on new content, maintain interest and release of additional vouchers.

In the initial release of the app, only three of the contracts were available: (Earthquake Insurance, Keep Families Together, Shine a Light). Subsequently, two more contracts were released through an update on Nov 8th (Cyclone Protector, Fight Climate Change).

Participants were provided with $10 when they first onboarded and installed the app. An additional $10 top-up was sent to all remaining active at a midway point. To end the trial: we set a date for final contracts to be signed, and then allowed these to play out (for up to 14 days), during which participants would continue to receive updates and notifications through the app.

Once a participant's involvement in the trial had concluded, participants were emailed and invited to complete a post-survey to reflect on their experiences. Concluding this survey, participants had the option to withdraw any remaining funds in their account as a shopping voucher, or donate to a particular Oxfam cause.

Timeline

Expression of interest
12th September

Invitation to pre-survey
from 24th September

Notification of selection
Onboarding 62 Android users
Between 8th October – 11th October

$10 top up
For 18 highly engaged android participants
31st October

Second wave of onboarding
Onboarding 60 iOS users
27th October – 4th November

Added new content
Added Climate Change and Cyclone contracts
8th November

$10 top up
For all participants
10th November

Trial finish soon notification
Notification that no new donations can be made after 24th Nov
21st November

No new donations
24th November

Invitation to post survey
From 24th November

Invitation to phone interviews
From 7th December

Trial finished
8th December

All phone interviews completed
27th December

Trial timeline

Research methods and data collection

This trial collected data from a range of sources, and we continue to analyse these. Our data includes:

App analytics

We have extensive analytics from the usage of the app, as users interact to move from screen to screen. This can tell us a great deal about *how* the people used the app, however this data is very dense, and will take time to analyse in detail for individual users.

Pre-survey

The pre-survey included open and closed questions on demographic info, knowledge of blockchain and past experiences with charity. It will primarily be used to understand and contextualise our sample. It was completed by 129 users.

Post-survey

The post-survey included open and closed questions to understand participants' experiences during the trial. It was completed by 55 participants. This included:

- **Detailed reflections on each contract**
- **Their overall approach to app and trial**
- **Effects to their view of Oxfam, blockchain tech**
- **Interest in a follow-up interview**
- **What to do with any remaining funds in their account**

Interviews

We also conducted 15 interviews, based on those who completed the post-survey, agreed to be interviewed, and provided their availability during December 2019. It should be noted that clearly this is a self-selecting group, as it depends upon those who completed the whole trial, and put themselves forward for an interview.

Limitations

There are some important limitations to the study to note.

- The trial had an unusual temporality, where we focused on generating short-term engagement and activity, and excluded some longer-term, less active contracts that might be included in a market-ready product.

- Participants were using funds provided by the research team, and this may well have affected how they pledged and experimented within the app.

- Although we can identify a wide range of users in our trial, our interviews revealed a number of participants with close links to the humanitarian sector. Although we know that many of our participants were not connected with Oxfam or any other charities, this was still a self-selecting group.

Who took part?

Pre-survey stats

129 people completed a pre-trial survey. Of these, 86 people (53 women, 30 men, and three participants of undisclosed or third gender) became active participants in our trial, using the app for more than one session.

While spread across ages from 18 to over 70 years, the majority of active users (68%) were aged 25 to 49 years and 42% were aged 30 to 39 years. There were two users aged over 70 years. Over 90% of users had university educations, and over half had Graduate diploma or certificates (9) or Masters, doctoral or professional degrees (40).

Users were fairly evenly spread across a range of occupations, although just under 10% described themselves as working in third-sector or non-profit/aid organisations. Most participants were in a middle to high-middle income group, with nearly half earning $37,001–90,000 (40) or $90,001–145,000 per year (17).

About half of users in the trial were familiar (32) or very knowledgeable (6) about blockchain technologies, and about half (43) had only heard about blockchain. About a quarter of users had not read about cryptocurrencies, on the other hand a small minority had bought (9), sold (5) and sent or purchased with cryptocurrency (3).

User engagement

Most participants reported to have used the app once or twice (18/49) to a few times a week (15/49). They were more likely to use it during weekdays than over the weekend, and users reported a slight tendency to use the app during the evening. Users were also more likely to use it while having a break in their daily routines and during their regular commute going home. Overall, this app clearly permeated different parts of individuals daily lives and routines.

Average number of sessions on weekend 128.5

Average number of sessions on weekday 145.6

Sessions per day

Mon	Tue	Wed	Thu	Fri	Sat	Sun
196	151	118	114	149	132	125

Sessions where a donation contract was made per day

Mon	Tue	Wed	Thu	Fri	Sat	Sun
90	43	38	43	64	60	49

This table shows sessions of users over the 8 weeks. A session relates to an active interaction with the app. Short status checks, log-ins without interaction have been removed.

Nearly half stated that their interest in the app varied throughout the pilot, with some reported to have been using the app "several times a day to start then less frequent". On average a user spent 3min and 5sec per session and 5min 16sec when they made a pledge.

Most users said they spent most of the time at the start of the trial setting up contracts, "going through the functionality" and "reading through information, trying to work out how it all works, fascinated by what the different triggers [did]". Our analytics confirm that observation. On average, participants spent 7 minutes 53 seconds using the app during the first 3 sessions where a pledge was made. As the trial unfolded, participants spent less time setting up contracts, spending 3 minutes and 15 seconds per session for the last 3 times they signed a pledge in the app. Many said that spending a few minutes setting up new contracts seems appropriate as they have familiarized themself with the app.

The engagement across participants differed significantly. Over the 8 weeks, users had an average of 11 longer interactive sessions, with the top three most interactive users having 71, 46 and 41 sessions.

Nearly three times as many respondents reported to have chosen contracts systematically, rather than randomly. However, this was often playful, rather than cautious, and twice as many respondents told us they experimented with contracts rather than repeating them. In general, this speaks to the engaged and interested nature of our participants.

Financial summary

Over the 8 weeks of the trial, participants claimed a total of $1,640.00 AUD in vouchers, that have been provided by the Oxchain project team. Participants were free to distribute funds across Smart Donations of their choice. Remaining funds have been returned to donors if a donation expired.

With the provided funds, donors made pledges worth a total $1,964.40 AUD across 567 pledges (an average of 7 pledges per donor). Given the small amount of available money ($20 per donor), these financial figures indicate the high level of engagement with the app and further suggests that participants tried out a range of different Smart Donations. The average donation as part of this trial was $3.46, however this is partly a reflection of the 'smart plans' available for each contract and whether or not there was a custom builder to configure the amounts.

From the funds pledged by donors, a total of $673.10 AUD (34.2%) have been issued to the respective charitable project. The payout rate differs significantly across the individual Smart Donations, with 2% as the minimum and 90% as the maximum payout rate. The Earthquake contract, which could be set to trigger for very small earthquakes, triggered very consistently. Thus around 90% of funds pledged to that Smart Donation were issued to its beneficiary.

Project/ Cause	Amount pledged	Number of pledges	Popularity	Average amount pledge	Amount issued	Payout rate
Cyclone Protector	$296.10	85	15%	$3.48	$35.90	12%
Fight Climate Change	$392.00	123	22%	$3.19	$19.40	5%
Earthquake Insurance	$619.70	148	26%	$4.19	$559.60	90%
Shine a Light on Refugees	$388.60	128	23%	$3.04	$51.70	13%
Keep Families Together	$268.00	83	15%	$3.23	$6.50	2%
Total	**$1,964.40**	**567**	**100%**	**$3.46**	**$673.10**	**34%**

The table shows a summary of the amount pledged through donors and Smart Donation, the number of individual pledges, the relative popularity (i.e. the relative number of pledges for each campaign), the average amount pledged by donors, the total amount issued per Smart Donation template and the pay-out rate in percent.

By contrast, the Keep Families Together contract, based on an ongoing Oxfam Australia campaign, very rarely triggered during the course of the trial.

However, the duration of the contract averaged between 3 and 5 days, which is significantly shorter than we would expect 'real' Smart Donations to be. Thus the statistical probability of an event occurring while being active was significantly lower than we would expect it to be for a market ready product. Nonetheless, these early results highlight the importance of calibrating contracts. It further suggests that charities and donors need to build up an understanding in terms of the likelihood of a contract being triggered. The 'best payout-rate' for a Smart Donation may vary. For example, there may be rare, but significant events backed by very high sums that will trigger less frequently. Other minor, yet more engaging events could lead to smaller, but more frequent payouts.

Popularity indicates the relative number of pledges for each campaign. However, this number should be understood with care, as three contracts appeared in the app. The Cyclone Protector and Fight Climate Change have been added around half way through the trial. All Smart Donations were presented in a non-random order in the app, ordered by the newest contracts.

After the trial, participants had the option to either donate remaining funds to a particular Oxfam project, to donate them unrestricted to Oxfam, or to cash out the funds for a sopping voucher. Only one participant cashed out funds, all other donated the remaining money to Oxfam Australia.

A full financial summary is available in a separate document on request.

Contract reports

Overview

A majority of respondents to the post survey considered Earthquake Insurance their favourite (21/50) or second most (9/50) preferred contract. Fight Climate Change was the second most popular contract and preferred by (16/50) participants and second most preferred by (9/50). Keep Families Together was the least preferred contract, with only 4 respondents reporting it as their most liked and 19 respondents reporting it as their least liked. This disparity is reflected in the number of pledges and the amount for each contract as well.

The Earthquake Contract was the most successful contract. It had the highest level in support through donors by the number of pledges and raised the most funds. With 90% payout-rate, it was also overly the most successful Smart Donation in this trial. Confirming the feedback from donors, the Fight Climate Change Smart Donation had the second highest financial backing through participants. As it was introduced mid-way through the trial, we would argue it was the second most successful campaign during this trial.

Funds issued per Smart Donations

Recipient	Issued Funds	Number of events/ issued	Average	Mode	Median	Stdev.
Cyclone Protector	$559.60	62	$0.58	$0.50	$0.50	0.30
Fight Climate Change	$51.70	40	$0.49	$0.50	$0.50	0.04
Earthquake Insurance	$6.50	754	$0.74	$0.30	$0.30	1.35
Shine a Light on Refugees	$17.95	200	$0.26	$0.20	$0.20	0.12
Keep Families Together	$37.35	13	$0.50	$0.50	$0.50	–
Total	**$673.10**	**–**	**$0.63**	**$0.3**	**$0.3**	**1.15**

This table shows the total number of funds issued per contract. It also shows the average amount of funds issued to beneficiary when the conditions were met, as well as the mode, and median with standard deviation.

Over the 8 weeks, the set conditions through donors were validated 1,038 times. The Earthquake Smart Donation accounted for 73% of validation which led to a pay-out rate of 90%. The second most triggered Smart Donation was Shine a Light on Refugees. Despite its high support, the conditions of the Fight Climate Change contract were only met 40 times, followed by the Cyclone Protector that we intentionally placed as a contract with a low trigger rate (31 successful validations). The Keep Families Together plan performed poorly and yielded a payout rate of only 2%. The donors conditions were only met in 13 instances.

Pledges per Smart Donation

Contract	Amount pledged	Number of pledges
Cyclone Protector	$296.10	85
Fight Climate Change	$392.00	123
Earthquake Insurance	$619.70	148
Shine a Light on Refugees	$388.60	128
Keep Families Together	$268.00	83
Total	**$1,964.40**	**567**

This table shows the number amount backed by donors and the number of individual pledges made.

Earthquake Insurance

The Earthquake Insurance Smart Donation was the most popular (148 pledges) and financially most successful contract, issuing $ 619.70. Nearly all survey respondents (44/51) created at least one pledge. Asked for their reasons, most of them reported to have chosen it because they wanted to donate to communities in need (39) and/or were interested in how the magnitude of earthquakes triggered donations (24). The choice of multiple pre configured plans was slightly more important (26) than being able to create a personalised Smart Donation (17).

Participants reported, the level of engagement originating from the Earthquake Smart Donation was appealing.

> *... so anything that was reactive was interesting. So reactive to, you know, actual earthquakes or cyclones, that was interesting.*

The simplicity of this contract clearly highlighted to participants how Smart Donations could work and highlighted the potential value and new temporalities, connecting donations to live data.

> *Like an earthquake happens, money goes. Like that's an obvious link and I think that appeals more – like you see it in the news and you think 'oh great, my money's just, like I'm already there!*

In interviews, participants showed a clear understanding of the links between the data, the trigger and the release of a donation. There was a perceived and well inferred 'objective' nature to this data, which was variously described as being 'hard' and 'concrete' compared to other kinds of more subjective data.

Number of validations per contract

Contract	Number of validations
Cyclone Protector	31
Fight Climate Change	40
Earthquake Insurance	754
Shine a Light on Refugees	200
Keep Families Together	13
Total	**1,038**

This table shows the number where donors set conditions have been successfully validated.

Shine A Light

The Shine A Light contract was the second most pledged Smart Donation (128 pledges), which raised $ 388.60 – slightly less funds than the Climate Change Campaign. Most survey respondents (43/51) reported to have chosen this contract, mostly because they sought to support refugees in crisis (37), and/or to advocate for refugees (31). Another reason was the interest in how politicians' or advocates' tweets triggered donations (21). The choice of multiple plans was much more important (24) than being able to create a plan (11).

Overall, this contract divided opinion. While some participants saw the opportunity to be counteractive – with one participant even tweeting @politicians in an attempt to encourage them to tweet about these issues and trigger a donation, others described this contract as subjective, unpredictable and overly political.

> *You set up a smart contract which says 'every time Peter Dutton says 'medevac' I'm going to donate a dollar' that might be much more interesting to me even if I think Twitter is dodgy, because I'm so annoyed by Peter Dutton that I want to feel like he's being- [laughing] like I'm doing something, that he wouldn't like.*

> *I thought the conditions would be something else... Perhaps some sort of, you know, something like an event like 'a boat has been found in the Mediterranean' or 'we've just passed one million people arriving in x camp' or 'y camp' or something. So the beneficiaries and everything was as I expected, the trigger was not.*

> *There's room to politicise it or popularise it on social media... maybe it's open more to manipulation... It could maybe get into, you know, it could become more-, I can definitely see it being a political tool, which... if that's contrary to... a certain individual or group's perspective... You could see some conflict about how it's used.*

Notably, five respondents to the survey found the fact the contract was based on Twitter activity to be a disincentive, while others felt this particular engaging and playful. These early results suggest that contacts like this may have to be carefully judged and monitored. A consecutive pilot could explore the use of social media data like tweets or facebook posts around a specific campaign, with a clear activist message and position from Oxfam.

Fight Climate Change

Despite being added around half way during the trial, the Fight Climate Change was very popular amongst participants (123 pledges, backed with $ 392.00). However, the payout rate (5%) was the 2nd lowest. A total of (42/51) survey respondents reported to have chosen the Fight Climate Change contract. Their main motivation to choose the contract was to persuade the government either to reduce emissions (37) and/or to support climate change adaptation in poorer countries (30). However, compared with other contracts, the reasons to choose this Smart Donation was more equally spread, including the motivation to supporting Oxfam's climate change campaigns (24), interest in how high temperatures will trigger donation (22) and trusting the Bureau of Meteorology to validate conditions for donation (21).

Since respondents could not create their own plans and because this Smart Donation only offered a few cities to choose from, the choice of multiple plans was only slightly more important (25) than being able to choose between cities (21).

Some respondents commented positively about the triggers:

> *I liked how I got to choose what temperature could influence where the donations went and based on the city too. It is a good cause to donate to.*

However, more reported dissatisfaction with the limited choice of cities on offer, commenting:

> *It was rather annoying that only the eastern state capitals were used as a trigger. I live in Adelaide and would like to have used the temperate here as a trigger, rather than just Melbourne.*

> *Absence of custom contracts. I feel this would be more meaningful to people if it could be hyper localised. Also, atmospheric temperature is just one indicator. This set of contracts could have been an opportunity to select different validators.*

> *I got all territorial. Which translates as not enjoying that I could only donate if temperatures in cities other than my own reached the threshold. Petty, I know!*

While public attention on the topic (i.e. through Friday For Future protests during the trial period) appeared to have influenced popularity for this Smart Donation, participants reported dissatisfaction with the limited choice on this contract.

Cyclone Protector

Cyclone Protector was the second least backed contract (85 pledges, backed with a total of $296.10) and was reported the least chosen contract by survey respondents (38/51) choosing it. Most often, participants reported this was because participants had already put their money in other contracts. While this contract was indeed added to the app later, it was added at the same time as the Fight Climate Change contract which was backed significantly more frequently (123 pledges). One reason may be the novelty factor of the latter contract since the Cyclone Protector Smart Donation shared similarities with the existing earthquake contract.

Survey respondents stated to have chosen the Cyclone Protector because they sought to assist Pacific Islanders affected by cyclones (31), and/or improve Pacific Islanders' resilience to natural disasters (27). They were less motivated by the more general causes of supporting the International Crisis Fund or Disaster Risk Reduction projects. Unlike the earthquake survey respondents were not so interested in how cyclone categories and impact trigger donations (13).

Although this contract was noticeably and intentionally less active as the Earthquake Insurance, participants in interviews made similar references to have more awareness of events in the world, even where the contract was not triggered.

> *I felt that one was good too because down here I'm closer to the Pacific so all the Pacific islands that often go through cyclone warnings and things like that, that was interesting for me, from a perspective that I'm not living through the cyclone! [laughs] But just knowing what was happening, or what wasn't happening, that this obviously wasn't cyclone season, for it to be happening all the time. Because like that one timed out because it wasn't used, because cyclones weren't going through, kind of thing.*

Keep Families Together

Overall, the Keep Families Together contract performed the poorest overall, with a total of 83 pledges and a total of $268.00 pledged within 8 weeks. This contract was not only the least popular, but also the least profitable, with a payout rate of only 2%. In total (39/51) survey respondents chose a Keep Families Together contract because they sought to persuade the government to keep refugee families together (30), and/or they care about issues relating to keeping refugee families together (28).

Relative to other triggers, such Earthquakes or Tweets, survey respondents were less interested in how petition signatures triggered donations (10).

> *Signing a petition seemed like a very vague and a less important thing than someone experiencing an earthquake.*

Several participants reported disappointment about lack of signatures on the petition and some mentioned that there should have been a link to the petition. In an interview, one participant mentioned trying to get more signatures himself by tweeting about the petition.

> *A bit dispiriting regarding the lack of progress with the petition. Once the donor engages, they probably want to see some sort of activity. Maybe I wasn't looking hard enough but maybe there should have been a link so that the donor themselves could participate in the petition.*

Respondents further reported not choosing this contract because the goal of the campaign was not clear or not as convincing as other contracts, e.g.:

> *The goal of this campaign was unclear to me. Which kind of support was to be provided to refugee families? Is this an advocacy campaign? It implies changes will be very slow and in the meantime, who will be supporting the refugees? In my opinion, not enough information that made me uncomfortable to be involved with.*

This highlights the importance of having a clear narrative and relationship between the condition, the data, and the resulting cause. Whereas this is very straightforward with some other contracts, it appeared to be more challenging for donors to grasp in this contract. In addition, visible progress (i.e. payouts) appeared to be more important for this contract.

Participants' experiences

In the following we describe some initial insights into our participants experiences of the Smart Donations app during our trial. These are derived primarily from qualitative interviews and discussions within the research team. Rather than describing all users, we highlight what we view as important and interesting aspects of the experience and meaning of the Smart Donations app, that we believe have important implications for the design and future development of the platform. Quotes are provided for illustrative analysis and to highlight the diversity of views we encountered during the trial.

Differing levels of engagement

In designing each contract and the trial overall, we made efforts to foster enough engagement that would produce meaningful data for the trial. We clearly saw variance in the extent to which different conditions in each contract were met, and this elicited numerous reflections from participants about the extent to which they desired ongoing and regular engagement with Smart Donations. Broadly, we saw at least two distinct attitudes in relation to this. Some participants sought less engagement: they envisaged being able to 'set and forget' contracts, and periodically check in on these, or that they would be set such to configure the occasional release of larger donations, rather than frequent smaller donations. Some of these users therefore saw the app as a means of configuring preferences, and some automated rules about how their money could be used. In some respects they displayed more 'rationalist' and long-term thinking, and several users related the app to efforts to achieve 'effective altruism'.

> *I mean I would say "OK, this year maybe I will give x amount of money" and maybe once or twice a year I go to the app and then if something really, I mean if… a special occasion comes like a very big natural disaster or, I don't know, a very (normative) project that you are aware of, yes, then this is, for a special occasion like this, I would like to be notified.*

However, another group of users actively sought engagement with the app in various ways. They set up contracts that they hoped would do something and

respond; they engaged with notifications; they envisioned new content, updates and data would be added regularly; they wanted sufficient funds to try out and experience different contracts.

> *I really like the idea of trying to get people to interact in a more regular way with whatever they donate to.*

Both of these are important perspectives, and should be understood through a number of other dynamics and experiences we noted in our analysis.

Offering immediacy

For a number of users, the app was valued for providing a sense of immediacy of response and action, especially for disaster relief. It was compelling to users that a donation could be made the instant an earthquake was detected for example.

Those with a good knowledge of humanitarian programming were also able to envisage how the immediate release of those funds, or the knowledge that funds would be made available could directly impact the scale of response that can be committed to in the initial 72 hours of a disaster, and this could have real outcomes for those affected.

Over time, it's important for charities to be able to tell transparent stories to their users about the immediacy with which funds can and will be used. Smart Donations certainly could create expectations of immediate use of funds, when of course practically this may not be the case.

But this immediacy needs to be contextually sensitive – some notifications related to particularly traumatic or individual events (for example violence against women) could be upsetting to engage with.

Awareness, and Smart Donations as a news source

Several users saw Smart Donations as a means to raise their awareness of certain issues or events in the world. In interviews, some users explicitly mentioned that they became aware about news events, such as earthquakes, earlier than they would have done otherwise, and considered this an attractive aspect of the app.

I mean it was almost like news. Like, an earthquake happening or the Twitter stuff, of course, but yeah, it was almost like 'oh, this has happened in this part of the world' which hadn't come up on my newsfeed that I was following. So I thought that it kind of alerted me to things that I didn't know were happening in the world, which I liked.

It was empowering for users to be connected and giving to a cause before it had even been reported.

Yeah… I can see how it has an element of being satisfying because when you hear about bad news, the first reaction is 'there's nothing I can do about it!' [half laughs] And in this case the moment you hear about it you've done something about it already… I don't know… that was a good feeling.

Indeed, for those most engaged, Smart Donations offers an alternative window on the world, reporting and acting upon specific causes and issues they care about. This awareness of course about more than simply fundraising, but also fostering empathy and understanding.

A respondent to the survey commented:

I was not aware how often earthquakes occur. I was saddened.

Setting preferences and investing

As above, in some contrast to those who sought frequent engagement was a perspective on the app as a means to personalise and set preferences regarding charitable giving. Here, rather than conditional giving, where pledged funds might be returned and not given at all, it was envisaged that the app could be a means to set priorities, and respond to the most urgent needs.

The one thing that I was sort of missing it to have sort of a view, a portfolio view, if I know that I have interest in the refugee topic and the other topic, in the course of things, because there are so many different contracts renewing at different times, I don't know anymore if I have roughly 75% invested in the refugee crisis or somewhere else. And I'd like to have this very easy visibility to say 'oh I'm a bit low on refugee and I'd like to keep it at roughly 75%' so that sort of thing.

For some participants, there is a sense this is about having distance, and not being overburdened in deciding how exactly to give.

> *I think the ideal format for me, for my donations is [laughs slightly sheepishly] I give, at the moment, what tends to be once a year, I give a certain percentage of my salary and I give it to one place, do a bit of research around that time just to check that who I'm giving to is still effective and doing good work.*

While this quote regards a current practice, it's important for us to consider how could Smart Donations work for this kind of occasional donor giving larger sums, as well as those who might engage frequently by giving smaller sums.

Fun, novelty and hype

Throughout the interviews, participants described the novelty of the app, and struggled to compare it to any prior or existing mobile or charitable experiences. Many participants were also enthused that Oxfam Australia was involved in such an innovative project.

There are also several examples of participants adopting a playful approach to the app, and intrigue and curiosity in how different contracts will play out.

Once again related to engagement, there are mixed feelings about this playfulness: whether this is truly an effective way to give, and conflicted emotions in seeking engagement and the release of money, even though this often signifies a negative event.

> *And it would – for example, the earthquake one, you don't want that to be triggered. Whereas the refugee one, I know that this thing's happening so it's disappointing when it's not being triggered even though you're certain there needs to be – it should be triggered, if you know what I mean?*

> *I think it's interesting, there's the sense of positivity but it's also balanced out by a – for me, a sense of guilt when I get those updates. It's this jolting reminder of I'm just living my privileged life here in Australia and people are suffering and maybe I should be doing more… And maybe that's a feeling that is useful for Oxfam to induce a little bit but… it doesn't feel like a positive experience, it's not something I'd actively try and invite more into my life at an instinctive, emotional level.*

On the other hand, some participants in interviews who were older or who worked in the IT sector commented that there was an element of marketing hype about using Blockchain and/or conditional programming.

An interview participant, who works in technology transfer referred to the danger of using a new technology unnecessarily:

> *I think the reason it might be done is to try and give an appearance to more credibility, so it sounds 'fancy', it might make it sound exciting and new for the general public. I think the risk for the general public is that it sounds a bit scary as well; they don't understand it therefore they won't get involved. I think from a tech world point of view, it's a risk… Look, and it's probably a pretty small group of people so I don't think this is a major PR risk but certainly amongst certain people there are-, it's just a bit of a standing joke that blockchain is way overused and people use it where it's not really needed just to try and sound impressive. So you know, in certain circles the fact that it used blockchain - people would have a bit of a chuckle I guess.*

Finding the right kinds of data

Respondents to the survey overwhelmingly (47/51) liked *"Basing donations on real-world data"*. However, participants held different views over what the best kind of data to be used for smart donations. There were many examples of participants who favoured data that was perceived as more factual, 'hard', 'concrete' or 'objective', such as the incidence of an earthquake.

> *I think if I was using the app myself I think I would probably lean towards the objective stuff because it's [laughing] it's very concrete, I'm a bit like that!*

> *That's why what I am saying, from my point of view, when it's going to be like, we do have an earthquake, nobody is going to lie about it […] It's a fact, it's a physical fact that you can touch it in your hand. But how can I know that the person is tweeting for collecting some extra funds or he is tweeting because he truly believes in this issue?*

This was contrasted with 'softer' data such as that drawn from Twitter where individuals had used a specific word. For some, this was too political a source of data, or too removed from real evidence of need. However for others, the opportunity to be political by giving in relation to Twitter activity was itself appealing.

I thought the thing around Twitter was interesting! [half laughs] In the sense that - more on the advocacy side, you can see how if someone is trying to make a topic - to put a topic on the political agenda during an election you can see how this can backfire for them, or not, so that was interesting.

Responses to how Smart Donations were triggered positively shaped respondents choice of Earthquake Insurance and negatively shaped respondents choice of Keep Families Together. It also emerges that different kinds of data can contribute to different kinds of emotions. Data around smaller earthquakes was playful and a curiosity; data about milestones reached in a petition could be celebrated; data related to disaster could be jarring.

In interviews we also reflected on the ongoing bushfires – and how it would have felt to have a contract related to this emergency. There's a sense that this 'data' might have been too close to home, or inappropriate for such a visceral issue. More deeply, there's a question here about the distinction between local and global or distant data. Data might give us a window to parts of the world we can never know, but if it's representing something closer to home, it needs to resonate with our lived experience.

Having money returned

Participants in our trial strongly valued having control over how their funds were disbursed, and (44/51) respondents to the survey liked setting maximum amounts to donate. However, there are also conflicting emotions that arise when funds are returned at the end of a contract if conditions were not met. A significant minority of participants (15/51) reported they disliked having funds left over after the 8 weeks trial phase. After the trial, we asked survey participants to select their prefered cause, to give to Oxfam in general or to cash out funds. In fact, only one participant decided to withdraw their remaining funds as a shopping voucher. All other participants donated their remaining funds to Oxfam.

Of course, we should bear in mind that these funds were not their own, to begin with, and for their own money, with larger sums, and over a longer period of times, users may very well feel differently. Nonetheless, participants in interviews described experiencing awkwardness, guilt and frustration at times when contracts were not triggered, and funds were returned.

For instance, one interview participant said:

> *… it felt weird when money was given back, I mean that's kind of obvious in the point of the contract that if it's not fulfilled then you get it back but to me that felt almost a bit frustrating in that it was kind of… the feeling was 'I guess this money isn't needed!' [half laughs] which of course isn't the logical conclusion but sort of emotionally I'm going 'oh OK, you're giving it me back, I guess Oxfam's all good then!*

Indeed, all but one participant in the pilot donated all their remaining funds to Oxfam. Of course we should bear in mind that these funds were not their own to begin with, and for their own money, with larger sums, and over a longer time period, users may feel differently. We suggest that while users value being in control of how their money is disbursed, and setting limits on this, we need to think carefully about how to design for money being returned, and how the app might offer sensible options or alternatives for users in these cases.

The prospect of donations being conditional is a powerful feature of Smart Donations. Conditions trigger not only *if*, but *when* a donation is made. However, our results highlighted a need to think carefully about how to design for money being returned, and how the app might offer sensible options or alternatives for donors in these cases. Our future research with users pledging their own money, over a longer trial should give us clearer answers for how to support conditional giving in a way that grants donors control of their funds, but without conflicting emotions in how to effectively support charitable work.

Finding the right conditions

An overarching question throughout this trial was: what are the right 'conditions' on which to base charitable giving? Our research has revealed some important factors to consider in choosing and refining conditions for Smart Donations.

Participants clearly contrasted data they perceived as 'objective' – such as the measurement of an earthquake – and data they understood to be more 'subjective' – such as tweets about a particular topic. In practice, there is subjectivity in any kind of data, but in any case, it was important for participants to be able 'see' a clear relationship between the data, the condition and the cause they were donating to.

In addition, participants distinguished between more 'positive' conditions – such as a petition reaching a milestone – and more 'negative' conditions, such as a disaster having taken place. While positive conditions might be celebrated, negative conditions can highlight need, but bring mixed emotions that need to be carefully accounted for.

Lastly, in the design of the contracts, and participants actions, we saw a clear distinction between infrequent, but high-impact donations (e.g. to give a larger amount, all at once) vs lower impact and more frequent donations. Smaller donations occuring frequently maintained awareness and engagement with a cause and could be used to educate and develop donor's interest in a topic. Higher impact donations were more of an insurance, and could be 'set and forget', but assured a donor their donation would be available when it mattered.

Future opportunities

The pilot in 2019 was the first exploration of the Smart Donations framework, through which we gained a better understanding of domain requirements and the expectations of NGOs and charities but also the implications of situating data-driven technologies and blockchain within the space of international aid. We identified future opportunities to continue exploring Smart Donations and data-driven technologies within the international aid sector in general.

User generated content and civic engagement

In our current implementation, Smart Donations templates can only be issued by NGOs and validated by external, trusted data sources. However, qualitative feedback from participants of our trial as well as prior workshops suggested that some would like to be able to engage beyond the current capabilities of the platform. Thereby, donors made a distinction between an early engagement in the design of the smart donations and the selection of trusted data sources and an engagement in the actual provision or verification of data. We believe this is an interesting opportunity for charities to increase civic engagements and to raise awareness across supporters for particular issues. Likewise, the involvement of supporters in the validation of data may offer interesting new relationships amongst donors and between donors and charities. Donors could for example select triggers or conditions that could be validated by their own personal data like bank accounts, fitness trackers, or validate conditions for friends and families. Moreover, we can envision models that build on crowd-validations and civic decision making, for example, by assessing specific milestones to release additional funds.

Management dashboards and analytics

Future digital fundraising channels may support charities to better understand the motivation and intentions of their donors, allow them to create more tailored and engaging experiences for donors and increase the value they deliver to their donors and beneficiaries.
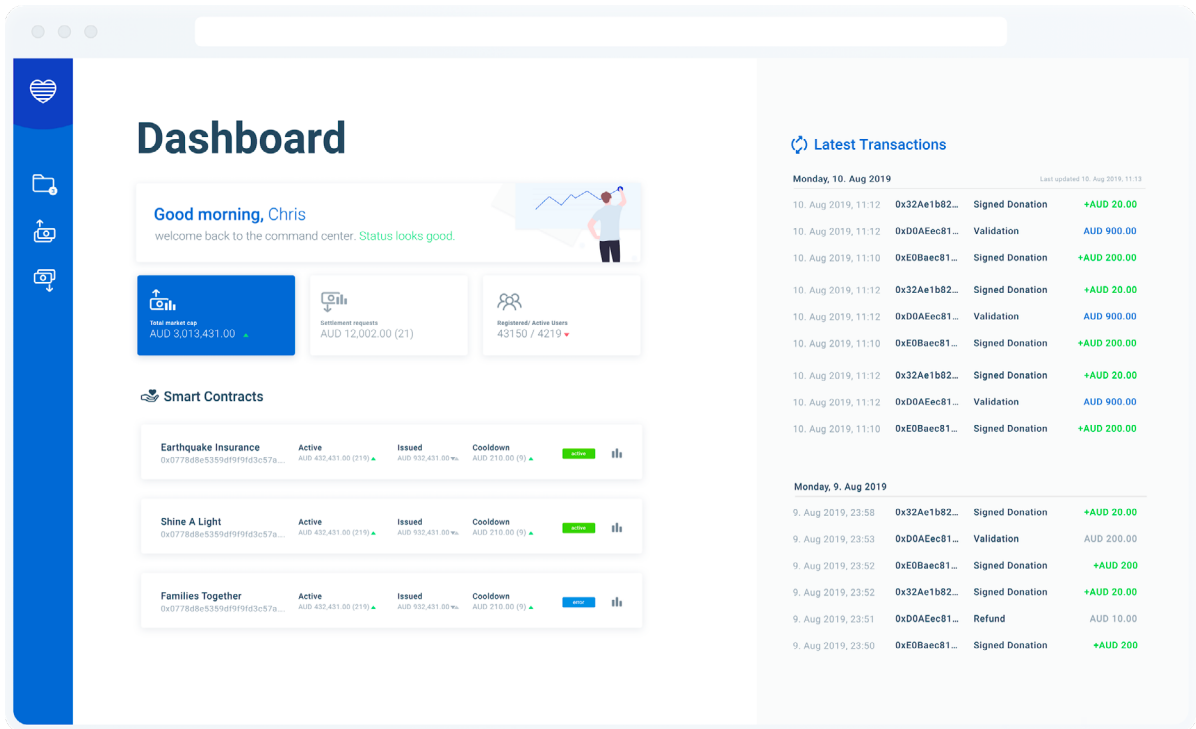
Mockup of a Smart Donations dashboard.

The scope of this trial was the first exploration of an event-driven donation framework for the charitable sector, hence mainly focused on the underlying concept and end user interface. However, our future work will address the requirements of administrative and management interfaces for NGOs and charities. Such interfaces will not only allow charities to manage the content on the platform (e.g. create, or update new donation templates), but will provide novel channels to connect and engage with donors, for example, by providing direct impact updates or background information to projects where donors pledged funds.

In addition to comprehensive donation statistics, we envision the creation of tools for supporting the decision making processes of charities, for example, by employing novel prediction models that could predict the frequency and how much funds will be released for specific conditions. We believe that such predictive features, together with conditional giving may have the potential to change fundraising operations within the charitable sector.

Scalability, privacy, governance

Our pilot identified some limitations of blockchain technology regarding scalability, e.g. limited transaction throughput, computational costs and high storage demands. In addition, our engagements with NGOs, domain experts and donors have raised concerns regarding stakeholder privacy and safety. These considerations have shaped our design and led to the hybrid-architecture and the reference implementation outlined in this report.

Offloading data to access restricted databases and the use of private blockchain can be a suitable solution to meet strict legal regulations such as data protection laws. However, a body of prior work underlines the importance of transparency and trust within the charity sector. And indeed, enhancing trust through increased civic engagement and governance, transparency, as well as accountability, are central motivators for the use of blockchain technology in the contexts of charitable giving. Therefore, one may argue that blockchain technology applications by NGOs should be generally implemented on a public ledger, since only a public ledger allows everyone to validate the integrity of transactions. However, public blockchains and its full transparency does raise legitimate concerns, for example, regarding user privacy.

In addition public networks usually rely on monetary awards as an incentive model to validate transactions and employ inefficient and costly algorithms that impact on the energy balance of the systems. This does not only lead to higher operational costs, but also contradicts principles of sustainability many NGOs aim to adhere. We believe that further research could be beneficial towards a better understanding of control dynamics, distributed governance, civic accountability and trust. It may challenge current trade-offs and encourage the exploration of alternative approaches, considering requirements like sustainability, accountability, trust and operational costs.

Deliver event-driven donations to donors

Our proposed architecture and its underlying event data and event-driven model for Smart Donations can be presented and delivered to donors in various ways. For our research, a mobile application was the preferable choice, as this gave us as suitable balance between design flexibility, distribution control, more comprehensive analytics and brought us closer to participants, being 'just in their pocket'.

The sample implementation of the app was designed with a neutral branding. However, the final delivery of event-driven Smart Donations to donors or targeted audiences may be manifold. Mobile applications may, for example, be branded in the design language of a NGO and communicate their values and attitudes and could be tailored to a single very specific campaign or theme, such as disaster relief. Likewise, a branded app could follow a more generic approach like our app, that was able to provide a broad range of campaigns. We can also envision Smart Donations as a service for a group of NGOs or charities that join forces, to deliver an open platform for charitable giving that provides a wide range of conditions, validators and beneficiaries.

Moreover, our architecture would also allow NGOs to connect Smart Donations to their existing infrastructure and communication channels, like their website. Keeping donors in a known and trusted environment, Smart Donations campaigns could be enriched and linked to existing textual and audio-visual content. Repurposing existing infrastructure such as 'SMS campaigns' for example, could introduce Smart Donations to less tech savvy donors that don't use the internet or smartphones.

How would you package and deliver event-driven Smart Donations?

Pathway to a series of studies

The reference implementation of Smart Donations, used for the 8 week long in-the-wild pilot with Oxfam Australia, will serve as the starting point for a series of studies that will focus on refining and evaluating the underlying concepts and architecture. We aim to continue collaborating and engaging with international NGOs, and in particular continue our existing relationship with Oxfam Australia. We are currently preparing for a second, longitudinal trial that will run for a minimum of 6 months starting in the last quarter of 2020.

We are aiming for a minimum of 1,000 participants, more available conditions, validators and templates. This second trial will focus more on the event-driven nature of Smart Donations. Unlike the first trial, participants will be able to spend their own money by topping up their accounts using credit cards. Through its longer duration and by allowing donors to pledge their own funds, we aim to get more realistic insights about donors behaviours, expectations and temporalities.

We will build upon the findings of the second trial to further explore donor preferences and attitudes which will help NGOs to create stronger and more engaging Smart Donations in the future.

Take home message

OxChain is a collaborative research project between the Universities of Edinburgh, Northumbria and Lancaster. Together with Oxfam Australia, we are exploring Smart Donations, a novel approach to giving, building on blockchain technology. Our Smart Donations platform allows donors to give to the issues they care most about, by attaching real-world conditions to their pledges.

- We conducted the first in-the-wild exploration of Smart Donations, a blockchain-powered platform and app for conditional giving.

- Our app was trialed over 8 weeks with a diverse, yet involved group of 86 participants.

- The app produced highly novel and compelling experiences for many. Yet participants' perspectives and experiences varied considerably.

- Our participants engaged with the app frequently, and across daily rhythms, often in between other activities as they were notified by the app.

- Participants valued an ongoing awareness of world events and the sense of immediacy of response and action it delivered.

- Some envisaged Smart Donations as a longer-term investment platform, while others sought and enjoyed frequent engagement with even small donations.

- The delivered awareness extended beyond fundraising, fostering donors' empathy, a deeper understanding, and reflection on how to support the causes that matter.

- The campaigns, conditions and temporalities offered have a significant impact on the donors perceptions. It is crucial for NGOs to be able to understand and manage the performance of contracts they offer.

- While we trialled Smart Donations as a mobile application, we outlined alternatives to deliver event-driven Smart Donations to donors.

Building on the success of the initial pilot, we aim to continue collaborating and engaging with international NGOs. Together with Oxfam Australia, we are currently preparing for a second, longitudinal trial that will run for a minimum of 6 months starting in the final quarter of 2020.

OXCHAIN

Smart Donations:
a project with Oxfam Australia
See more at **oxchain.uk**