0X-CHAIN

Workbook #1

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Investigators

Chris Speed
Raluca Bunduchi
Nigel Davies
Aggelos Kiayias
John Vines

Researchers

Kate Symons
Mike Harding
Chris Elsden
Aydin Abadi

Grant

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Website

http://oxchain.uk

Blog

https://medium.com/life-on-the-blockchain

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EXECUTIVE SUMMARY

This report summarises Work Package 1 of the OxChain project, a three-year research project between the Universities of Edinburgh, Northumbria and Lancaster, Oxfam and other partners. The project is made up of five research phases (some running in parallel) which explore ethnographic, business modelling, logistics, human-computer interaction and design aspects of the research problem, followed by a final dissemination phase. Work Package 1 included project planning, partner engagement, literature review, academic engagement and pilot research in stores and at Oxfam UK.

The research goals of the project are as follows: To investigate the ways in which a blockchain technology could enhance Oxfam's ability to meets its international development goals; and, to explore how the technology can be explored and implemented through the Oxfam Trading business.

We have brought five academic literatures into conversation to address the interdisciplinary challenges of the research problem. These include: Cutting edge developments in ethical and supply chain applications of blockchains; business model innovation and international development critiques to understand Oxfam's particular operations; research which rethinks the construction of value as a social-technological assemblage rather than as a conventional supply chain; and, debates on how to frame sustainability and circular economies.

We also considered literatures to inform our methodological approach. Human-Computer Interaction (HCI) examines the social processes and context technology design, development and deployment. We also draw on global production networks (GPN), or 'follow the thing' as a methodological framing, which complicates the notion of a linear supply chain. Together, HCI and GPN confirm our methodological focus on deeply understanding valuation practices across Oxfam's network. These will be informed by a close focus, through business model mapping methods, on Oxfam's core value propositions.

Pilot research (including two co-design workshops at Oxfam HQ and ethnographic engagement in stores) revealed the wide potential of blockchain applications in Oxfam's value constellation.

This has opened the project from our initial research proposal (which centred on the cascading problem identified by consultancy firm McKinsey), to consider three further areas: Provenance and transparency in supply chains; new relationships between donor and recipient; and, revealing hidden values in development funding and volunteer engagement. This flexible approach is in line with the project's co-design principles. These broad themes will be more deeply explored in the projects subsequent research phases.

INTRODUCTION

The OxChain project places Oxfam at the forefront of emerging developments in the digital economy, particularly distributed ledger technologies such as blockchain. It is a three-year, £1.2m research project between the Universities of Edinburgh, Northumbria and Lancaster, and research partners Oxfam and other community and circular economy groups, funded by the Engineering and Physical Sciences Research Council (EPSRC). It brings together experts in interaction design, cryptography, human-computer interaction, organizational and entrepreneurship studies, and geographies of international development.

Through collaborative research, we will design and develop an opportunity to use blockchain technology for Oxfam to better support its ability to meet its international development goals. We are working with the Oxfam Trading business, made up of over 650 stores which circulate second-hand goods, support its global development programmes through revenues, and promote the work of Oxfam to its shopper, volunteer and donor stakeholders, along with strategic and innovation operations at its head office.

Distributed Ledger Technologies (DLTs)

Blockchains are short hand to describe distributed ledger technologies (DLTs). DLT's may radically change the way we share, circulate and distribute the things that we value. Data pertaining to forms of value exchange (which includes money, but also contracts, agreements and other transactions) are recorded in an algorithm, which can be checked and stored by a distributed system of many computers across the globe, rather than a central ledger. Rather than exchanging through a centralised authentication body like a bank or a state, individuals, collectives and other groups are free to trade semi-anonymously, and do not have to use national currencies in their transactions. All transactions are recorded in an immutable ledger, making a blockchain a record of transactions that cannot be disputed (Nakamoto 2008). This distributed, secure and shared database of transactions by semi-anonymous participants opens up the possibility of fundamental changes to our current use of fiat currencies as the primary method of value exchange, enabling new forms of social interaction, and different models of trust between people, states, organisations and institutions.

DLTs could bring immediate benefits to Oxfam's trading business, particularly around exploring ways to improve their valuation, cascading and logistics practices. For example, it may provide innovative ways to support the circulation and re-circulation of valuable items within its business model, and thereby exploring innovative circular economy models. It may also provide new ways to engage donors, to make the donation and shopping process more participatory and transparent, and move Oxfam towards more innovative and participatory modes of distributing value across its stakeholders (in the UK and globally). It may also provide a way of foregrounding the complex affective and emotional relationships that donors, development beneficiaries, Oxfam staff and volunteers have with each other and with the organisation.

The implications of DLTs for the not-for-profit sector have only begun to be understood, and much research and innovation is presently limited to the financial and tech industries. A significant and successful shift in Oxfam's approach could potentially resonate across charities and related businesses world wide and demonstrate how wealth generation and distribution can be readdressed.

The research will also provide insights into ongoing research agendas surrounding distributed ledger technologies, including building trust and innovation through digital technologies, constructing alternative economic models, and participatory methodologies around how participants understand, construct and exchange value using emerging blockchain technology. The project is structured over three years around five research phases. This report summarises activities in work package one: research design, theoretical reviews, partner engagement and pilot research.

This booklet explains the project goals, sets out its research questions and critical approach, and reports our initial participatory scoping work with Oxfam and other research partners.

RESEARCH GOALS

A core task of phase one was to integrate the multiple economic, technical, social, political and business model debates into a research challenge. Our overarching research goals are:

To investigate the ways in which a blockchain technology could enhance Oxfam's ability to meets its international development goals.

To explore how the technology can be explored and implemented through the Oxfam Trading business.

As part of this overall project goal, we will have specific questions guiding each work phase, with a cross-disciplinary methodological approachs. The following research questions guided work phase 1:

What ideas and values do Oxfam head office and store staff attach to value transactions?

How should these positions inform our co-design approach?

THEORETICAL FRAMING

UNDERSTANDING OXFAM

There is a significant literature around the practices, politics and outcomes of development which highlights the politics and positionality of Oxfam as a global development organisation. This provides vital context in understanding the Trading business as part of Oxfam's wider organisational mission.

Development is itself a complex and highly political practice, rooted in post world war ideas of the 1940s, 50s and 60s, in which it was thought that the rollout of supposedly 'superior' Western scientific knowledge, greater capitalist economic production and the roll-out of democracy would solve poverty in what was then framed as the 'under-developed' world (Rist 2002). Oxfam's own history is deeply rooted in this framework, founded by Oxford University academics concerned with famine in post-war Europe. However, development era thinking has been replaced by a much more political and nuanced approach (Ferguson 1994, Sachs 2009). Traditional top-down development organisations, including Oxfam, have become much more reflexive regarding their own position and assumptions, and are increasingly reframing their activities to make them more participatory, iterative and bottom-up, and more responsive to differences across context (Oxfam Working Paper June 2015). Oxfam proposes rights-based solutions including challenging global economic inequality, cancelling debt, empowering women and poor people, and calling for food, water and energy justice (Green 2012).

Future Positive

However, while recognising that development cannot be a top-down Western imposition, development organisations must still adopt a 'future positive' orientation (Mosse, 2005), and present development as an achievable goal – one which they are uniquely capable of understanding and delivering – in order to maintain their appeal to donors, and role as central mediators of development funds and expertise. This context is important to understand Oxfam's current structure as a largely centralised institution which retains control over development funding, practice and ideas. This changing and challenging development landscape raises important questions around aid and development effectiveness, transparency, and how to mediate between donor priorities and the needs of development projects on the ground (Oxfam Working paper June 2015). As this workbook will go on to discuss, the potentially disruptive nature of DLT's provide both challenge and opportunity for Oxfam to further revise its centralised model of operations, and to reframe itself as a mediator of value in a network of complex development relationships.

Oxfam History

Oxfam's history, position and arena of operation means it is different in several respects to a conventional business. Oxfam's core activities are in identifying, formulating and implementing solutions to international development needs. It performs emergency aid work and ongoing economic and social development, and operates through a series of country and issue-based development programmes, across 90 countries. Its stakeholders include national governments, private sector partners, development recipients, other NGO and charity partners in developing countries, its donors (public and private) and its staff and volunteers. Oxfam receives funding from several sources including from the private sector (which it also encourages to invest directly in development projects), government (including the UK's Department for International Development), fundraising drives relate to particular emergencies, and other direct donations from the public (including its 400,000 monthly donors).

The Trading Business

Oxfam's trading business (that is, its stores which sell second-hand donated items and new Oxfam products) provides vital financial support to its development mission, as well as a significant physical presence on high streets across the UK. The revenues Oxfam raises from trading are not hypothecated, providing it with funds to support less publicly popular causes. Hence, trading is key to enable Oxfam to operate flexibly and proactively. Trading is structured across 680 stores nationwide, including specialist bookstores and music shops. General stores sell donated items including clothes, toys, vintage and other collectables, along with new Oxfam products such as fair trade coffee and decorative household items, sourced according to ethical and fair trade policies, and charity gifts ('Oxfam Unwrapped'). It also has a significant online presence, and a back-end sorting and distribution facility at Batley, along with a network of drivers. Consultancy firm McKinsey highlighted that there is a significant amount of untapped expertise across Oxfam's value chain on where and when an item will sell for the most profit. Consequently, a key research priority for OxChain will be exploring how Oxfam's 680 stores can be turned into a linked platform for sharing knowledge and value, capturing the distributed expertise and providing new means for stakeholders to engage with the trading business.

"The potentially disruptive nature of DLT's provide both challenge and opportunity for Oxfam to further revise its centralized model of operations, and to reframe itself as a mediator of value in a network of complex development relationships."

ETHICAL BLOCKCHAIN APPLICATIONS

There is a growing literature around the opportunities presented to international development and sustainability challenges by digital technology, including multiple examples of alternative and digital currencies in developing countries (see Ammous, 2015; Blockchain for Good (BC4G), Undated). These include Ghana's e-ZWITCH, Africa's first biometric currency, Kenya's highly successful M-Pesa service, and the e-West African Franc, a digital fiat currency underpinned by Senegal's central bank. In some cases, these have had enormous success in providing financial inclusion, and have marked developing countries out as sources of innovation in financial technologies.

There is also a great deal of hype and some complex political imaginaries around blockchain to advance a variety of political positions (from post-state libertarian positions to revitalising the global commons), meaning that the project needs to pay close attention to the relevance of blockchain solutions for the problems it frames (Huckle and White 2016). Nevertheless, there are also several emerging blockchain-enabled projects across several development challenges including aid transparency and security, the provision of state services, and the construction or recording of ethical supply chains (see Figure 1 over page for examples). These opportunities, summarised in Kshreti (2017) may include: Promoting transparency and reducing corruption in donor and aid disbursements; improving trust and reliability in government services like land registry; enabling developing country business to trade effectively internationally; enabling the diaspora to make remittances to family and friends without high transaction costs; and, support state-like services such as secure identities for people excluded from state provision such as refugees.

However, while the opportunities are undoubtedly significant, there are also challenges. The first challenge concerns the issue of data. Thatcher, O'Sullivan and Mahmoudi (2016: 990) refer to "data colonialism", whereby large data companies are capturing and profiting from data storage and trade without consent, and Mann (forthcoming in Development and Change journal) highlights that the capture of big data in Africa is largely unregulated. Depending on how Oxfam and OxChain choose to deploy blockchain as a means of capturing and using data, the project may provide opportunities to consider how and why Oxfam Trading uses data, and what its options might be for the future.

The second challenge concerns Oxfam's current position as a holder of power, value and expertise through which development solutions are framed, understood and executed. The disintermediation of development which may be encouraged by blockchain proponents would require NGOs like Oxfam to consider how to reframe their position. The distribution of value in developing contexts through blochchain innovations may also create new intermediaries, the role of which is not yet properly understood. Again, OxChain may provide a platform for Oxfam to begin considering these issues, although it is unlikely that this project will have the scope to directly implement blockchain payments in a developing country context.

Promoting transparency in a supply chain

Everledger is database of ethical diamond certification which uses the geomorphological qualities of diamonds as a signature, recorded on a blockchain and used to guarantee 'blood' free diamonds.

AgriLedger's mobile app supports and empowers small farming co-operatives in Latin America by recording working, buying, selling, and sharing activity on the blockchain.

Provenance is piloting blockchain records to trace yellowfin and skipjack tuna fish in Indonesia, from fishing catches to consumption.

Providing state services

Bitnation provides 'governance 2.0', a range of borderless, decentralized and voluntary services underpinned by blockchain, and paid for by 'citizens' in bitcoin. Services include securing identities, resolving property and other disputes, providing currency, and crisis services like embassies.

A similar service to provide ID to vulnerable people is proposed by **Microsoft**, **Accenture** and the **United Nations.**

Development Alternatives Incorporated (DAI) is a UK/ Belgium/ US based company which is exploring using blockchain to encrypt and store medical records. The governments of Ghana and Estonia are trialling using the blockchain to support land registry services and tackle land dispute cases.

Making payments across national borders

BitPesa and **Bitsoko** provide international transfer services in Africa using virtual currencies.

Mexico's **mexBT** uses the blockchain for business-to-business payments across firms in developing economies.

GeoAid is a Design Informatics, University of Edinburgh trial software to make peer-to-peer, geographically located payments in areas of humanitarian crisis (underpinned by Ethereum).

The Start Network is a collection of 42 international development organisations which is exploring blockchain as a means of changing the economics of humanitarian aid.

South African company Bankymoon's **USIZO** project allows donors to purchase utility credits for poor public schools using virtual currencies.

Finance, trade, supply chain tracking

Contracts can be embedded in DL to allow multiple parties, who may not trust each other, to automate contractual agreements in a secure way (Mazieres, 2015).

Cardano, **Hyperledger**, **Stellar**, **R3** are examples of DL-based business frameworks.

BUSINESS MODEL INNOVATIONS AND VALUE CONSTELLATIONS

To examine how Oxfam can exploit the opportunities provided by blockchain technology, we bring literature on innovation and entrepreneurship into conversation with cutting edge research on new forms of value. Business model innovation research examines the phenomenon of value creation, including changes posed by digital technologies (Amit and Zott, 2001). This has progressed significantly into a core concept in strategic management research to describe the architecture of value creation and capture, and thus explain performance and competitive advantage (Zott et al., 2011). There are many different facets to the business model concept that are covered in existing research (Al-Debei and Avison, 2010), but at its core business model articulates the logic of how a business creates and delivers value, provides the data and justification to support this logic, and articulates the architecture of revenues, costs, and profits for that organisation (Teece, 2010). This is known as the value proposition dimension, which seeks to explain how firms create and capture value through its value proposition for the customers, and the activity system which aims to deliver this value proposition (Seddon et al., 2004; Zott et al., 2011).

DLT's have the potential to disrupt Oxfam's existing value proposition in several ways, and research shows it can be challenging for organisations to respond to disruptive change. We therefore also considered literature which assesses how large organisations respond to change, particularly potentially disruptive innovation that challenges their core practices, structures or value propositions (Henderson, 2005; (Tripsas and Gavetti, 2000). It is often not sufficient to just deploy new technologies within the existing configuration of business activities (Markides, 2005; Tripsas and Gavetti, 2000). Disruptive innovation therefore requires organisations drastically change many of their core activities and rethink their value propositions, thus fundamentally altering their existing business model.

The scale of change potentially facing organisations through DLTs is significant. As Speed and Maxwell (2015) discuss, DLTs do more than introduce new technology; rather, they contribute to a fundamental reorganisation of economic practices. This can be seen as the shift from a push economy (in which value is constructed through pushing products onto consumers, passively construed) to a pull economy, in which digital innovations enable complex value constellations and autonomous forms of digital commercial and governance activity.

Value constallations are ecosystems or assemblages of technology, product and consumer, in which "the value of a service is constantly mediated according to algorithms and check-sums that recalibrate the network to sustain the value proposition" (Speed and Maxwell 2015: 41). In distribution, there is a clear distinction between conventional linear supply chains, and the dynamic scenarios presented by the configuration of automatic ordering, complex personal data usage and innovative distribution methods. Under value constellations, engagement itself has value, and businesses are benefitting from exploiting data as a commodity.

For Oxfam, the shift from push to pull economies provides both opportunity and challenge. As we have mentioned, the possibilities afforded by new technology and new configurations of donor and recipient in international development shifts the delivery of development funding, and may unseat Oxfam as the central node, reframing it as a mediator of value across a variety of relationships. That Oxfam is actively considering how to innovate with this potentially disruptive technology is encouraging, and this project aims to make the most of the opportunities provided to Oxfam to rethink its role as development expert in a shifting economic and technological environment.

SUSTAINABILITY AND THE CIRCULAR ECONOMY

OxChain seeks to research questions of alternative economic models, especially the circular economy. However, the literature around sustainability and economic models is contested and debated, with multiple positions which do not necessarily share views on either diagnosis or remedy for the problems with contemporary capitalism. In brief, the circular economy vision argues that increasing the adoption of measures like resource efficiency, reuse, recycling and zero waste can close the loops of our current linear production and consumption pathways, and result in cleaner production, healthier ecosystems and reduced social inequality. This position seeks to regulate and limit economic growth, and introduce manufacturing and supply efficiencies (Ghisellini, Cialani and Ulgiati, 2016; Lieder and Rashid, 2016). The circular economy position can find common ground with contemporary discourses of the green capitalism, which suggests that sustainability can be achieved through incentivizing projects, schemes and companies which are perceived to be green.

In contrast to the circular economy which seeks regulation and efficiency, green economy advocates believe that the market will automatically respond to incentives which value ecologically sustainable modes of production more highly than polluting or ecologically degrading ones (UNEP 2011).

A third position suggests that the ownership and management of resources, and the power structures behind global economies need to be fundamentally changed. They argue that circular and green visions, however well-meaning, are panaceas which are unable to deal with the serious social and ecological crises facing our current model. If this is true, approaches which seek to promote capitalist growth will be unable to substantively address crises (Davidson 2012).

One example of an alternative paradigm in this radical tradition is degrowth, which has gained significant momentum in recent years, and suggests that (Kallis, 2011; Martínez-Alier, Pascual, Vivien and Zaccai, 2010).

These distinct yet related positions have different implications for how OxChain addresses questions of sustainability; through efficiencies and changed practices, through market-driven incentivisation, or through more overtly political approaches. For example, focusing on a circular economy model may mean paying close attention to trade-offs between differing priorities in a supply chain (for example, between greater revenue or carbon reduction), and adjusting practices based on sanctions and efficiencies. If the incentive model proposed by green economy advocates is correct, then OxChain should seek to bring about desirable behaviours through inventives (for example, the greater consumption of ethical products).

The project may also align itself with degrowth debates by claiming to reduce the amount of new goods produced; however, this will depend on the value proposition offered by the project, as in some scenarios, new (albeit 'ethical') products may be produced. The OxChain project questions how the addition of new technologies might shape and change these difficult debates.

METHODOLOGICAL APPROACHES

HUMAN-COMPUTER INTERACTION

Technology studies considers technology as a social construct (Russell and Williams, 2002), the development and deployment of which can be understood only by taking into account the interaction between the technology and the social context in which it happens, whether at institutional level (Avgerou, 2001) or organizational level (Orlikowski and Robey, 1991). Sociomaterial and practice studies of information technology examine technology development and deployment by focusing on the processes underlying the assemblage of human and material agency within highly idiosyncratic contexts (Leonardi, 2013; Orlikowski and Scott, 2009), as users shape technology structures through their recurrent practices (Orlikowski, 2000). Such approaches enable researchers to provide rich descriptive accounts of localised information technology use practices, allowing for the unpicking of the complexity of dynamic sociomaterial configurations performed in practice in specific contexts (Orlikowski, 2009).

Methodologically, this position implies attention to the material and social realities of blockchain applications, and the wider context in which applications are developed, implemented and used. For example, Karlstrøm (2014) shows how virtual currency bitcoin is entangled with the material world through its interactions with existing conventional institutions (such as its users' need to rely on the postal service to send items on the so-called 'virtual' silk road, and its dependence on large-scale and energy-hungry mining) (see also Maurer, Nelms and Schwarz 2013). Such social and material embeddedness is also exemplified by Jabbar & Bjorn (2017) when they describe the multitude of social and material actions and considerations in maintaining a series of Bitcoin ATMs across

This perspective highlights the urgency for design research, which considers on what terms blockchain and distributed ledger technologies are made manifest materially and socially in the world. In the context of the OxChain project, the project as proposed may transform the experience of donors and shoppers, and the work of volunteers in stores and across the Trading business. Concerns for how new technologies shape people's social and working practices have been a long-running concern for researchers in the field of Human-Computer Interaction (HCI). Notably, participatory and co-design approaches (Simonsen & Robertson, 2013; Sanders & Stappers, 2012) have become commonplace as a means to understand, and generate design ideas with multiple stakeholders – especially the end-users of new technologies.

The mechanics, application and impacts of DLT's remains opaque to many academics and industry professionals, so work which engages different publics in discussions about this technology is both timely and presents particular challenges. In particular, how can we relate the seemingly nebulous and abstract explanations of blockchain to individuals' and organizations' everyday practices and values? One approach is to draw from the canon of speculative methods – which in a parallel way attempt to explore and relate abstract futures to present experience (@Candy & Dunagan). Speculative approaches typically aim to generate discourse or critique by presenting possible visions and designs of the roles of future technology. For example, Brown et al. (2016) present a speculative IKEA catalogue representing various visions of the smart home in a common accessible format. However, work by Vines et al. (2012), and most recently Elsden et al. (2017) have sought ways of engaging participant's in the generation and experience of different possible futures. The OxChain project will turn to these approaches (along with other design research methods) to engage stakeholders towards the generation of requirements for any system to be implemented.

GLOBAL PRODUCTION NETWORKS

The 'follow the things', or global production networks (GPN) research agenda is pertinent in mapping the complex social, material and technological aspects of Oxfam's multiple supply chains. This research approach places commodities and objects rather than people at its centre, and exposes the multifaceted relationships between commodity producers, consumers, regulators, labourers, transporters and marketers who make up 'the' global economy (Cook and Harrison, 2007; Hawkins, 2009, Gregson, Crang, Ahamed, Akhter and Ferdous; 2010). Appadurai (1994: 76) argues that understanding the creation of value means paying attention to how things move through the world through practices of exchange, suggesting that "commodities, like persons, have social lives". This approach suggests that, in order to understand how value is produced in a historic and concrete sense, we need to look in detail at the things that we consider have value, and examine the multiple practices by which value is understood, ascribed, built up, exchanged, and lost.

GPN's complicates the traditional conception of a supply chain, which usually places producers at one end, and consumers at the other in a fairly straightforward process. However, GPN researchers reveal a much more complex series of entanglements, which involve processes of moving things across countries, social groups, cities and other locations. For example, second-hand clothing passes through several hands and has several lives, each of which has a political economy attached to it. Brooks (2013) writes about the value that cast off clothes have in Mozambique, creating opportunities for women in a developing country to build livelihoods around Northern cast-offs.

Tracing these processes is part of what Cook et al. (2007) call "the everyday geographies of connected lives". Envisaging global networks rather than linear processes will help the OxChain project understand the complexity of Oxfam's valuation process from the perspective of the product and the network used to distribute it, conceptualising value as something which arises form a series of non-linear relationships between people, technologies and things. This speaks to the core goals of Oxfam: How to generate value from discarded things in ways which benefit other people. Through using a distributed ledger, we may also be able make these relationships more visible, helping Oxfam's customers and donors visualise different values at different points in the life of the second-hand thing.

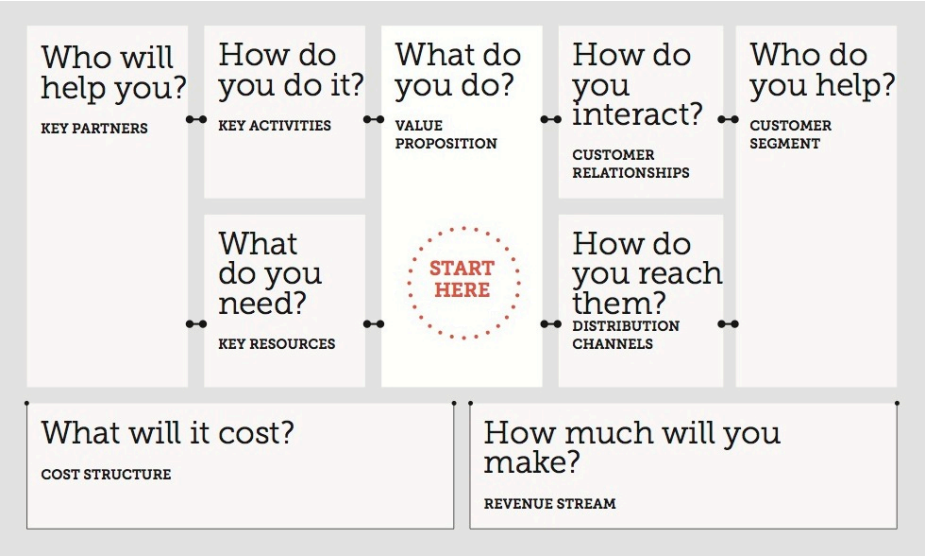
"This research approach places commodities and objects rather than people at its centre, and exposes the multifaceted relationships between commodity producers, consumers, regulators, labourers, transporters and marketers who make up 'the' global economy."

BUSINESS MODEL MAPPING

There are many frameworks developed in existing research that attempt to map the components of the business model (see Chesbrough and Rosenbloom, 2002; Morris, Schindehutte and Allen, 2005; Osterwalder and Pigneur, 2010). We are primarily guided by the business model canvas approach developed by Osterwalder and Pigneur (2010) (and later refined in Osterwalder, Pigneur, Bernarda and Smith, 2014). This approach identifies nine components of the organization (which, for the purposes of this analysis, would include Oxfam's Trading business), and provides a research methodology around investigating the business model of the Trading organisation.

This includes: the value proposition to the customers; the key sources of revenue underpinned by the customer relationships, the target customer segments, and the distribution channels including the relationships between the stores and across the rest of the Oxfam distribution network, and the cost structures underpinned by the supply network including key partners; the key activities within the stores and across the supply chain, and the key resources employed by the Trading unit to perform these activities. By mapping the current components of the Oxfam Trading unit, the analysis would unveil where the technology can generate most value, and the changes involved in its deployment within the organisation, for example in terms of enhancing the value proposition, changing or improving customer and donor relationships, or through changing key activities.

The generic business model canvas shown overleaf will provide the methodological basis for investigating Oxfam's particular value proposition.



In summary, our theoretical and methodological approach approaches the question of how value is constructed, and takes the perspective that it can be understood through the multiple lenses of social, technological and business literatures. We pay particular attention to context, addressing the particular positionality of Oxfam as a political institution concerned with the complex practice of international development. We also draw from the combined insights of technical computer studies and the HCI tradition, to seek to produce a robust technical research tool which is also sensitive to the multiple research questions identified above. We draw on two insights which complicate the notion of a linear supply chain, reconceptualising value as complex series of entanglements, which involve processes of moving things across countries, social groups, cities and other locations, and as a constellation of technology and social processes rather than a linear process.

PILOT RESEARCH

We conducted two co-design workshops at Oxfam headquarters on 16 May and 1 June 2017 to explore the implications of DLT for Oxfam.

We have begun ethnographic research at Oxfam stores in Edinburgh.

The sessions followed the BlockExchange format, a highly participatory and dynamic workshop which helps its participants consider what might happen if money is no longer the mainstay of value exchange.

The workshops used Lego bricks to provide a tangible and accessible illustration of how blockchain technology works, and enabled participants to experiment with peer-to-peer trading over three stages of iteration. The first two stages of the sessions allowed participants to get to grips with blockchain protocols and means of exchanging conventional resources like timber and oil, while round three helped them imagine what might happen if exchanges can happen between individuals and involve more than money and resources.

The workshops culminated with a session on innovating and presenting new ideas for what DLTs might mean for Oxfam. While the workshops inevitably simplified blockchain technology, they were extremely useful in eliciting ideas around how the technology might change, enhance or even challenge Oxfam's current value proposition and practices.

The workshops produced several ideas each with particular values and themes attached to them. The ideas expressed particular values and possible futures around three key areas:

Provenance and transparency

Several of Oxfam's teams were particularly interested in using DLTs to foreground and authenticate the provenance of items sold in stores. One team ('Weave to Believe', workshop one) wanted to introduce a blockchain database to authenticate the woven goods produced by Oxfam by various communities around the developing world. These items could carry an authentication code, recorded in a blockchain, which would allow customers to trace the items and confirm its fair trade qualities.

A related idea was proposed in workshop two, where a group imagined creating a distributed, mutually-authenticated database around the ethical qualities of the goods sold in stores. This idea would draw on the multiple manufacture and making sites used to produce goods for Oxfam, and use each site to store data about each other, in a distributed authentication database of ethical participants. A further idea was proposed around using digital technology to clearly communicate the impacts of their donated item, allowing them to trace the item through a supply chain (workshop two).

The advantages of this approach may include making ethical supply chains and development impacts clearer to shoppers, providing a way to increase sales through finding new ways to promote its core values to shoppers. Challenges may include how increased transparency may reshape conversations around value in development, for example, how to communicate secondary and long-term value that may be generated by donations, and, the perennial problem of how to support the need for spending on administration costs and overheads.

Novel donor/recipient relationships

Three teams explored the practical implications of a decentralised currency on making development disbursements. One group in workshop two imagined that Oxfam may be able to directly adopt Bitcoin as a currency, while a second group explored using a DLT to make direct contributions based on immediate needs expressed in developing countries in the form of database entries ('Oxfam Instant', workshop one). A further group from workshop two also considered using a blockchain to record development needs from project teams, and link this information directly with Oxfam's donor and shopper community.

The idea of using blockchains and other digital technology to find new ways of connecting donors and recipients is a very active research area (see Ammous 2015, Kshetri 2017, Scott 2016). In the context of OxChain, this issue raises two practical challenges. The first relates to the capacity of potential recipients to receive donations in novel currencies, a challenge which is likely to be outwith the scope of the research. The second relates to understanding how Oxfam's role as development expert and delivery channel may change if development payments are made as direct peer-to-peer transfers. This project will provide theoretical and empirical reflection and important insights from the perspective of a development organisation on this issue. Disintermediation also presents opportunities for Oxfam. A key area may be exploring innovation around using digital technology to communicate development needs and the impact of aid donation in an immediate and compelling way to store shoppers and donors.

Revealing hidden values

Two teams explored how blockchains could be used to make hidden values tangible. The first, 'The Love Chain' (workshop one) imagined using a blockchain to express the role of donors and volunteers as a form of value, and embed their contributions in the supply chain (in time, goods, participation money or other formats). The Love Chain would also record what volunteers gained from being involved with Oxfam, hence expressing how the stores give rise to several forms of intangible yet important social value. The second group envisaged an 'Oxcoin' or a 'Love Coin' which would be given to donors of goods and money to give them a tangible record of their engagement with development.

This approach offers compelling ways for Oxfam to foreground many forms of engagement and value beyond financial contributions. In doing so, it may be possible to find new ways of creating and engendering affective and emotional attachments to development goals and the work of Oxfam, thus increasing donor and volunteer engagement and promoting Oxfam values more widely. Further advantages may exist around finding new ways to engage volunteers through creating novel forms of reward and engagement, within the parameters of what is permissible in rewarding volunteers. However, it is important to avoid being seen to simplistically commodify forms of emotional or social value.

These three themes will be considered by the project team and Oxfam in further research phases, and some, all, or a combination of them may be used as a basis for further participatory design iteration, as well as technical and business model scoping.

ETHNOGRAPHIC RESEARCH

As part of the pilot research phase we conducted several hours of ethnographic research at two Oxfam stores in Edinburgh, using methods including participant observation of valuation practices, observations, and interviews with store managers and volunteers.

This initial research is producing many insights. Store managers are highly expert at quickly valuing items and moving stock efficiently through the limited space and time that the stores have to process donations. Store managers draw on a range of their own and others' expertise to understand the local market, and are already quickly able to ascertain the marketability and sale value of a donation. Trusted informal networks such as social media communities, friends and other store managers assist them with valuing unusual and rare items, and a range of innovative channels such as eBay and social media help them to take these to market.

Stores also already have a series of practices around moving stock around the Oxfam network. This includes making use of other value networks such as bulk buying to extract some revenue from the unsellable DVDs and CDs they receive, and online book sellers. Similarly, store managers might make use of the area manager or their own vehicles to transport goods between stores. A large proportion of some donations is moved on via these networks.

The stores have a complex social life, with volunteers participating for a range of reasons. While some may be primarily interested in the Oxfam mission, others are attracted to the product (especially rare records and books), others for social interaction, and others for work experience. Volunteers can sometimes be 'protected' by store managers from what can be seen as top down innovations which do not always make sense in individual stores. People may be donors and customers as well as volunteers, and they have a range of technological savvy.

Stores are also important to promote Oxfam branding, and create and maintain affective relationships around the development mission. Understanding this complexity of motivation, connectivity, materiality and capability will be important to a successful technological implementation.

CONCLUSIONS AND FUTURE APPROACHES

To conclude briefly, this initial work phase of OxChain has involved research planning, partner engagement, engaging with relevant methodological and conceptual debates, and conducting research with Oxfam in the form of pilot store studies and workshops.

This has revealed a range of debates and research priorities which have built on the projects original research questions. These include issues of transparency in development practices and funding, and provenance in the supply chain of the new and second-hand goods sold in stores. This may also include entering debates around trust, authority and direct value exchange in international development from the perspective of a major development institution (though the project is unlikely to fully trial a blockchain within a developing country). We are also greatly attuned to the importance of volunteer values and practices, and the possibility of using stores as nodes for multiple forms of value exchange (including the possibility of stores as tech hubs), thus dealing with much wider challenges faced in the retail sector. The next phase of research includes ongoing in-depth ethnography and business modelling to map valuation practices, 'follow the thing' research to map relationships in the Oxfam supply network, HCI and participatory design-led work to co-design technological innovations, and detailed technological scoping and production around DLT implementation.

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Contact

Kate Symons

K.Symons@ed.ac.uk