Enabling Data Sharing for Social Benefit Through Data Trusts: Data Trusts in Climate

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Contents

Executive Summary

According to the World Meteorological Organization, 2019 concluded **a decade of exceptional global heat**, retreating ice and record sea levels driven by greenhouse gases produced by human activities[1].

Data and artificial intelligence have a vital role to play in helping us understand and tackle this climate crisis, from predicting extreme weather events, to improving the energy efficiency of our homes and helping to identify deforestation.

However, as with data systems at large, individuals and communities tend to have little say in how data is collected, used and shared for climate action. Data trusts and other forms of 'bottom-up' data stewardship have emerged to reverse this trend and **empower people to take part in the data economy.**

This report sets out the work undertaken for the project **'Data trusts in climate'**, completed between November 2021 and March 2022. The project was commissioned by the Global Partnership on Artificial Intelligence (GPAI) and delivered in partnership by the Open Data Institute (ODI) and Aapti Institute, with support from the Data Trusts Initiative. It consisted of a literature review, expert interviews and a co-design process involving more than 50 organisations from around the world.

We articulate **a design for a London Cycling Data Trust**, describing how it could interact with the cycling community, be legally incorporated, the technologies it could use and its options for funding. We found that data trusts will be less feasible in other contexts and difficult to apply for a variety of reasons, including ones of cultural, technological and economic nature. We set out lessons learned from exploring data trusts for **small shareholder farming in India** and for **Indigenous climate migration in Peru.**

This work has produced **a set of generic feasibility criteria for data trusts**, which are intended for use by policymakers and practitioners seeking to understand where data trusts may be necessary and possible, in climate change and beyond. It also sets out a **practical roadmap** for the development of a London Cycling Data Trust and other similar data trusts, outlining the steps required to implement it in the real world.

We also discuss **other approaches to responsible data stewardship for AI**, and options for GPAI and other policymakers interested in this agenda.

As in all progress around new approaches to data stewardship, it is essential to test these ideas further. This project is **another step forward for data trusts**, but much more is required to unlock their potential.

[1] United Nations Environment Programme, 'Facts about the climate emergency',. https://www.unep.org/explore-topics/climate-action/facts-about-climate-emergency

1. Introduction

The objective of this project was to assess the opportunity to create data trusts that would facilitate action to tackle climate change and, if feasible, produce a roadmap for the development of a real-world data trust in a vital climate domain. It is the latest in the GPAI's efforts to enable data sharing for social benefit through data trusts, and builds on previous work[2] undertaken by the ODI, Aapti Institute and Data Trusts Initiative to explore their potential.

We set out to help bridge the gap between the theory and practice of data trusts. What could data trusts look like in the wild and how would they interact with different communities to address pressing climate issues? What are the key barriers and frictions that would need to be overcome to develop them? This report shares our findings.

In **Section 2**, we provide a backdrop, discussing the role of data and artificial intelligence in understanding and tackling climate change. We contextualise data trusts as a promising approach to 'bottom-up' data stewardship, where individuals and communities are empowered to control how data about them is collected, used and shared, and provide a summary of the latest discourse on the concept.

Drawing from the core functions of the approach identified by GPAI's Data Governance Working Group in 2021, we document the criteria developed and used to assess the feasibility of data trusts in **Section 3**. Given data trusts exist as a mode of stewardship designed to empower communities around data, these feasibility criteria are anchored around a community's readiness and ability to engage. We intend for others to use this as a general framework to understand where data trusts may be useful in the near-term, in climate change and beyond.

Designing data stewardship arrangements is contextual, dependent on different and specific dynamics, issues and needs. In **Section 4**, we document the results of our work to design and assess the feasibility of applying data trusts to three different climate domains: city sustainability, small shareholder farming and climate migration. This work followed a process of co-design, whereby experts in these domains and data stewardship came together to explore what data trusts could look like, using collaborative design frameworks and methodologies.

Based on our positive assessment of its feasibility, we build out a roadmap for the development of the London Cycling Data Trust – also applicable to other locales – in **Section 5**. The roadmap includes steps covering the essential elements of community, capacity, legal and governance, technology, and scale and sustainability. Like any roadmap, the reality of building the data trust will be messier, more difficult and less linear than we set out, but we hope it describes to GPAI and other stakeholders the nature of the interventions required on their behalf.

In **Section 6**, we share broader conclusions from this work, including on the feasibility and next steps for the three climate domains, the process of co-design and the general feasibility of data trusts. We also discuss other approaches to responsible data stewardship for AI, and options for GPAI and other policymakers interested in data stewardship.

[2] Aapti Institute and The Open Data Institute (2022), "Enabling data sharing for social benefit through data trusts". https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

More information about this research, along with the methodology used and a bibliography, can be found as appendices.

2. Climate Change, Artificial Intelligence and Data Trusts

2.1 The Role of Data in Understanding and Tackling Climate Change

In 1856, Eunice Foote determined that increasing concentrations of 'carbonic acid gas' in the atmosphere would lead to a global warming of the climate. Working under the constraints of her time, Foote collected data to compare the temperature of exhausted and condensed air under differing exposures to the sun's rays to demonstrate how an atmosphere with higher carbonic acid gas would warm the earth[3].

In the time between Foote's experiments and the writing of this report, human activities have raised atmospheric concentrations of carbon dioxide by almost 49%[4]. Scientists predict that this trend will lead to a continued warming of the planet and many significant effects, some of which are already occurring. These include more droughts and heat waves, stronger hurricanes and tropical storms, rising sea levels and loss of arctic sea ice. The Intergovernmental Panel on Climate Change (IPCC) has recently described how these changes will directly impact human life, highlighting increased climate migration, food and agricultural insecurity, water scarcity and disease transmission[5].

Just as Foote demonstrated more than 160 years ago, data has a vital role to play in helping us understand and tackle these impacts to our planet and humanity. GPAI's Responsible AI Working Group describes how significant advancements in the field of artificial intelligence – 'any computer algorithm that makes predictions, recommendations or decisions on the basis of a defined set of objectives'[6] – have made yet more possible with data[7]. GPAI's Responsible AI Working Group identifies four ways[8] in which data and AI are being used to support climate understanding and action:

- **distilling raw data into actionable information.** For example, the UK's Office for National Statistics (ONS) generates insights from large transportation datasets to inform the development of pedestrian-friendly infrastructure, improved public transport measures and a transition to ultra-low emissions vehicles[9].

- **optimising complex systems.** For example, ThermaFY is applying artificial intelligence to identify energy inefficiencies in buildings' heating and cooling systems, helping to reduce their emissions[10].

[3] Foote, E. (1856), 'Circumstances affecting the heat of the sun's rays'. https://static1.squarespace.com/static/5a2614102278e77e59a04f26/t/5aa1c3cf419202b500c3b388/1520550865302/foote_circumstances-affecting-heat-suns-rays_1856.pdf

[4] NASA Global Climate Change. (2022), 'Carbon Dioxide' https://climate.nasa.gov/vital-signs/carbon-dioxide/

[5] IPCC Working Group II (2022), 'Sixth Assessment Report: Fact sheet – Central and South America: Climate Change Impacts and Risks', https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_FactSheet_CentralSouthAmerica.pdf

[6] The GPAI, Climate Change AI, and Centre for AI & Climate, (2021), 'Climate Change and AI: Recommendations for Government Action', https://gpai.ai/projects/responsible-ai/environment/climate-change-and-ai.pdf

[7] Ibid.

[8] Ibid.

[9] UK Office for National Statistics (2019 September 16), 'Road transport and air emissions', https://www.ons.gov.uk/economy/environmentalaccounts/articles/roadtransportandairemissions/2019-09-16

[10] Microsoft: AI for Earth, 'ThermaFY', https://www.microsoft.com/en-us/ai/ai-for-earth-thermafy

- **accelerating scientific modelling and discovery.** For example, in Brazil, Imazon is using artificial intelligence to identify deforestation zones in the Amazon, and assist government agencies in protecting and conserving the rainforest[11].

- **improving predictions.** Many governments around the world are using data to better predict and prepare for extreme weather events, including periods of drought, extreme cold or heat, hurricanes and cyclones[12,13].

However, despite the positive advancements of data and AI in this field and the wider data economy, one can observe two inter-related phenomena: 'data hoarding' and 'data fearing'[14].

'Data hoarding' relates to a scenario where organisations restrict access to data due to misperceptions about its value or the risks associated with data sharing. The benefits of data collection and use are only enjoyed by a few, while the negative impacts of its use affect society as a whole[15]. In their report on the digital commonwealth, Mathew Lawrence and Laurie Laybourn-Langton argue that the power of data and AI is concentrated in the hands of the few in the current digital economy, and that 'without action, the boundless ambition of the universal platforms threatens to undermine democracy, accelerate inequality and concentrate economic power'[16].

The scenario of 'data fearing' describes how data might not be collected or used to the extent it could, due to concerns about the harm that it can cause people being left unaddressed[17]. People might avoid using services, or withdraw consent for data to be collected, which means that we end up missing data and the uses of it that could support human flourishing. In the report 'Digital technology and the planet: harnessing computing to achieve net zero'[18], the Royal Society set out how new technologies could be used to address the challenges to privacy and security that deploying AI to the climate crisis can encounter. It also outlined the need to ensure that the positive impacts generated from data use in this context are felt by those who have originated the data.

These phenomena have problematic consequences in terms of making use of data and AI in the battle against climate change. For example, a lack of accessibility to proprietary mobility data sets – driven by organisations hoarding data they hold – has impacted our ability to adequately track carbon emissions[19]. Elsewhere, smart meter users have withdrawn consent for data to be shared, due to concerns that it would be used to identify

[11] Microsoft: AI for Earth, 'Imazon', https://www.microsoft.com/en-us/ai/ai-for-earth-imazon

[12] Hickey, H (2020 December 15), 'A.I. model shows promise to generate faster, more accurate weather forecasts', https://www.washington.edu/news/2020/12/15/a-i-model-shows-promise-to-generate-faster-more-accurate-weather-forecasts/

[13] Richmond, S. (2020 June 30), 'How AI could help us stay ahead of extreme weather', https://gca.org/how-ai-could-help-us-stay-ahead-of-extreme-weather/

[14] Hardinges, J. & Keller, J. R. (2021 January 29), 'What are data institutions and why are they important?', https://theodi.org/article/what-are-data-institutions-and-why-are-they-important/

[15] Newman, N. (2014), 'How Big Tech enables harms to consumers, especially to low-income and other vulnerable sectors of the population', https://www.ftc.gov/system/files/documents/public_comments/2014/08/00015-92370.pdf

[16] Lawrence, M. & Laybourn-Langton, L. (2018), 'The Digital Commonwealth: From private enclosure to collective benefit', http://www.ippr.org/research/publications/the-digital-commonwealth

[17] The Open Data Institute. "Our Theory of Change". https://theodi.org/about-the-odi/our-vision-and-manifesto/our-theory-of-change/

[18] The Royal Society. (2020). "Digital technology and the planet: Harnessing computing to achieve net zero". https://royalsociety.org/-/media/policy/projects/digital-technology-and-the-planet/digital-technology-and-the-planet-report.pdf

[19] Ibid.

their personal routines, sold to other companies or help 'hackers' access the data[20]. While data and AI alone will not solve the climate crisis, improving access to data could help provide valuable insights to policymakers, communities and organisations in the efforts to respond to it.

2.2 The Emergence of Bottom-Up Data Stewardship

The concept of data stewardship is a response to these 'data hoarding' and 'data fearing' scenarios. Data stewardship can be understood as an approach to data governance that aims to unlock the societal value of data, while responsible and rights-preserving in nature[21]. More specifically, the idea of 'bottom-up data stewardship' is a tonic to the typical exclusion of individuals and communities from data collection, use and sharing[22]. Bottom-up data stewardship recognises individuals and communities as more than recipients of information – or mere providers of consent – about how data about them is used[23], and seeks to empower them to participate in the process of data collection, use and sharing.

An ecosystem of research and practice has emerged around this concept of 'bottom-up data stewardship'. The MyData Global community, for example, is set out 'to empower individuals by improving their right to self-determination regarding their personal data'[24]. The Mozilla Data Futures Lab was launched in 2021 to support experimentation around 'new approaches to data stewardship that give greater control and agency to people'[25]. The Ada Lovelace Institute advocates for 'participatory data stewardship', where people whose data is used, or about which data decisions are taken, are meaningfully involved[26]. Aapti Institute's work at the Data Economy Lab[27] aims to empower individuals and communities to play a bigger part in data governance, and it has documented numerous examples of this in practice[28]. The Data Trusts Initiative is supporting pilot projects that create bottom-up data stewardship mechanisms to serve their communities[29].

A number of promising data stewardship initiatives have emerged to enable groups to generate or repurpose data about them, and exert collective control over it for a common purpose. For instance:

- **Variant Bio**[30] works with historically marginalised populations to facilitate people-driven therapeutics, where communities are engaged prior to the beginning of research projects and their data is collected and used within a framework that focalises community concerns.

[20] Opus Energy. (2020 June 29). "Security, data and privacy: setting the record straight on smart meters". https://www.opusenergy.com/blog/smart-meter-security-data-privacy/

[21] Ada Lovelace Institute. (2021). "Disambiguating data stewardship". https://www.adalovelaceinstitute.org/blog/disambiguating-data-stewardship/

[22] Manohar, S. (2021). "Responsible data sharing for public good: Theoretical bases and policy tools". https://thedataeconomylab.com/2020/07/31/data-sharing-for-public-good-theoretical-bases-and-policy-tools/

[23] Ada Lovelace Institute (2021). "Participatory data stewardship: A framework for involving people in the use of data". https://www.adalovelaceinstitute.org/report/participatory-data-stewardship/

[24] MyData, https://mydata.org/

[25] Mozilla, 'Data Futures Lab', https://foundation.mozilla.org/en/data-futures-lab/

[26] Ada Lovelace Institute (2021), 'Exploring participatory mechanisms for data stewardship – report launch event', https://www.adalovelaceinstitute.org/event/exploring-participatory-mechanisms-data-stewardship-report-launch/

[27] The Data Economy Lab, https://thedataeconomylab.com/

[28] The Data Economy Lab, 'Tracking Stewardship', https://thedataeconomylab.com/tracking-stewardship/

[29] Data Trusts Initiative, 'Pilot Projects', https://datatrusts.uk/pilot-projects-1

[30] Variant Bio, https://www.variantbio.com/

- **Driver's Seat**[31] is an independent, driver-owned cooperative where members' data is used to derive insights that help them optimise their performance.

- **OpenHumans**[32] empowers individuals and communities to explore and share their personal data for the purposes of education, health and research.

Bottom-up approaches to data stewardship are already being used to tackle the climate crisis[33]. They are often framed as 'citizen science', whereby individuals contribute data through observations or sensors, such as:

- **iNaturalist**[34] is a citizen science project which empowers people to document biodiversity and share images of flora and fauna as they come across it in nature.

- **Globe at Night**[35] is an international citizen-science campaign to raise public awareness of the impact of light pollution by inviting citizen-scientists to measure and share their observations of the brightness of the night sky.

- **Sensor.Community**[36] is a network of individuals with DIY air quality sensors. The community pools data about air quality from all over the world to create an open environmental dataset.

These examples of data stewardship, focused on empowering individuals to exert more control over data, offer inspiration for the role that data trusts could play in tackling the climate crisis. However, despite their vast potential, there are few examples and most initiatives of this type are limited in scale and focus on citizen-science – there remains significant work to explore further climate contexts where they can be applied.

2.3 Data Trusts

The concept of 'data trusts' can be seen against this backdrop of bottom-up data stewardship. Although there have been varying interpretations of the term[37], the idea of extracting value from data and restructuring its distribution through the use of data trusts was posited by Professor Neil Lawrence in 2016[38], who noted data trusts could act as 'power brokers' to mediate the use of data for public benefit, without compromising the rights of the data subjects to whom the data relates.

[31] Driver's Seat Cooperative LCA, https://driversseat.co/

[32] Open Humans Foundation, https://www.openhumans.org/

[33] Snaith, B. & Massey, J. (2021), 'Data Institutions for Climate Action', https://theodi.org/article/data-institutions-for-climate-action/

[34] iNaturalist, https://www.inaturalist.org/

[35] Globe at Night. https://www.globeatnight.org/

[36] Sensor.Community. https://sensor.community/en/

[37] Aapti Institute & The Open Data Institute. (2022). "Enabling data sharing for social benefit through data trusts". https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

[38] Lawrence, N. (2016 June 3). "Data trusts could allay our privacy fears". https://www.theguardian.com/media-network/2016/jun/03/data-trusts-privacy-fears-feudalism-democracy

Subsequently, Professor Sylvie Delacroix and Lawrence articulated 'bottom-up data trusts' in 2019[39] as a tool of collective engagement used by communities to decide on how their data is used and shared by third parties. They described how trustees could be bound by fiduciary obligations of undivided loyalty and care towards its beneficiaries, defining the terms for purpose-led data sharing. The Data Trusts Initiative builds on this conception of data trusts[40]. It describes them as a 'mechanism for individuals to pool their data rights into an organisation'[41] to rebalance the respective control that corporations and individuals have over personal data, and provide a legal mechanism to empower data subjects to choose to appoint others to make those decisions on their behalf.

Similarly, Aapti's interpretation of a data trust refers to 'a legal arrangement wherein a person authorises an individual or entity to manage certain property for the benefit of a third party or for certain defined purposes'[42]. In the context of the data economy, the data (or rights over it) constitutes the property[43] that will be managed by the trust and the trustee (an authorised representative individual or entity) is bound by fiduciary obligations to act in the best interests of its beneficiaries and according to the defined purposes.

GPAI's Data Governance Working Group is advancing the understanding and application of data trusts, based on their potential to 'expand access to data for innovation while putting citizen interests at the heart of stewardship'[44].

Functionally speaking, GPAI's Data Governance Working Group has described that data trusts[45]:

1. **provide a platform for collectives to establish desirable terms and conditions of data use, setting the constitution of a trust;**
2. **appoint expert trustees (professional managers) to take responsibility for the stewardship of the trust's assets;**
3. **create a regime of strong fiduciary responsibilities to bind the trustees to act in the interests of the trust's members;**
4. **negotiate the use of trust assets in accordance with agreed terms and conditions, facilitating safe and controlled data use;**

   establish safeguards and oversight mechanisms to prevent data misuse and to take remedial action in the event of the trust's terms and conditions being breached.

[39] Delacroix, S. & Lawrence, N. (2019). "Bottom-up data Trusts: disturbing the 'one size fits all' approach to data governance". https://academic.oup.com/idpl/article/9/4/236/5579842

[40] The Data Trusts Initiative. https://datatrusts.uk/

[41] Data Trusts Initiative. (2021 January 28). "Data trusts: international perspectives on the development of data institutions". https://static1.squarespace.com/static/5e3b09f0b754a35dcb4111ce/t/603ce3325e1da817afe6b193/1614603061204/WP+2+-+DTI+-+global+perspectives.pdf

[42] Manohar, S. (2019), 'Trust Law, Fiduciaries and Data Trusts', https://thedataeconomylab.com/wp-content/uploads/2020/10/DataTrustsPpr_SM.pdf

[43] Certain scholars have demonstrated that data lacks the requisite quality to be considered and treated as 'property' in law. Refer Professor McFarlane's work for more information – https://www.law.ox.ac.uk/research-and-subject-groups/property-law/blog/2019/10/data-trusts-and-defining-property

[44] The GPAI Data Governance Working Group, (2021), 'Understanding Data Trusts', https://ceimia.org/wp-content/uploads/2021/07/2021-07-09-GPAI-summary-understanding-data-trusts-updated.docx.pdf

[45] Ibid.

In February 2022, GPAI's Data Governance Working Group published the report 'Enabling data sharing for social benefit through data trusts'[46], documenting the findings of research conducted by Aapti Institute and the ODI into global knowledge, attitudes and practices of data trusts. The research found general optimism about the potential of data trusts (particularly in Europe and North America). However, despite encountering several other real-world bottom-up data stewardship initiatives, it found no examples of data trusts that were able to deliver all of the functions listed above. While existing initiatives do provide platforms for communities to pool data and place safeguards and oversight mechanisms around its use, the role of trustees in enabling data stewardship remains a difficult function to operationalise[47]. In parallel, Aapti Institute was commissioned by GPAI to examine the existing and necessary legal mechanisms required to develop data trusts[48]. This analysis found a disparity in the maturity of legal landscapes for data trusts around the globe, and the need to explore diverse legal structures for enabling data trusts and other forms of data stewardship.

There are a number of domains where data could support the development of AI and where that data could be subject to the control of individuals. Data trusts are worth investigating as providing a vehicle for communities to do this around climate issues, under a regime of strong fiduciary protections.

[46] Aapti Institute and The Open Data Institute (2022), 'Enabling data sharing for social benefit through data trusts', https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

[47] Ibid.

[48] Ibid.

3. Criteria for Assessing the Feasibility of Data Trusts

This project sought to assess the feasibility of data trusts in the context of pressing climate issues. Through this work, we learnt that feasibility is a function of a number of factors, many of which relate to the characteristics of the community needed to create and sustain it. We have structured these as the following questions:

1. Is there an incentive for the community to come together to create a data trust?

As a mode of bottom-up data stewardship, a group of motivated individuals need to come together around a common purpose or cause that can be addressed by a data trust. The incentive could be based on financial return, reciprocal value exchange or altruism.

2. Do members of the community have the capacity to engage in the development and running of a data trust?

As well as coalescing around a cause, a data trust requires individuals to actively participate by delegating their data or rights to it. Not all groups of individuals will have the awareness, skills or time to engage and participate to this extent, both in the setting up of a data trust and in the running of it.

3. Is there a person, group or organisation who can credibly drive the development of a data trust with the community?

In the spirit of bottom-up/participatory data stewardship, the process of building a data trust should be led by someone from or with a strong connection to the community. They may have a role to play in building awareness, educating, upskilling and organising. While organisations like GPAI can seek to provide inspiration and even facilitate, contextual expertise, credibility and leadership is important.

4. Is there demand for the data among prospective users, with clearly bound use cases for it?

More data isn't always better[49]. If the purpose of a data trust is to enable access to data – and importantly, to safeguard the rights of, and distribute value back to, those contributing it – then the intended data users, use cases and impacts of the data's use should be clearly articulated. If similar data is available from other sources, then it should also be clear why users would seek to access it via the data trust.

5. Are there data rights in the jurisdiction that individuals from the community could delegate to the data trust?

A data trust is designed to steward data on behalf of a community. This requires the existence of legal data rights that individuals can delegate to a data trust to execute on their behalf, as well as the right to data portability, which may be needed to repurpose data from existing sources as part of the data trust's stewardship activities. As previous research by Aapti Institute has shown, there is a variance in access to these rights internationally[50].

6. Are there legal instruments in the jurisdiction that could be used to construct a data trust and establish fiduciary obligations to the community?

In contrast to other forms of bottom-up data stewardship, a data trust is designed to hold contextual, specific fiduciary duties to the community who have originated the data. To impart them, this requires the existence of appropriate legal forms or constructs, such as trusts, charities and other organisational forms.

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[49] Coldicutt, R. (2019), 'Just enough Internet: Why public service Internet should be a model of restraint', https://doteveryone.org.uk/2019/10/just-enough-internet/

[50] Aapti Institute and The Open Data Institute (2022), 'Enabling data sharing for social benefit through data trusts', https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

7. Is it technologically possible for the data trust to exert control over the data it would be responsible for?

While we don't see an absence of technology as a particular barrier to setting up a data trust, there will be varying levels of technological feasibility[51]. Important factors include whether the data trust actually holds data on behalf of the community, and whether the data already exists or needs to be collected – and if it does already exist, whether there is infrastructure that enables it (or at least access to it) to 'flow' to the data trust and/or prospective data users.

8. Is there access to sufficient funding to set up the data trust, and options to ensure its continued sustainability?

Setting up and running a data trust will require funding, including to build interfaces with those who will contribute data, develop technological systems to securely hold and provide access to it, and recompense trustees. Options for funding could include philanthropic donors and other actors aligned with its purpose, or charging data users for licences to access data and other services.

We intend for this feasibility criteria to be useful to others considering whether a data trust – and with some adaptation, other forms of bottom-up data stewardship – is suitable in their context.

[51] For further reflections on relevant technical infrastructures and technical design choices associated with different forms of data trust, see: https://www.youtube.com/watch?v=ol3kY1NhEjE

4. Data Trusts for Climate

In this section, we document the results of our work to co-design and assess the feasibility of applying data trusts within: city sustainability, small shareholder farming and climate migration. The three data trusts were co-designed with experts from across the three domains – to learn more about the process behind the selection of these domains and the co-design phase, please see the Methodology appendix of this report.

4.1 Exploring a Data Trust for Cycling in London

Summary

- **Context**: Meeting emissions reduction targets requires a significant move away from motorised transport to more active forms of travel. In London, a quarter of carbon emissions come from the transport of people and goods, but cycling is on the rise.
- **Key actors**: The ecosystem consists of cyclists, Transport for London, the 33 London Boroughs, mapping and navigation services, micro mobility providers, and academic institutions.
- **Opportunity**: There is demand for more precise data in this domain, as well as desire for improved cycling infrastructure among the cycling community and existing models of bottom-up civic participation to provide inspiration.
- **Potential data trust**: A London Cycle Data Trust could provide London's cycling community with a platform to contribute data to affect positive changes to the design of cycling infrastructure in their city.
- **Legal form**: Under UK GDPR, subjects of personal data are granted eight extended rights, which could be delegated to a 'true' legal trust or a company limited by guarantee.
- **Governance**: Trustees could include experts on city sustainability, digital economy, law, and technology, taking on responsibility for granular decisions about who can access the data brought together as well as advocating for broader improvements to cycling infrastructure.
- **Technology**: A mobile app - Positive Cycle - could collect GPS data and motion data about the cyclists' movements; given the sensitive nature of the data, a 'privacy by design' approach should be adopted.
- **Sustainability**: Setting up a London Cycle Data Trust could be supported by philanthropic funders, with various potential revenue models for self-sustainability.

4.1.1. Introduction to the domain

Cities are major contributors to climate change - despite accounting for less than 2% of the Earth's surface, cities consume 78% of the world's energy and produce more than 60% of greenhouse gas emissions[52]. According to a UN report, another 2.5 billion people will reside in urban areas by 2050[53]. Taken from a historical perspective, cities in the global north have contributed significantly more to climate change than those in the global south – according to one study, the global north has contributed around 92% of excess global carbon emissions[54].

There are a number of areas where cities can mitigate their impact on climate change – from reducing the amount of energy and water that is used, to tackling the level of air pollution around the city, to improving the ways that its citizens move around the city in a more sustainable way[55]. Meeting greenhouse gas emissions reduction targets requires a significant move away from motorised transport – shifting to active transport could save as much as a quarter of personal carbon dioxide emissions from transport[56]. This makes shifting away from car usage in cities a high impact opportunity. In order to encourage more people to cycle, there is a general consensus that if good cycling infrastructure is built, then people will use it. In Spain, Seville's decision to build 80km of cycle lanes in just a few years led to significant behaviour change, and an 11-fold increase in rider numbers[57].

A quarter of London's carbon emissions come from the transport of people and goods, with three quarters of these from road transport[58]. While some action has been taken (such as the expansion of the Ultra Low Emissions Zone), there remains more to be done to reduce the number of cars on its roads. As part of this, more than 260km of new cycling infrastructure has been built since 2016, increasing the cycle network by a factor of five[59]. Combined with the increase in physical exercise due to the Covid-19 Pandemic[60], it has contributed to a huge boost in cycling, with more than 200% increase in cycle flows in the last two weekends of February 2021 compared to 2020[61].

[52] United Nations, 'Cities and Pollution', https://www.un.org/en/climatechange/climate-solutions/cities-pollution

[53] Ibid.

[54] Hickel, J. (2020), 'Quantifying national responsibility for climate breakdown: an equality-based attribution approach for carbon dioxide emissions in excess of the planetary boundary', https://www.sciencedirect.com/science/article/pii/S2542519620301960

[55] Ibid.

[56] Dunning, H. (2021 February 4), 'Ditching the car for walking or biking just one day a week cuts carbon footprint', https://www.imperial.ac.uk/news/214235/ditching-walking-biking-just-week-cuts/

[57] Walker, P. (2015 January 28), 'How Seville transformed itself into the cycling capital of southern Europe', https://www.theguardian.com/cities/2015/jan/28/seville-cycling-capital-southern-europe-bike-lanes

[58] Bosetti, N. et. al. (2021), 'Reimagining London's transport system', https://www.centreforlondon.org/blog/reimagining-london-transport/

[59] Mayor of London (2021), 'Record-breaking growth in London's cycle network continues', https://www.london.gov.uk/press-releases/mayoral/mayor-and-tfl-announce-work-on-four-new-routes

[60] Nuffield Health (2021), 'Over half of Brits have taken up a new form of exercise during lockdown, with many vowing to continue with their new regimes', https://www.nuffieldhealth.com/article/over-half-of-brits-have-taken-up-a-new-form-of-exercise-during-lockdown-with-many-vowing-to-continue-with-their-new-regimes

[61] Ibid.

4.1.2. The cycling ecosystem in London

Cycling is growing in popularity in London and its number of **cyclists** have more than doubled since 2000[62]. According to a recent report, 27% of Londoners already cycle and another 16% are actively considering taking up cycling[63]. During the Covid-19 pandemic, many cities experienced a boom in cycling, as people spent more time outside exercising. London was no different, with a 7% increase in cycling in inner London and a 22% increase in outer London in 2020 compared to 2019[64].

50% of Londoners own or have access to their own bikes[65], and this ecosystem is supported by a growing network of **micro-mobility providers**, including Santander Cycles, HumanForest and Lime.

There is a strong desire from the **London Mayor's Office** to improve the cycling experience in London. Its transport strategy states that by 2041, 80% of journeys are to be made by walking, cycling and public transport[66]. Decisions about the development of cycling infrastructure in London are made by two key groups: **Transport for London** and the 33 **London Boroughs**. These groups employ an evidence-based approach to planning and evaluating new cycling infrastructure, utilising an increasingly wide range of information to inform their decisions[67].

Cyclists use a number of services to get around, including **mobile apps** such as Google Maps, Komoot and CityMapper. On these apps cycling is one of the standard mobility options to choose from, while other services – such as Strava – are more directly focused on meeting cyclists' needs.

Advocacy groups, such as the London Cycling Campaign, advocate on the behalf of London cyclists to improve the safety of London's cycling ecosystem[68], and have created products like the Healthy Streets Scorecard[69] and the Climate Safe Streets report[70].

[62] Mayor of London and Transport for London (2018), 'Cycling action plan', https://content.tfl.gov.uk/cycling-action-plan.pdf

[63] 2CV (2021), 'Cycling potential in London's diverse communities', https://content.tfl.gov.uk/cycling-potential-in-londons-diverse-communities-2021.pdf

[64] TfL (2021). 'Outer London sees 22 per cent rise in cycling as new data shows vital role in active travel', https://tfl.gov.uk/info-for/media/press-releases/2021/january/outer-london-sees-22-per-cent-rise-in-cycling-as-new-data-further-highlights-vital-role-of-active-travel

[65] 2CV (2021), 'Cycling potential in London's diverse communities', https://content.tfl.gov.uk/cycling-potential-in-londons-diverse-communities-2021.pdf

[66] Mayor of London (2021), 'The Mayor's Transport Strategy', https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

[67] Mayor of London (2018), 'Cycling action plan', https://content.tfl.gov.uk/cycling-action-plan.pdf

[68] London Cycling Campaign, 'Campaigns', https://lcc.org.uk/campaigns/

[69] London Boroughs Healthy Streets Scorecard, https://www.healthystreetsscorecard.london/

[70] Graham, F. (2021), 'Climate Safe Streets: One year on', https://www.lcc.org.uk/wp-content/uploads/2021/03/LCC-Climate-Safe-Streets-one-year-on-2.pdf

4.1.3. The opportunity to improve how data is stewarded

Understanding the different ways that people move around the city is important for making decisions about infrastructure improvement. TfL utilises data modelling to understand where the best value cycle routes could be built, and provide the local boroughs with the funding to build these routes. They take an evidence based approach to evaluating the impacts of new infrastructure, utilising survey data, traffic counts and more. TfL's models attempt to predict traffic flows around the city, and to understand the impacts that new infrastructure may have on the flow of the city.

Through the co-design phase, we also learnt that other actors were interested in accessing and using data about cycling patterns in London. Transport providers and micro mobility companies are seeking to understand how people move around the city to best meet the needs of their customers. Companies like Vivacity Labs are working with the local boroughs to improve transport services by reducing congestion and improving air quality using data from cameras and sensors, and academic institutions such as the AI for People and Planet department at UCL are attempting to use data and AI to improve passenger forecasting and personalised travel recommendations.

Cycling data tends to originate from manual processes like bike counts, origin-destination polls and surveys or directly from service users who have consented to data collection through Google, Strava and telecoms providers. For example, Strava's Metro tool 'aggregates, de-identifies and contextualises this [Strava's] dataset to help make cities better for anyone on foot or on a bike'[71]. Strava Metro claims to be the largest aggregated and de-identified active transportation dataset in the world[72] and has worked with cities such as Oslo and Sydney to better understand mobility flows and to improve their infrastructure[73].

However, multiple participants in the design phase for this domain suggested that this data is often too expensive to access, not granular enough or lacking representation[74,75]. On the latter point, they argued that the common user of the Strava and similar 'niche' apps does not represent the majority of London's cycling community, missing everyday Londoners who utilise their bikes for trips to the shops or to drop their kids at school.

According to several of our participants, there is precedent for cyclists coalescing around efforts to improve cycling infrastructure. For example, in their use of platforms such as FixMyStreet to report, view, or discuss problems with local roads[76], and in Galway, Ireland, using a collective intelligence tool to generate ideas for improving the city's mobility planning[77]. Despite this, and increases to people's awareness of data collection and use that underpins technologies like these route planning services[78], cyclists currently have

[71] Strava Metro, https://metro.strava.com/

[72] Strava (2019),. 'Strava Releases 2019 Year In Sport Data Report', https://blog.strava.com/press/strava-releases-2019-year-in-sport-data-report/

[73] Saberi, M. (2021), 'Mapping bicycling ridership across Sydney metropolitan area with Strava data', https://medium.com/strava-metro/mapping-bicycling-ridership-across-sydney-metropolitan-area-with-strava-data-aada5b6954d7

[74] Climate AI, 'Climate Change AI Dataset Wishlist', https://docs.google.com/document/d/1E1vhuGNiUWUbij8WxqNbTfytxfyaS9LnaBEdx58KQQc/edit

[75] Griffin, A. (2019), 'Strava data shows just how severe the gender gap is in cycling and running', https://www.independent.co.uk/life-style/gadgets-and-tech/news/strava-cycling-running-gender-gap-data-2019-review-indoor-training-turbo-smart-a9242921.html

[76] FixMyStreet, https://www.fixmystreet.com/

[77] Galway City Council Mobility Team (2021), https://www.arcgis.com/apps/dashboards/a49a14d971d340dbbf8e14b56efb1840

[78] Miller, C. et. al. (2020), 'People, Power and Technology: The 2020 Digital Attitudes Report', https://doteveryone.org.uk/report/peoplepowertech2020

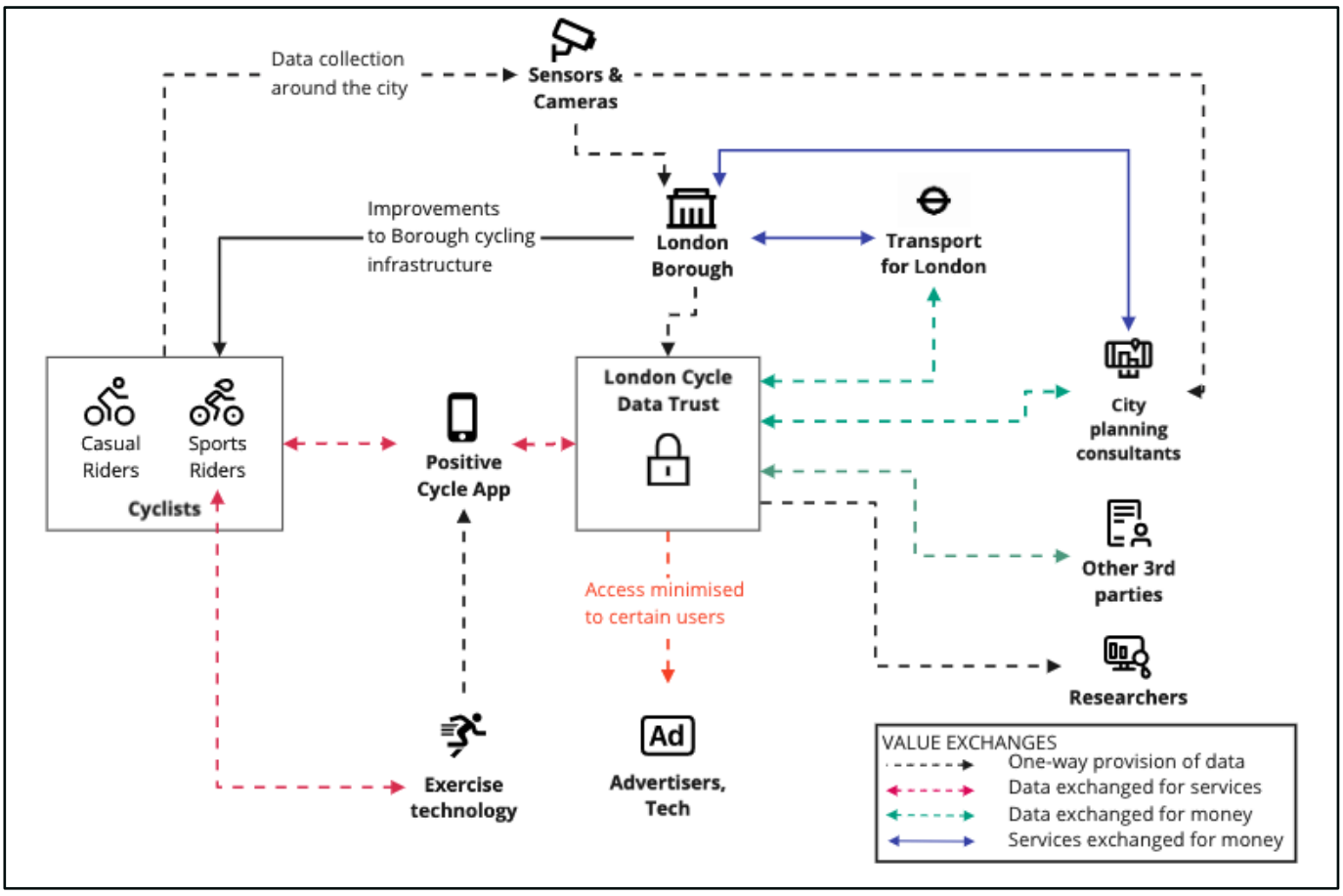
limited control over how data about them is collected, used or shared, and opportunities to direct it towards causes they support.

4.1.4. The potential of a data trust in this domain

A London Cycle Data Trust could bring together London's cycling community, and provide them with a platform to contribute data to affect positive changes to the design of cycling infrastructure in their city.

In aggregate and under specified terms, the data brought together by London Cycle Data Trust could be used by Transport for London and the 33 London Boroughs to feed into their decision making and the design of new cycling infrastructure. Further context about how different people move around the city, and for what reasons, would feed directly into the modelling and evaluation models. Other organisations like London Cycling Campaign could use the data to drive their evidence-based advocacy work, and micro mobility companies could use the data to better position their fleets to support the public. Importantly, some uses would be blocked – for example, access may not be granted to companies seeking to target cyclists with advertising based on their movements.

Figure 1: a potential London Cycling Data Trust



Some bottom-up data stewardship initiatives are enabled by groups of individuals being willing to donate data towards a good cause[79]. OpenHumans, for example, enables people to make data about their health available for citizen science projects and new medical research. In this context, participants felt that cyclists would need to engage in some form of mutual value exchange, beyond the knowledge of putting data to use for a cause they believe in. So what could this value exchange look like?

Our participants described that a data trust in this context would need to 'meet Londoner cyclists where they are', using technologies they are already familiar with. Given 71% of people in the UK use a smart phone every day[80] and the popularity of mobile apps like Google Maps, CityMapper and Strava, we developed a set of wireframes to show what a smartphone app for the London Cycle Data Trust could look like, called Positive Cycle. The app would be the interface through which individuals interact with the data trust.

Figure 2: Positive Cycle's introduction, home, route planning and saved route screens

[79] Tophof, N. & Tischer, M. (2020), 'Data donation: better health and quality of life for all', https://www.data4life.care/en/library/journal/data-donation-in-medicine/

[80] Ofcom (2020), 'Online Nation: 2020 Report', https://www.ofcom.org.uk/__data/assets/pdf_file/0027/196407/online-nation-2020-report.pdf

The Positive Cycle app could provide a cycling route planning tool. Our participants felt that a well-designed tool, with options based on faster routes, slower routes, and routes taken by other similar cyclists, could attract a significant body of users, including those who may not normally be comfortable with cycling in London. Positive Cycle could also provide access to ride statistics and information about previous trips around the city, and enable users to rate routes or report poor quality or issues with cycle infrastructure.

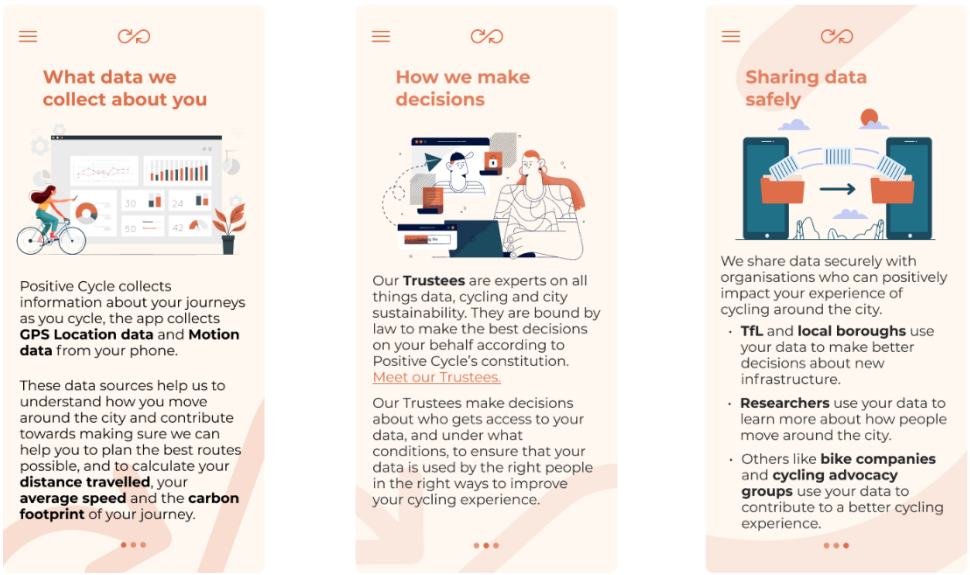
One of the main challenges to attracting users to the London Cycle Data Trust would be in ensuring the users of the trust are representative of the wider cycling community. Levels of cycling will vary across London boroughs as a result of a number of factors, including the quality of cycle infrastructure, the demography of its residents and levels of digital access and literacy.

4.1.5. Legal underpinnings of the data trust

The London Cycle Data Trust, via the Positive Cycle app, would collect and hold at least two types of data, both of which would be sensitive. The first is demographic and contextual data, such as gender and ethnicity, as well as important locations to the user such as their home, school, and place of work. The second would be location and motion data generated through use of the app.

Under UK GDPR, subjects of personal data[81] are granted eight extended rights, including the right to portability, and the London Cycle Data Trust would need to gain the consent of the user to process this personal data. Given the well documented limitations of informed consent[82], and indeed the spirit of bottom-up data stewardship, one participant suggested that the London Cycle Data Trust would need to 'be exceedingly transparent with information about what data is collected, how it is used, and who it is shared with'.

Figure 3: Positive Cycle's information screens



[81] The Privacy and Electronic Communications Regulations defines location data as 'information collected by an app or service provider about where the user's phone was located at a certain time'.

[82] Hayden, E. (2012), 'Informed consent: A broken contract', https://doi.org/10.1038/486312a

We arrived at two potential legal forms to incorporate the London Cycling Data Trust and bind trustees to clear fiduciary duties to the cyclists.

First, it could be possible to structure it using a 'true' legal trust. Research has shown that trusts' origins in England and Wales make it a suitable jurisdiction for instantiating data trusts through trust law[83]. There are three certainties required for the creation of an express trust under English law: certainty of intention; certainty of subject matter; and certainty of beneficiaries (objects)[84].

In the case of the London Cycle Data Trust, there would be clarity in the intention of the trust – for cyclists in London to come together to improve cycling infrastructure. In this structure, the cyclists would be both the settlers, those who come together to create the trust, and the beneficiaries of the trust, those who receive the benefits of the trust, while the 'trustees' would have fiduciary duties towards the trust.

With regards to the certainty of subject matter, trusts have proven to be flexible in adapting to different types of assets across centuries, and have already been established for rights relating to intellectual property[85]. The legal literature relating to data trusts suggests that almost any right can be held in trust and that data rights could in principle be held in trust[86,87]. However, as yet no examples of trusts holding data rights have been established. This has been recognised in literature around data trusts. Questions also remain around the ability of individuals to delegate rights under GDPR according to Paragraph 24 of the draft Data Governance Act[88]. Participants in our co-design phase indicated that structuring the London Cycle Data Trust as a legal trust *could* be possible, but that 'we would not know until a data trust was established and implemented in the UK' in this way.

It could also be possible to create the London Cycle Data Trust using alternate legal form[89], such as incorporating it as a company limited by guarantee. Limited by guarantee companies are most often formed by non-profit organisations – such as sports clubs, workers' co-operatives and membership organisations – whose owners wish to have the benefit of limited financial liability. For this legal structure to be a 'data trust', it must meet the essential characteristics of a data trust. Based on the definition of a data trust used by GPAI's

[83] Aapti Institute and The Open Data Institute (2022), 'Enabling data sharing for social benefit through data trusts', https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

[84] Knight v. Knight, (1840) 3 Beav 148; Wright v. Atkyns, (1823) Turn & R 143, 157

[85] AI Council & Ada Lovelace Institute (2021),. 'Legal Mechanisms for Data Stewardship', https://www.adalovelaceinstitute.org/report/legal-mechanisms-data-stewardship/

[86] Delacroix, S. & Lawrence, N. (2019), 'Bottom-up data Trusts: disturbing the 'one size fits all' approach to data governance', https://academic.oup.com/idpl/article/9/4/236/5579842

[87] Element AI & Nesta (2019), 'Data Trusts: A new tool for data governance', https://hello.elementai.com/rs/024-OAQ547/images/Data_Trusts_EN_201914.pdf

[88] Gilman, N. et. al. (2021), 'A Conversation about the Delegability of Data Rights', https://www.radicalxchange.org/media/blog/a-conversation-about-the-delegability-of-data-rights/

[89] Blankertz, A. & Specht, L. (2021), 'What regulation for data trusts should look like', https://www.stiftung-nv.de/sites/default/files/regulation_for_data_trusts_0.pdf

Data Governance Working Group[90], as well as other leading experts[91,92,93,94], the key component that distinguishes a data trust from other forms of stewardship, is the placing of fiduciary responsibilities on the independent trustees.

In this structure, the cyclists could be members of the company, while the 'trustees' would be the directors (of the limited company). Directors would have fiduciary duties towards the company[95] and are regarded as the trustees of their office as well as the subject matter or proceeds of the company[96]. They would have separate duties to shareholders/members of a fiduciary character[97].

Both of these options could prove feasible vehicles for the creation of the London Cycling Data Trust and data trusts generally; here more than anywhere there is a need for real-world data trusts to prove what is possible.

Setting up new organisations is difficult[98]. A number of participants suggested another option would be for a similar, active initiative such as Posmo.Coop or the Bike Data Project[99] to take on the intended functionality of the London Cycle Data Trust. This was on the basis that the main difference between this hypothetical data trust and the other initiatives was their lack of independent trustees and fiduciary obligations (two of GPAI's five functional elements). Provided there was demand, attempting to layer on these functions could be a practical route to instantiating a real-world data trust, rather than starting from scratch in parallel.

4.1.6. Potential trustees and decision making within the data trust

As data trusts have yet to become operational, the role of trustee of a data trust has not yet existed. While it has been theorised[100], and there may be learnings from trustees in other trusts, from the operationalisation of fiduciary duties in other domains, and from the charity sector, this is a novel role which would come with new challenges.

The role of trustee requires independence and 'undivided loyalty and dedication to the interests and aspirations of the beneficiaries'[101]. Therefore, the London Cycling Data Trust would need to be made up of a

[90] The GPAI Data Working Group (2021), 'Understanding Data Trusts', https://ceimia.org/wp-content/uploads/2021/07/2021-07-09-GPAI-summary-understanding-data-trusts-updated.docx.pdf

[91] Delacroix, S. & Lawrence, N. (2019), 'Bottom-up data Trusts: disturbing the 'one size fits all' approach to data governance', https://academic.oup.com/idpl/article/9/4/236/5579842

[92] Element AI & Nesta. (2019), 'Data Trusts: A new tool for data governance', https://hello.elementai.com/rs/024-OAQ547/images/Data_Trusts_EN_201914.pdf

[93] BPE Solicitors et. al. (2019), 'Data trusts: legal and governance considerations', https://theodi.org/wp-content/uploads/2019/04/General-legal-report-on-data-trust.pdf

[94] Rukaak, A. (2019), 'Data Trusts: Why, What and How', https://medium.com/@anoukruhaak/data-trusts-why-what-and-how-a8b53b53d34

[95] Singh, V. P. (2021), 'Directors' Fiduciary Duties to the Company: A Comparative Study of the UK and Indian Companies Act', https://academic.oup.com/tandt/article-abstract/27/1-2/132/6104503?login=false

[96] Re Lands Allotment Company: CA [1894] 1 Ch 616. See also Fiduciary duties of companies' Directors in English law available at https://swarb.co.uk/re-lands- allotment-company-ca-1894/

[97] Ibid.

[98] Patel, N. (2015). '90% Of Startups Fail: Here's What You Need To Know About The 10%', https://www.forbes.com/sites/neilpatel/2015/01/16/90-of-startups-will-fail-heres-what-you-need-to-know-about-the-10/

[99] Note: These are examples of bottom-up data stewardship initiatives and have not explicitly expressed a desire to evolve into a data trust.

[100] Delacroix, S. & Lawrence, N. (2019), 'Bottom-up data Trusts: disturbing the 'one size fits all' approach to data governance', https://academic.oup.com/idpl/article/9/4/236/5579842

[101] AI Council and Ada Lovelace Institute (2021), 'Legal Mechanisms for Data Stewardship', https://www.adalovelaceinstitute.org/report/legal-mechanisms-data-stewardship/

diverse range of experts without direct ties to the usage of the data. The trustees could include experts on data stewardship, city sustainability, and climate change, as well as the digital economy, law, and technology. It's worth noting that the role of a trustee may not be suitable for the settlers of the trust, in this case London cyclists, given the legal implications and skills required for the role. A question therefore remains around how individuals can meaningfully participate in decision making about how data is accessed, used and shared within a data trust without taking on the role of a trustee.

The role of trustee would involve acting on behalf of and furthering the interests of the cyclists. It could include making granular decisions about who can and cannot access the data brought together and for what purpose, and defining the terms of data sharing agreements with third parties and ensuring they are upheld. The trustees could also seek to leverage the negotiating power of the pooled rights to secure more favourable broader outcomes for the beneficiaries. In this case, this could take the form of advocating for specific changes to cycling infrastructure, informed by uses of the data, or for changes to data portability legislation to enable cyclists to more easily transfer data from other sources to the London Cycling Data Trust[102]. The role of trustee of a data trust, including this one, would be specialised and likely more hands-on than that of a trustee of a 'regular' charity. Ultimately, data trusteeship could require professionalisation, such as in the form of qualification, remuneration and defined liability.

4.1.7. Digital infrastructure and technology

There are many mobile apps that collect mobility data, such as Strava, Nike Running and Komoot. It's even relatively common among existing bottom-up data stewardship initiatives – for example, Posmo.Coop[103] is a mobility data cooperative that enables people to collect and donate mobility to improve transport planning and investment, and Tripshift[104] helps individuals and businesses to understand their carbon footprint by collecting data about the ways they move around. The digital infrastructure of the London Cycle Data Trust is inspired by these services, as well the Bike Data Project and Smart Green Journeys.

Utilising services embedded in the iOS and Android operating systems, the London Cycle Data Trust app would collect GPS data to capture how the user is moving around[105], and motion data[106], which helps to decipher the form of mobility each journey takes, such as walking, running, cycling and driving. This could be combined with data that the user could manually enter, such as demographic information, route preferences or even trip ratings. Another option speculated by design phase participants would be to ingest data originally collected and held by other, similar services. This could be possible through real time connection via an API (such as Strava's) to enable users to 'port' data directly, or allowing bulk uploads for data that the user has already downloaded from other services.

[102] Strava (2018), 'Strava API Agreement', https://www.strava.com/legal/api

[103] Posmo.Coop, https://posmo.coop/

[104] Tripshift, https://tripshift.eco/

[105] Apple, 'CLLocation Manager', https://developer.apple.com/documentation/corelocation/cllocationmanager

[106] Ibid.

Location data is particularly sensitive, as would be the contextual data collected about users by the app. A number of participants in the design phase argued strongly that the London Cycle Data Trust would need to take a 'privacy by design' approach. This could manifest in data collection, whereby for each trip the start and end points could be blurred within a 1km radius. Another option would be to limit the granularity of the data that organisations can access, such as allowing for a time lag before sharing. A number of participants argued for the usage of Privacy Enhancing Technologies (PETs), which could help maintain the utility of the dataset for the purposes of AI. When allowing users to access data, techniques like differential privacy, which allows the generation of aggregate statistics about a dataset but obfuscates individual records[107], could be used. One participant described how developing a synthetic dataset (data that is artificially created rather than being generated by actual events)[108] would allow organisations to develop models to apply to the London Cycling Data Trust data while reducing the risks to privacy of the data subjects; these models could be audited by the trustees of the London Cycling Data Trust to ensure they are within the bounds of the cyclists' preferences before being applied to the real dataset. Alternatively, Trusted Research Environments – a secure computing environment to help keep data secure, whilst making it accessible for researchers to conduct research in a safe way[109]– were also posited as an option that would safely allow the data trust to engage with data users.

[107] The Open Data Institute (2019), 'Anonymisation and Open Data: An Introduction to managing the risk of re-identification', https://docs.google.com/document/d/1CoXniaTnQL_4ZyQuji9_MA_YCEElQjx4z1SEdB08c2M/edit#

[108] Dilmengani, C. (2018), 'The Ultimate Guide to Synthetic Data: Uses, Benefits & Tools', https://research.aimultiple.com/synthetic-data/

[109] Sudlow, C. (2021), 'The what & why of trusted research environments', https://understandingpatientdata.org.uk/news/what-why-trusted-research-environments

4.1.8. Financial sustainability and scale

Access to initial funding, plus the development of a sustainable revenue model, is one of the main challenges faced by bottom-up data stewardship initiatives[110]. Given the lack of precedent for data trusts, the amount of funding to establish the London Cycle Data Trust is difficult to estimate.

Regarding sources of funding, Transport for London and the Greater London Authority have a history of supporting data initiatives. Other options include philanthropic funders based in the UK – for example, The National Lottery, which supports a number of community-based initiatives. Similarly, philanthropic organisations with an interest in data stewardship may take an interest in a practical application of a data trust. One participant suggested that bike companies and other mobility providers could be motivated to provide support, on the basis that the London Cycling Data Trust would improve the cycling experience, and in the long run, possibly even boost cyclist numbers.

The London Cycle Data Trust would need to attract a critical mass of users. It would need to accumulate (control of) a dataset of a certain size, breadth and/or depth so as to offer something useful to other actors in the ecosystem. One expert articulated that "it's difficult to put a number on a critical mass of users, because it depends not only on how many journeys, but also on the contextual data that explains those journeys". In other words, a dataset of 100 journeys with context (age, ethnicity, gender of the rider, and data about the start and end locations) may be more useful than a dataset of 10,000 journeys which detail a route taken from the same A to B.

Once it has such a critical mass of data, the London Cycle Data Trust could attempt to adopt a sustainable business model. Revenue could be generated by charging for licences to access the data to organisations (which the trustees deem to align with the preferences of the cyclists)[111]. Alongside, for public sector access, the approach taken by the High Street Data Project, which aims 'to provide organisations ongoing access to the best local high streets and town centre data at low cost'[112], could be used. For this, the Greater London Authority purchased access to large datasets from Mastercard and O2 on behalf of the 33 boroughs and then used in-house capabilities to analyse the data streams and provide insights back to them. Such a model would suit the London Cycle Data Trust as it takes into account the relative digital skills and capacity of each borough to analyse data, and it mimics the current decision-making flow for the development of cycling infrastructure. With this differential approach, the London Cycle Data Trust should be able to enable access to data for reduced fees (or even free) to certain types of organisations, like academic institutions or civil society organisations. Further down the line, the London Cycle Data Trust could offer consultancy, insights and other services 'on-top-of the data'.

[110] Dodds, L. et. al. (2020), 'Designing Sustainable Data Institutions', https://theodi.org/article/designing-sustainable-data-institutions-paper/

[111] Ramesh, A. & Kapoor, A. (2020), 'Principles for Revenue Models of Data Stewardship', https://thedataeconomylab.com/2020/07/31/principles-for-revenue-models-of-data-stewardship/

[112] London Data Store, 'High Streets Data Service and Partnership', https://data.london.gov.uk/high-street-data-service/

4.2 Exploring a Data Trust for Small Shareholder Farming in India

Summary

- **Context**: Populations in developing countries are more likely to be affected by climate change's impacts on agriculture, owing to a greater dependence on agriculture. Small shareholder farmers make up nearly 86% of all farmers in India.
- **Key actors**: The ecosystem consists of small shareholder farmers, government, research institutions, private firms, intermediaries and local traders.
- **Opportunity**: Current data collection efforts in this domain are disparate and their resultant datasets being largely siloed, with little benefit accruing to farmers themselves.
- **Potential data trust**: A data trust in this domain could help farmers gain value from their data in the form of more tailored advisories for improving the efficiency of their practices, and also provide hyperlocal agricultural information to other stakeholders.
- **Legal form**: While existing legal forms such as registered societies could be used to set up a data trust, the lack of a data protection legislation in India provides limited legal guardrails.
- **Governance**: Given the power imbalance between farmers and other stakeholders in the ecosystem, trustees would have a heightened responsibility in deciding how data stewarded by a data trust would be used.
- **Technology**: Existing technologies could be leveraged to facilitate the collection, sharing and management of data in this domain, but difficulties caused by low levels of digital literacy, low internet connectivity and a lack of data standards.
- **Sustainability**: A data trust may not need a very large number of farmers to take part to create a useful dataset, although funding for data initiatives in India is hard to come by.

4.2.1. Introduction to the domain

Climate change has had a tremendous impact on agriculture. Higher temperatures lead to a decrease in yield (crop production), while encouraging the proliferation of pests and diseases[113]. Changes in the frequency and severity of droughts and floods pose challenges for farmers and threaten food safety[114]. Through a combined effect of increased temperatures and shifts in precipitation cycles, farmers the world over are also now unable to harvest crops traditionally grown on their lands, and the nutritional value of many crops is reducing[115].

Agriculture, in turn, contributes to climate change. Agriculture is one of the greatest contributors to global warming, through greenhouse gas emissions[116]. In 2010, agriculture, forestry and land-use change were estimated to contribute 20–25% of global annual emissions[117]. In 2020, the European Union's Scientific Advice Mechanism estimated[118] that the food system as a whole contributed 37% of total greenhouse gas emissions, and that this figure was on course to increase by 30–40% by 2050 due to population growth and dietary change.

While populations living in developing countries are already vulnerable and food insecure, they are also likely to be the most affected by the impacts of climate change on agriculture, owing to their greater dependence on agriculture[119]. The Asia-Pacific region may also experience the worst effect on wheat and rice (the two main staples in India) worldwide, with crop models indicating average yield levels for wheat and rice in 2050 to decrease from 2000 yield levels by 50% and 17% respectively[120].

Small and marginal shareholder farmers account for 86% of the total number of farmers in India[121]. They are hampered by low productivity, due to a combination of being unable to afford advanced machinery and an inability to implement modern farming practices. Despite this, they contribute to 51% of India's agricultural output, and 70% of all high-value crops[122], highlighting their importance in the food supply chain.

[113] Nelson, G.C. et. al. (2009), 'Climate Change: Impact on Agriculture and Costs of Adaptation', https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130648/filename/130821.pdf

[114] United States Environmental Protection Agency (n.d.), 'Climate Impacts on Agriculture and Food Supply', https://climatechange.chicago.gov/climate-impacts/climate-impacts-agriculture-and-food-supply

[115] World Bank (2021), 'Climate-Smart Agriculture', https://www.worldbank.org/en/topic/climate-smart-agriculture

[116] Garcia, F. (2019), 'AI in Agriculture for tackling Social and Environmental Challenge', https://www.dwih-tokyo.org/files/2019/11/Garcia_talk_FG_241019.pdf

[117] Working Group 3 (2014), 'AR5 Climate Change – Mitigation of Climate Change', https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf

[118] SAPEA (2020), 'A Sustainable Food System for the European Union', https://web.archive.org/web/20200418105107/https://www.sapea.info/wp-content/uploads/sustainable-food-system-report.pdf

[119] Nelson, G.C. et. al. (2009), 'Climate Change: Impact on Agriculture and Costs of Adaptation', https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130648/filename/130821.pdf

[120] MANAGE (n.d.), 'Study Material: Climate Change and Its Impact on Agriculture', https://www.manage.gov.in/studymaterial/CCA-E.pdf

[121] Paliath, S. (2020), 'India's plan to collectivise millions of small and marginal farmers may fall short', https://scroll.in/article/978820/indias-plan-to-collectivise-millions-of-small-and-marginal-farmers-may-fall-short

[122] Singh, S. (2021), 'Future of Indian agriculture and small farmers: Role of policy, regulation and farmer agency', https://www.downtoearth.org.in/blog/agriculture/future-of-indian-agriculture-and-small-farmers-role-of-policy-regulation-and-farmer-agency-75325

4.2.2. The small shareholder farming ecosystem in India

Small shareholder farmers comprise an overwhelming majority of the farmers in India, but despite this contribute to less than 50% of the total cropping area[123]. Such farmers tend to hold very small pieces of land – around 37% of farm households owned land parcels smaller than 0.4 hectares and 30% had holdings which fell between 0.41 and 1.0 hectares[124]. Small shareholder farmers in India are typically from rural areas and have low incomes[125].

Intermediaries, who are referred to in various terms across different regions in India, play a critical role in the small shareholder farming ecosystem. These intermediaries provide a variety of services including credit lending, transportation, aggregation of produce as well as advisory roles[126]. Given the importance of these intermediaries in obtaining essential services, farmers tend to put a lot of faith in them and they hold significant power.

Given their small margins, and inability to store and transport crops, small shareholder farmers rely on **local private traders**[127]. These traders typically buy crops from a number of small shareholder farmers to then store and sell it further. These traders exist as an option to farmers alongside the APMC **'mandis'**, government regulated primary markets which guarantee farmers a minimum sale price[128].

Governance of agriculture in India is divided between the **central and state governments**, set out by Article 246 of the constitution[129]. The central and state governments provide a number of welfare schemes to farmers, however there is a deficit of trust in many areas of India between farmers and the central government, which has been exacerbated[130] by the recently repealed farm laws and protests[131].

The **Indian Council for Agricultural Research (ICAR)**[132] and **state agricultural research institutions** issue regular advisories to farmers, including weather-based crop advice[133] and manuals that provide guidance on water management[134], land preparation[135], and cultivation of specific varieties of crops[136].

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[123] Subanandhini, D. (2020), 'The Future of Smallholder Farming in India', https://diplomatist.com/2020/12/03/the-future-of-smallholder-farming-in-india/

[124] Ibid.

[125] Paliath, S. (2020), 'India's plan to collectivise millions of small and marginal farmers may fall short', https://scroll.in/article/978820/indias-plan-to-collectivise-millions-of-small-and-marginal-farmers-may-fall-short

[126] Chatterjee, S. et. al. (2020), 'Research shows intermediaries' role is misunderstood. Local market realities more at play', https://theprint.in/opinion/middlemen-in-indian-agriculture-help-reduce-farmers-risks-that-govt-doesnt-study/569259/

[127] Rukmini, S. (2020), 'Selling to private traders or mandis? Why farmers are on the edge', https://www.indiatoday.in/diu/story/selling-to-private-traders-or-mandis-why-farmers-are-on-the-edge-1748928-2020-12-12

[128] Kapur, D., & Krishnamurthy, M. (2014), 'Understanding Mandis: Market Towns and the Dynamics of India's Rural and Urban Transformations', https://www.theigc.org/wp-content/uploads/2014/10/Kapur-Krishnamurthy-2014-Working-Paper-1.pdf

[129] Constitution of India. Art. 246.

[130] Bera, S. (2021), 'Why farmers have a trust deficit with agricultural reforms', https://www.livemint.com/industry/agriculture/why-farmers-have-a-trust-deficit-with-agricultural-reforms-11611309743093.html

[131] Mathew, L. & Sharma, H. (2021), 'Behind farmer-govt trust deficit, misreading of protests', https://indianexpress.com/article/india/behind-farmer-govt-trust-deficit-misreading-of-protests-7146759/

[132] Indian Council for Agricultural Research, 'About Us', https://icar.gov.in/content/about-us

[133] Indian Council for Agricultural Research, 'Weather based crop advisory', https://www.icar.org.in/weather-based-crop-advisory

[134] Tamil Nadu Agricultural University, 'Nursery – Water Management', https://www.agritech.tnau.ac.in/agriculture/agri_cropproduction_cereals_rice_tranpudlow_nursery_water_mgmt.html

[135] Tamil Nadu Agricultural University, 'Land Preparation', https://www.agritech.tnau.ac.in/agriculture/agri_cropproduction_cereals_rice_tranpudlow_mainfield_land.html

[136] Ibid.

Private firms in the agriculture sector in India include **seed suppliers** and **fertiliser manufacturers**. In addition to providing the necessary farming materials and equipment, certain private companies also provide farmers with income security. For example, by providing seeds to farmers at a discounted rate, along with guidance on how to grow the crop, provided they can buy the harvest directly from the farmers.

There are also now a number of **agtech companies** that are looking to deploy new technologies to improve farming practices in the sector. Climate-smart agriculture[137], for example, is an initiative that looks to adopt an integrative approach to increase productivity (crop yield), enhance crop resilience, and reduce emissions.

4.2.3. The opportunity to improve how data is stewarded

Via our co-design participants, we learned that current efforts to collect, use and share data about small shareholder farming in India are driven by two main forces.

The first is to increase the transparency of supply chains, which is essential for the certification of 'organic' or 'pesticide free' produce. In this case, companies selling to end consumers collect information regarding the types of fertiliser, and insect prevention used by farmers. However, this information is not collected directly from farmers, but from the local traders from whom the produce is bought by the companies. There is no direct benefit from such data collection being borne to the farmers.

The second is undertaken by the government for multiple purposes such as designing welfare programmes and informing the state of agricultural output. This data collection is usually carried out through procured partners and is often paper-based. Similar types of information are collected by different departments and stored in different formats, fuelled by the lack of prescribed standards within this domain. Over the last few years, the Indian government has shown an increasing interest in digitising the agriculture sector via initiatives like AgriStack[138], which aims 'to build a National Digital Agriculture Ecosystem, to elevate Indian Agriculture Sector to higher levels of efficiency and productivity, and to improve the welfare and income of farmers[139].' However, it is unclear what access farmers will have to the data collected by these initiatives, as well as how they will derive benefits from the activities. Additionally, it is unclear whom their data will be shared with and what uses it will be put to.

In practice, these collection efforts do not foreground the needs and concerns of the farmers, rather they typically approach data collection through a lens of either broader public good or private gains. As a result, there is very little-to no benefits accruing to farmers from data collection initiatives.

The participants of the co-design phase for this domain showed interest in the idea of bottom-up data stewardship, as they felt it could help to reverse current data practices, where farmers could take the initiative, exert more control over the data about their farming and benefit from its use. We learned of bottom-up initiatives in other parts of the word like the Birchip Cropping Group[140], which is a farmer-led organisation in

[137] World Bank (2021), 'Climate-Smart Agriculture', https://www.worldbank.org/en/topic/climate-smart-agriculture

[138] Ministry of Agriculture and Farmers Welfare (2021), 'Government is in the process of finalising 'India Digital Ecosystem of Agriculture (IDEA)' which will lay down a framework for Agristack', https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1741995

[139] Ibid.

[140] Birchip Cropping Group, https://www.bcg.org.au/

Victoria, Australia aiming to improve the prosperity of farmers and agricultural communities by providing evidence, support and tools for improving farm management practices and profitability.

The diversity in India's geology and weather patterns represent another opportunity to improve data use around small shareholder farming. One of our participants described how the highly varying nature of environmental conditions across the country renders pan-India standardisation of farming guidance futile. This suggests that local groups of farmers could coalesce to generate hyperlocal datasets, which could be shared with the government, research institutions and agtech firms, in return for services and advice better suited to their environmental circumstances and needs (for example, related to appropriate seeds, efficient water consumption, and sustainable land and soil usage).

4.2.4. The potential of a data trust in this domain

Small shareholder farmers could come together to set up a data trust. The data trust could collect data from the farmers, such as farm size, soil type and quality, water usage, types of seeds used, types and quantities of fertilisers, insecticides and pesticides used and crop yield.

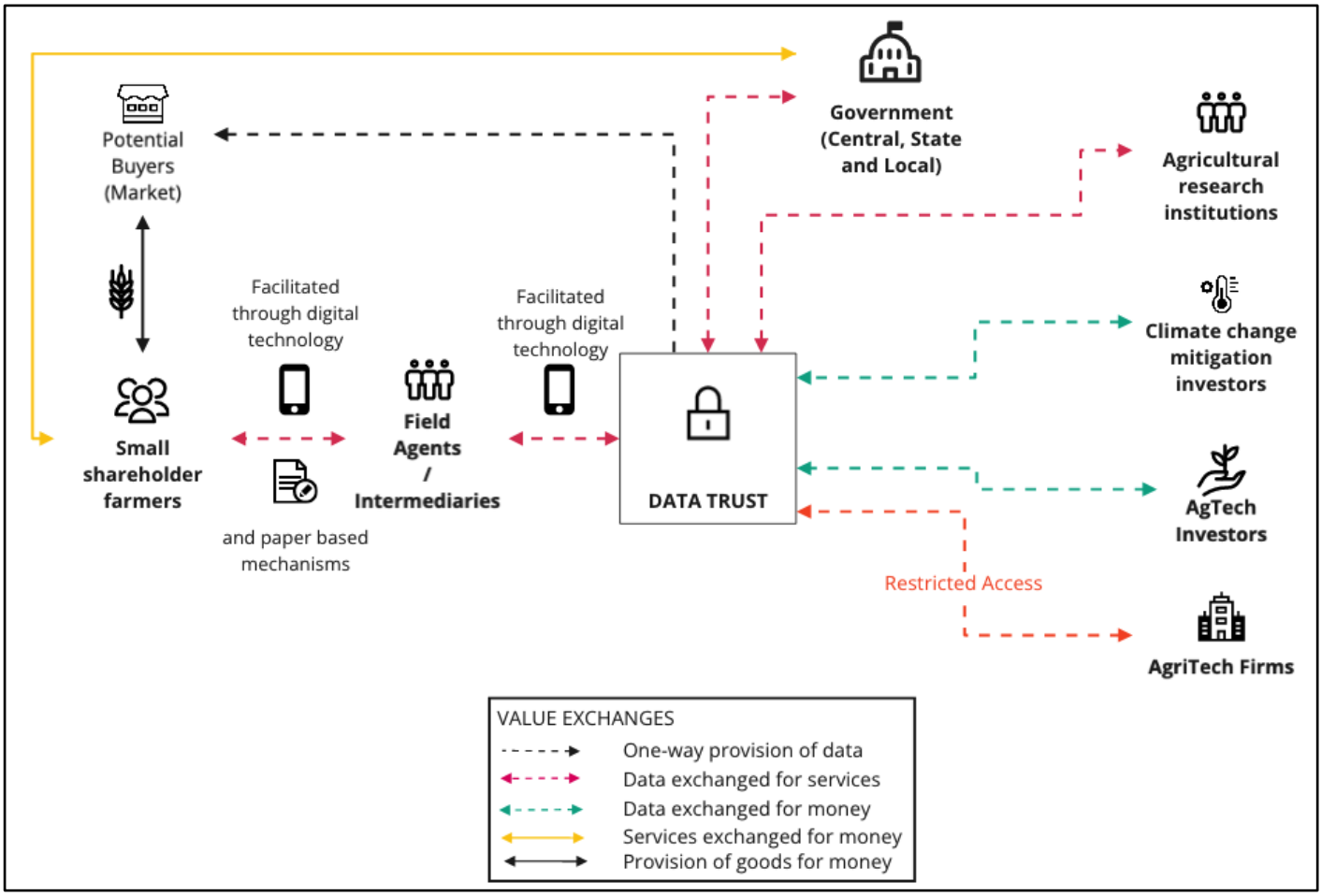
The data collected could then be aggregated and shared by the trust on privacy respecting terms with relevant stakeholders. Privacy is crucial in this context, as a lot of this data could be used to aid private firms' land grabbing[141], or to introduce farmers into new systems of credit rating that could be potentially exploitative and biased[142]. These stakeholders could include the government, research institutions and private sector firms. This data could be used by the government and public research institutions to gain a more accurate and hyperlocal understanding of the agriculture practices adopted by farmers. The sharing of data with these stakeholders would take place under terms that are in line with the farmers' preferences as indicated to the trustees. The data could also be used by private sector firms to train and fine tune smart agriculture technologies, again if permissible under those preferences.

Importantly, in return, the farmers could access more tailored advice and information on sustainable farming practices, which could also help them increase their yield.

[141] Shiva, V. (2011), 'The great land grab: India's war on farmers', https://www.aljazeera.com/opinions/2011/6/7/the-great-land-grab-indias-war-on-farmers

[142] Dhara, T. (2016), 'Marathwada's drought: Why debt-ridden farmers are deemed least creditworthy', https://www.firstpost.com/india/marathwadas-drought-why-debt-ridden-farmers-are-deemed-the-least-creditworthy-2731158.html

Figure 4: a potential data trust for small shareholder farmers in India



During the co-design process, we spent time with stakeholders that work closely with small shareholder farmers or have experience in establishing new data initiatives in agriculture. In general, these participants were doubtful as to whether this constituted enough of an incentive for farmers to engage with a data trust. To begin with, participants described that many small shareholders farmers in India have rigid, traditional attitudes towards farming practices and based on negative experiences in the past, would be sceptical of a new data collection effort.

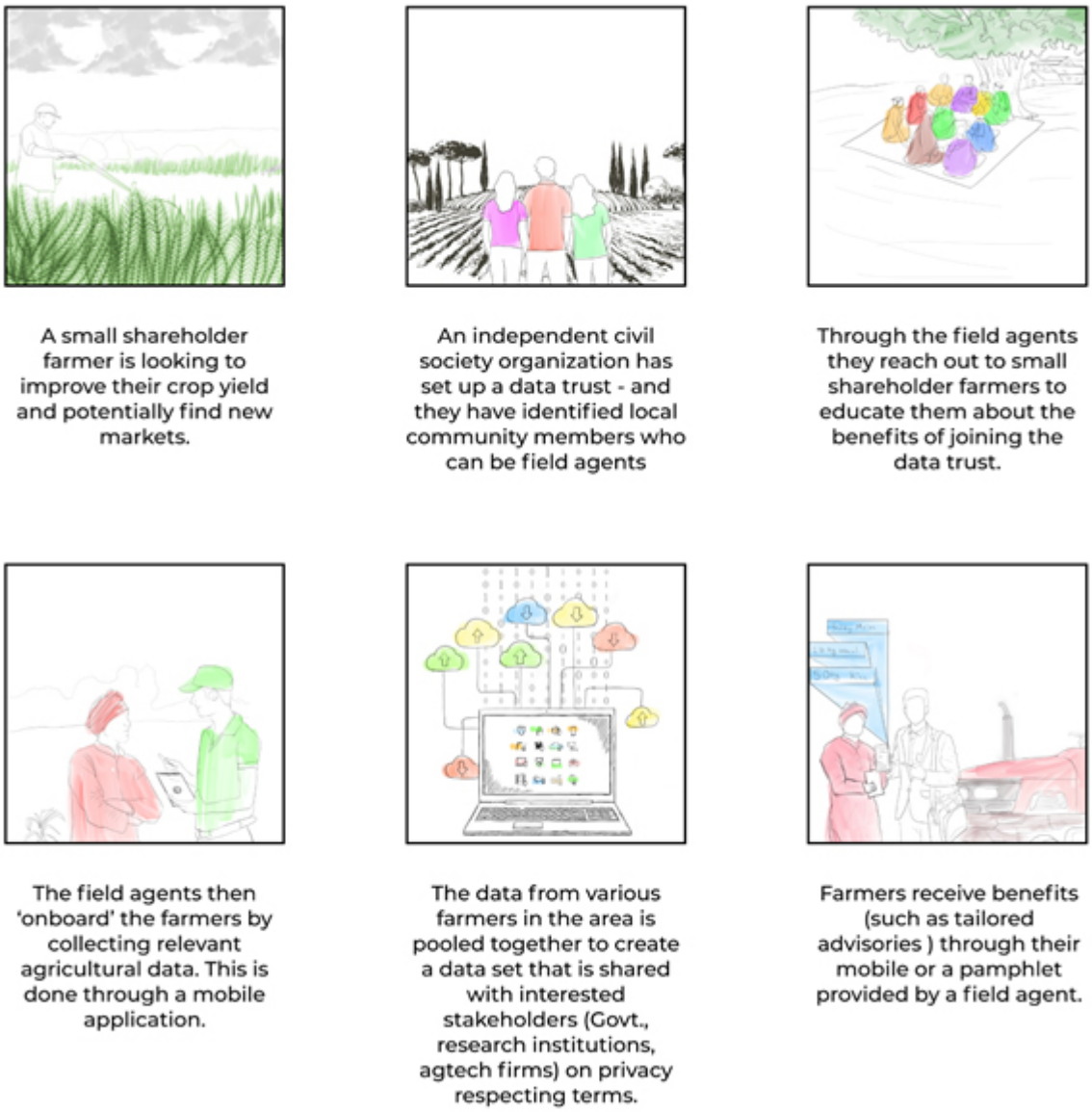
Moreover, data is unlikely to be high up on small shareholder farmers' agenda. One farmer we spoke to noted that using data to understand the impact of climate on their farming or to increase the sustainability of their practices is not a priority concern. Rather, the main concerns for farmers lie in obtaining access to capital and finding new markets for their produce. While it was suggested by one participant that the data trust could ingest financial information from farmers and use it 'to create creditworthiness ratings to enable access to credit', this did not feel like a suitable use case to us. This could introduce farmers to a new financial system, which could be opaque and discriminatory[143].

[143] Ahmed, S. (2020), 'Alternative Credit Scoring – A Double Edged Sword', https://vidhilegalpolicy.in/wp-content/uploads/2020/12/AlternativeCS_ShehnazA-1.pdf

Another issue we encountered were low levels of digital access and literacy among farmers in India, with digital literacy levels of farmers in rural areas varying from 13% to 26%[144]. Taken in tandem with poor data connectivity, this would make it incredibly difficult for farmers to engage with a data trust, even if there was sufficient incentive.

Participants in our design phase suggested that an external organisation would be needed to convey to farmers the potential value of engaging and to help 'onboard' them. On this basis, we considered that a civil society organisation, with expertise in establishing new data initiatives, could partner with existing community-level farmer organisations such as a regional farmer producer or a farmer cooperative to drive the development of a data trust on behalf of the community. Participants posited the idea of engaging 'field agents' to help in conducting outreach, building capacity, and collecting data and directing it to the data trust. These field agents could act as an intermediary between the farmers and the data trust, and even share and help farmers interpret the advisories they receive in exchange.

Figure 5: Storyboard indicating how a potential data trust in this domain could function



[144] Mothkoor, V., & Mumtaz, F. (2021), 'The digital dream: Upskilling India for the future', https://www.ideasforindia.in/topics/governance/the-digital-dream-upskilling-india-for-the-future.html

4.2.5. Legal underpinnings of the data trust

Many of the types of data that could be collected by this data trust – details about framing practices, and soil quality, seeds used, water usage, etc – would likely constitute non-personal data under the proposed Data Protection Bill. The report by the Committee of Experts on Non-Personal Data Governance Framework (NPDR)[145] outlined certain key principles for governing non-personal data in India, including the recognition of community rights over data, and recommended the need for a separate law to govern it. However, this has not yet been acted upon.

The data trust could of course also need to steward some personal data about the farmers themselves. India does not have a data protection legislation, with a bill to regulate data governance still being debated in Parliament[146]. Data protection is therefore regulated in India by the Information Technology Act, 2000 (IT Act) and rules made under it[147]. The IT Act's conception of data protection is limited to aspects of consent, access and correction rights[148]. In addition to this, the Supreme Court of India has recognised a constitutional right to privacy for individuals[149].

Within the Indian agriculture sector, the AgriStack project seeks to digitise the agriculture sector in India and create an ecosystem for the sharing of agriculture data. However, the only guidance document on this project currently is a consultation paper, which does not go into specific details about the exact provisions that will govern data sharing within this domain[150]. The report by Aapti Institute and the ODI on 'Enabling data sharing for social benefit through data trusts' provides a detailed overview of other data sharing initiatives currently being explored by the Indian government[151].

There are therefore limited legal guard rails for developing this data trust. It could be argued that there is also no law that prevents the collection, use and sharing of these types of data in India. However, this could be a problematic route to follow – it could allow for instances of misuse of data, either by trustees or third parties. While there are fiduciary obligations in the former case, the only recourse in the latter instance would be under contract law, with the terms of the contract dictating the level of remedies available to farmers.

In terms of a legal structure for the data trust, it could not be incorporated as a true legal trust under the Indian Trusts Act, 1882. This is because Section 8 of the Indian Trusts Act, 1882 is very clear that the subject matter of the trust must be property that can be transferred to the beneficiary, and jurisprudence on trust law in India is clear that there needs to be property capable of being transferred as a subject matter of the trust, which is not possible in the present case, as arguments for treating data as property are tenuous[152].

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[145] Committee of Experts on Non-Personal Data Governance Framework (2020), 'Revised Report of the Committee of Experts on Non-Personal Data Governance Framework', https://ourgovdotin.files.wordpress.com/2020/12/revised-report-kris-gopalakrishnan-committee-report-on-non-personal-data-governance-framework.pdf

[146] Joint Committee of Parliament (2021), 'Report of the Joint Committee on The Personal Data Protection Bill, 2019', https://prsindia.org/files/bills_acts/bills_parliament/2019/Joint_Committee_on_the_Personal_Data_Protection_Bill_2019.pdf

[147] The Information Technology Act 2000, https://www.indiacode.nic.in/bitstream/123456789/13116/1/it_act_2000_updated.pdf

[148] Ibid.

[149] Justice K.S. Puttaswamy vs. Union of India. (2017). 10 SCC 1, AIR 2017 SC 4161

[150] Department of Agriculture, Cooperation & Farmer Welfare (2021), 'Consultation Paper on IDEA', https://agricoop.nic.in/sites/default/files/IDEA%20Concept%20Paper_mod01062021_1_0.pdf

[151] Aapti Institute & Open Data Institute (2022), 'Enabling data sharing for social benefit through data trusts', https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

[152] Pavel, V. (2020), 'Ownership or rights: what's the path to achieving true agency over data?', https://www.adalovelaceinstitute.org/blog/ownership-or-rights-whats-the-path-to-achieving-true-agency-over-data/

It could be possible to structure the data trust as either a private company registered under the Companies Act, 2013[153] or as a Society registered under the Societies Registration Act, 1860[154]. In the former case, the farmers would be the shareholders of the company, with the independent trustees serving as directors of the company. Directors of a company in India are recognised to have fiduciary duties towards the company (the data trust in this case)[155]. It could be beneficial to register the trust as a Society, with the fiduciary responsibilities of the trustees being codified in the memorandum of association of the trust. These are only mooted legal structures, as the issue regarding lack of data protection in India serves as an overarching concern in this domain, irrespective of the legal structure of the data trust.

4.2.6. Potential trustees and decision making within the data trust

In this context, trustees would play a very critical role in stewarding data on behalf of the small shareholder farmers, owing to the existing power imbalance between the farmers and the actors in the ecosystem, such as government and private firms.

As we've discussed, small shareholder farmers have low levels of digital literacy and are extremely reliant on local intermediaries to provide services such as access to credit, provision of machinery and transportation of crops to the market. Data held by the data trust would have the potential to provide insights that could be used by malicious actors for private gains at the detriment of farmers –for example, bottoming of prices for crops, biased credit rating of farmers and possibly even acquisition of fertile farmland from individual farmers at low prices.

It would fall on the trustees to ensure they use the highest degree of care in deciding who may access the data and enforce any data sharing arrangements. The data trust could be governed by a board of trustees made up of experts with diverse expertise, including data stewardship, agriculture, climate change, technology, law and the digital economy. The board could also have a respected member of the local community as a trustee.

However, there are unanswered questions around the incentives for an individual to take on the role of a trustee within a data trust. The role is likely to be under high pressure, with trustees under an increased fiduciary obligation to not only act in the best interests of the beneficiaries, but to also ensure that the data of the members of the trust is not misused. There would also likely be a requirement of a minimum level of remuneration to the trustees.

[153] The Companies Act, 2013 (2013), https://www.indiacode.nic.in/bitstream/123456789/2114/1/A2013-18.pdf

[154] The Societies Registration Act, 1860, https://www.indiacode.nic.in/bitstream/123456789/2262/1/AAA1860____21.pdf

[155] Singh, V. P. (2021), 'Directors' Fiduciary Duties to the Company: A Comparative Study of the UK and Indian Companies Act', https://academic.oup.com/tandt/article-abstract/27/1-2/132/6104503?login=false

4.2.7. Digital infrastructure and technology

In our co-design phase, a number of existing technologies that could be used by the data trust were highlighted to us. FarmOS, a web-based app for farm management, planning, and record keeping[156], could be used by farmers with access to digital technologies, as well as the trust itself to steward data on their behalf.

We had originally considered whether data could be collected by a mobile app, similar to the London Cycle Data Trust. However, given the low levels of digital literacy and digital access amongst farmers, and as discussed in previous sections, field agents from the local community could be trained to collect data from small shareholder farmers. Field agents could use tools such as SurveryCTO, Survey Stack or KoboCollect. The advantage of tools such as SurveyCTO is that they enable offline collection of data, which is essential given the relatively low levels of internet connectivity in rural areas.

Data collected by the trust could be aggregated and stored on a cloud server – for which there are many providers. As we discuss in previous sections, the data being collected from farmers would largely be non-personal in nature. However, there may still be risks of harm, and it would be imperative that the data was stored securely. Given that the majority of small shareholder farmers are not digitally literate, there will be a massive burden on the trustees to put in place technologies that share data with users securely and in ways that could not be against their interests.

One of our participants noted that “this isn’t as much a technology problem as it is a data interoperability and policy problem”. The lack of standards for the types of data considered in this domain means that the data trust would, at least, have a role to play in cleaning and standardising the data if intending to aggregate it across farms. In the longer run, it could convene different parties to develop those standards openly[157], so that they work for the different actors in the ecosystem.

In terms of disseminating the results of use of data accessed via the data trust, we learned of the need to consider ‘informal’ outputs. The advisories on farming practices supplied to farmers, for example, could be shared via Whatsapp or other popular messaging services.

[156] farmOS. https://farmos.org/

[157] The Open Data Institute (2018), ‘Open Standards for Data’, https://standards.theodi.org/

4.2.8. Financial sustainability

Participants highlighted that funding for data initiatives in agriculture in India is hard to come by, and successful examples have largely been fundraised from farmers themselves and/or via online crowdfunding campaigns.

It does not appear that the Indian government would look to fund the set up of a data trust in this context. One participant with experience of philanthropic funding noted that, historically, philanthropic funders have funded initiatives that collect large amounts of data and unlock them for public value in a relatively short period of time, whereas it may take considerable time for a data trust of this type to gather data at sufficient scale.

The capability of farmers to engage in data collection practices, and the outcomes from data use, also has a bearing on the financial sustainability of the data trust. For a data trust to function successfully, a necessary precondition would be to have farmers who are well-funded and motivated enough to be able to implement the new sustainable practices recommended to them. As these would typically involve capital expenditures on the part of farmers, the data trust would also need to find a way to provide monetary support to farmers – it couldn't exist in a vacuum. Likewise, the use of field agents to accurately collect and upload data would require an investment in training and ongoing compensation, which would be a significant cost.

In order to sustain itself, the data trust could look to adopt a similar differentiated pricing model to the London Cycle Data Trust, whereby it charged for licences to access the data to organisations (which the trustees deem to align with the preferences of the farmers), while allowing for subsidised or free access for others (such as the farmers themselves). In terms of a critical mass of farmers to take part in this type of data trust, participants suggested that it might not be very high, given the current dearth of timely, hyperlocal data in the ecosystem. Adoption by even 100 farmers from one particular area may be sufficient for the data to be meaningful enough to create valuable tailored advisories.

Again, given that data trusts currently do not exist[158], it is difficult to estimate what financial resources would be required to establish a data trust in this domain[159].

[158] Aapti Institute and Open Data Institute (2022), 'Enabling data sharing for social benefit through data trusts', https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

[159] One participant suggested that it might be possible to set up a data trust in this context for 100-200 farmers for US $1.2million, based on their understanding of the design and experience in setting up other data initiatives. This is only a mooted figure, and actual costs could vary dramatically.

4.3 A Data Trust for Indigenous Climate Migration in Peru

Summary

- **Context**: In South America, Peru has been identified as one of the countries facing the high rates of future displacement due to climate change, with Indigenous communities in Peru being some of the most vulnerable to these impacts.
- **Key actors**: The ecosystem consists of Indigenous communities, 55 indingenous nations, several Indigenous representative organisations, the Peruvian Government, small non-governmental actors, larger multinational organisations and academic institutions.
- **Opportunity**: There is a need for data to better identify and understand climate-driven displacement, and Indigenous communities in Peru have been active in establishing greater control over their data.
- **Potential data trust**: A data trust could act as steward of qualitative data sets related to Indigenous climate displacement from across Peru, ensuring that the data is shared with trustworthy organisations, and importantly, accessible to displaced communities themselves.
- **Legal form**: Peru has some data rights afforded by data protection law and legal trusts, although establishing a data trust would involve considerable challenges related to the sensitivity of the data.
- **Governance**: The most suitable candidates for trustees, or indeed hosts, of the data trust would be Indigenous representative organisations already in operation in the region, building on developments in the broader field of Indigenous data sovereignty and stewardship.
- **Technology**: Qualitative data could be collected through a smartphone app or voice recording software, and there may be opportunities to apply natural language processing to identify patterns in the data.
- **Sustainability**: Philanthropic funding could be the most realistic option to establish a data trust in this domain, especially given the non-profit nature of the organisations involved.

4.3.1. Introduction to the domain

Climate change has a severe impact on human mobility, driving both national and international movement as people flee rising sea levels, increasing temperatures, drought, floods and extreme weather events. In 2020, close to seven million people in 104 countries were living in displacement as a result of disasters, with 98% of the new displacements occurring due to weather-related events[160].

As climate change continues to worsen, these numbers are predicted to grow, with the World Bank predicting that more than 143 million people could be displaced within their own country by 2050[161].

In South America, the International Organisation for Migration has identified Peru as one of the most vulnerable to the impacts of climate change including a significant rise in climate migration, and specifically internal displacement and migration[162]. Due to its geographical location, climate and environment, the country is at an increased risk of flooding, extreme weather events, food and water scarcity and increased disease transmission. In 2021 alone, intense flooding led to 8,000 new internal displacements, more than doubling the numbers from the previous year[163].

The Peruvian government has addressed these concerns through the implementation of its Framework Law on Climate Change, outlining its plan for tackling the adverse impacts of climate change, including increased climate migration[164]. Both the law and associated report identified the importance of Indigenous participation in the national discussion and set goals for implementing an action plan to address and reduce climate migration[165].

Indigenous leaders, advocates, front line defenders and communities have a long history of working to slow and reverse the effects of climate change and environmental damage in Peru and beyond[166]. They have successfully fought for increased land rights, Indigenous land stewardship and stronger legislation[167], forging international alliances such as Coordinadora De Las Organizaciones Indígenas De La Cuenca Amazónica and the Ceibo Alliance.

[160] Migration Data Portal (2021), https://www.migrationdataportal.org/

[161] Bergmann, J. et al. (2021). "'Assessing the Evidence: Climate Change and Migration in Peru', https://publications.iom.int/system/files/pdf/assessing-the-evidence-peru.pdf

[162] Ibid.

[163] Cazabat, C., & O'Connor, A. (2021), '2021 Internal Displacement Index Report', https://www.internal-displacement.org/sites/default/files/publications/documents/IDMC_Internal_Displacement_Index_Report_2021.pdf

[164] Velarde, L. G. et al. (2018), 'Framework Law on Climate Change', https://busquedas.elperuano.pe/normaslegales/ley-marco-sobre-cambio-climatico-ley-n-30754-1638161-1/

[165] Ministry of the Environment, Ministry of Women (2015), 'Plan de Acción en Género y Cambio Climático del Perú (PAGCC-Perú)', https://www.climatelinks.org/sites/default/files/asset/document/2015_IUCN_Climate-Change-Gender-Action-Plan-Peru.pdf

[166] Blackman, A. et al. (2017), 'Titling indigenous communities protects forests in the Peruvian Amazon', https://doi.org/10.1073/pnas.1603290114

[167] Veit, P. et al. (2019), 'Peru's Indigenous Communities Manage Their Forests. Others Should Follow Their Lead', https://www.wri.org/insights/perus-indigenous-communities-manage-their-forests-others-should-follow-their-lead

4.3.2. The Indigenous climate migration ecosystem in Peru

There are roughly 4 million **Indigenous people** living in Peru, making up 55 **Indigenous nations**[168], according to the International Working Group for Indigenous Affairs.

There are several well recognised **Indigenous representative organisations** throughout Peru. For example, the Amarakaeri ECA, an Indigenous organisation made up of ten Indigenous communities, manages and promotes the protection and holistic management of the Amarakaeri Communal Reserve (RCA)[169]. **Associations** such as the Interethnic Association for the Development of the Peruvian Jungle (AIDESEP) and Coordinator of the Indigenous Organisations of the Amazon Basin (COICA), are working towards common goals of protecting Indigenous ancestral land, promoting planetary health and guaranteeing Indigenous rights[170,171]. These organisations have leadership boards consisting of representatives from each participating community, selected by the communities themselves[172,173,174].

The relationship between the **Peruvian government** and indigenous communities is undergoing considerable changes, as these communities organise and develop their own governing bodies[175]. For example, in 2015, the Wampis People of Peru declared the 'formation of the first Autonomous Indigenous Government in Peru' with a goal of preserving 1.3 million hectare of ancestral territory and encouraging sustainability and harmony with the national world[176]. The national government has recognised Indigenous peoples as extremely vulnerable to the impacts of climate change and at a high risk of potential displacement[177].

There are **small, non-governmental actors** active in Peru, such as Hivos[178], which provides support to Indigenous organisations through its All Eyes On the Amazon programme, and Climate Refugees, an organisation based in New York that provides vital insights into underlying climate drivers of displacement[179]. There are also **larger, multinational organisations** such as the International Organisation for Migration and the Internal Displacement Monitoring Centre, which support international action related to climate migration and displacement.

[168] International Working Group on Indigenous Affairs (2021), 'Indigenous Peoples of Peru', https://www.iwgia.org/en/peru.html

[169] ECA Amarakaeri (2022), 'Amarakaeri Communal Reserve: Conservation with Effective Participation of Indigenous Peoples', https://amarakaeri.org/conservacion-participacion-pueblos-indigenas

[170] Asociación Interétnica de Desarrollo de La Selva Peruana (2022), 'What We Want', http://www.aidesep.org.pe/que-queremos-interno

[171] Coordinadora de las Organizaciones Indígenas de la Cuenca Amazónica (2022), 'About COICA', https://coicamazonia.org/somos/

[172] Ibid.

[173] ECA Amarakaeri (2022), 'About us', https://amarakaeri.org/eca-amarakaeri

[174] Asociación Interétnica de Desarrollo de La Selva Peruana (2022), 'About us', http://www.aidesep.org.pe/quienes-somos-interno

[175] Cregan, F., Intercontinental Cry (2015), 'Wampis Nation Establishes The First Autonomous Indigenous Government In Peru', https://intercontinentalcry.org/wampis-nation-establishes-the-first-autonomous-indigenous-government-in-peru/

[176] Ibid.

[177] Ministry of the Environment, Ministry of Women, Government of Peru (2015), 'Plan de Acción en Género y Cambio Climático del Perú (PAGCC-Perú)', https://www.climatelinks.org/sites/default/files/asset/document/2015_IUCN_Climate-Change-Gender-Action-Plan-Peru.pdf

[178] Hivos, & Greenpeace (2022), 'All Eyes on the Amazon', https://alleyesontheamazon.org/

[179] Climate Refugees (2022), 'What We Do', https://www.climate-refugees.org/foundingvision

Several **academic institutions** are involved in the study of climate-driven internal displacement. These include programmes such as Stanford Earth, which focuses on researching planned relocation as a form of climate adaptation, and the University of Liège's Hugo Observatory, an interdisciplinary research centre dedicated to the study of human migration and its relation to environmental changes and policy[180,181].

4.3.3. The opportunity to improve how data is stewarded

Climate as a driver of migration and displacement is notoriously difficult to identify. It was recently discovered, for example, that future migration caused by rising sea levels had been underestimated by a factor of three, with new estimates showing roughly 150 million people at risk of displacement by 2050[182]. This difficulty was something repeatedly expressed by participants in our co-design phase.

Migrants will often identify economic reasons for moving, such as low crop yields without recognising that slow-onset climate change is a driving factor. As a result of this, one of the most important methods used to understand climate migration is qualitative interviews with displaced people. At the moment, only a few organisations are carrying these out with a climate focus, including non-governmental organisations like Climate Refugees, and academic institutions such as the University of Liège and Stanford. These are typically conducted in a semi-structured format, with recorded verbal consent. This style of data collection allows interviewers to investigate underlying drivers of displacement that are easily missed on more structured methods such as surveys.

A number of our participants indicated that, while this type of research provided vital information on climate displacement, these institutions can hold data away from the Indigenous communities and organisations the data originates from. Combined with the fact that many of these institutions are based in the global north, rather than in Peru or the wider South American region, some criticised this as 'data extractivism'.

However, Indigenous groups across the Amazon have begun using data themselves to advocate for increased land rights, the application of Indigenous land stewardship and stronger climate legislation[183]. All Eyes on the Amazon, for example[184], alongside Mapeo and Global Forest Watch, have been identifying and mapping deforestation, illegal mining and oil production in their territories and Indigenous communities have used this data to launch investigations that hold these operations accountable[185].

[180] Field, C., & Bower, E. Stanford Earth (2022), 'Planned relocation as climate adaptation: Are destination sites safer than origin sites?', https://earth.stanford.edu/planned-relocation-climate-adaptation-are-destination-sites-safer-origin-sites#gs.taata2

[181] University of Liège, 'The Hugo Observatory: Environment, Migration, Politics', https://www.hugo.uliege.be/cms/c_4655083/en/hugo

[182] Kulp, S. A., & Strauss, B. H. (2019), 'New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding', https://doi.org/10.1038/s41467-019-12808-z

[183] Cregan, F. (2015), 'Wampis Nation Establishes The First Autonomous Indigenous Government In Peru', https://intercontinentalcry.org/wampis-nation-establishes-the-first-autonomous-indigenous-government-in-peru/

[184] Hivos and Greenpeace, 'All Eyes on the Amazon', https://alleyesontheamazon.org/

[185] Sánchez, N. (2021), 'Innovative Solutions to Foster Climate Action in the Amazon', https://hivos.org/news/innovative-solutions-to-foster-climate-action-in-the-amazon/

Indigenous organisations throughout the Amazon have outlined further objectives that could be supported by better data collection, use and sharing, including the protection of uncontacted Indigenous communities, and active participation in the management of non-renewable resources in their territories[186]. We also learned how data could be used by Indigenous communities to support legal claims and advocate for stronger legislation.

The participants of the co-design phase showed interest in applying bottom-up data stewardship in this domain, as a tool to enable Indigenous communities to manage data about climate displacement for their own benefit.

4.3.4. The potential of a data trust in this domain

Indigenous communities and organisations could come together to form a climate and displacement data trust, electing representatives to act as trustees. The data trust in this context could act as a steward of qualitative datasets related to climate migration from across Peru, ensuring that the data is shared with trustworthy organisations, and importantly, is accessible to displaced people themselves. As we describe in later sections, it could provide a powerful mechanism for Indigenous data stewardship.

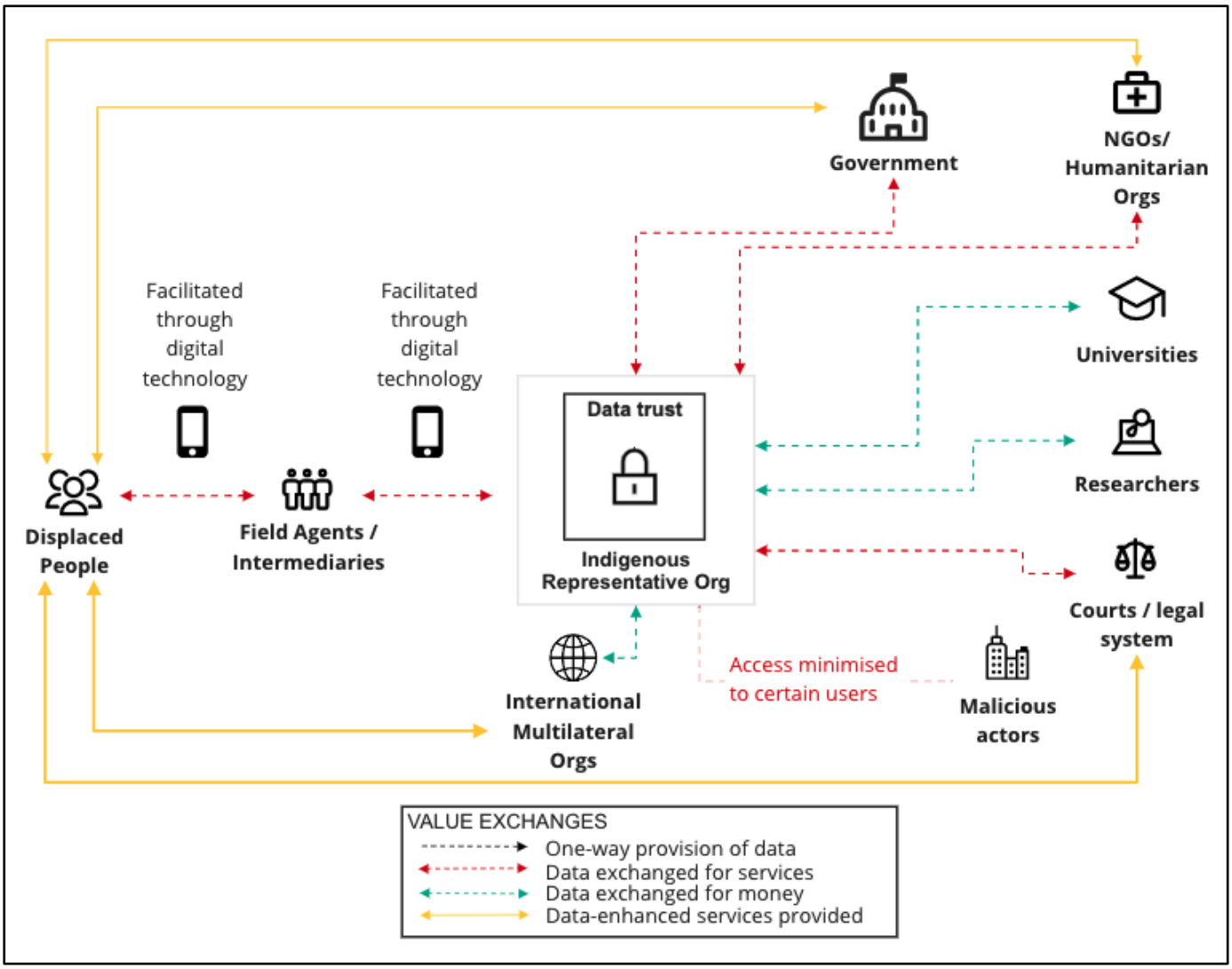
Similar to the Indian small shareholder farming domain, there could be a need for field agents to collect the data, in the form of recording interviews. This is because according to some of our participants, qualitative information on climate drivers of internal displacement are rare. Additionally, work done by the First Nations Information Governance Centre (FNIGC) has highlighted how data collection designed and conducted by the Indigenous peoples themselves can be far more effective for their causes, than methods designed and collected by non-Indigenous groups[187]. There would also be potential for the data trust to partner with groups focusing on these areas such as academics, humanitarian organisations and migration researchers, to help develop and facilitate data collection.

The data collected could be aggregated, processed to ensure privacy and security, and shared with relevant stakeholders according to the terms set out by trust members. These stakeholders could include climate advocacy groups, environmental defenders, humanitarian organisations, and academic and research institutions. These stakeholders could use this data to gain a better understanding of the underlying climate-drivers of human mobility. Participants suggested that the datasets could also be used to train machine learning models to create more accurate predictive models of future climate driven human migration and displacement. These models could help governments and communities prepare for changes in their urban and rural areas and ensure that resources are funnelled into the regions that need it the most. Most importantly however, these datasets could be applied by the Indigenous nations themselves in cases related to land rights, Indigenous environmental stewardship and active investigations into illegal mining and deforestation activities that put them at greater risk for climate-driven displacement.

[186] Asociación Interétnica de Desarrollo de La Selva Peruana (2022), 'What We Want', http://www.aidesep.org.pe/que-queremos-interno

[187] First Nations Information Governance Centre, 'Our Impact', https://fnigc.ca/about-fnigc/our-impact/

Figure 6: a potential data trust for Indigenous climate migration in Peru



During the co-design phase for this domain, we engaged with organisations with experience working with Indigenous groups in Peru such as Climate Refugees, Hivos/All Eyes on the Amazon, International Organisation for Migration, Internal Displacement Monitoring Centre, International Service for Human Rights and Refugees International.

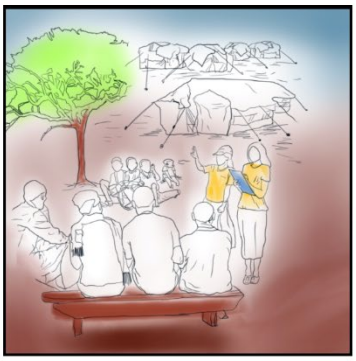
Participants in the co-design process, especially those who were working on the ground in direct collaboration with Indigenous peoples in Peru, were confident that these communities were highly motivated to establish greater ownership and control over their data, and to participate in data collection themselves. They described that in response to the impact climate changes are having on their lives – including forced displacement, loss of ancestral lands and customs, and adverse impacts on their health and wellbeing – many communities have already developed data-sharing agreements and data-collection programmes, to help advocate for action.

However, they indicated that a data trust in this context may need to look different to those in other geographical and cultural environments. One participant described how the definitions and interpretations of concepts like 'bottom-up stewardship' and 'data trusts' may need to be adapted in this context, in recognition of different perspectives and worldviews. This is especially important considering the number of unique

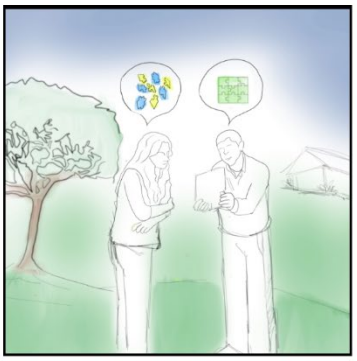
Indigenous nations in Peru – each with its own views and requirements for how these concepts should be applied to its people, potentially leading to several different interpretations.

Figure 7: Storyboard indicating how a potential data trust in this domain could function

Belkis' home and crops are destroyed by floods, forcing her to move.



Her community representatives inform her of the Indigenous Data Trust and the work they're doing related to climate displacement



She is interviewed by a member of the Data Trust's data collection team

The elected indigenous trustees decide how the data is used on behalf of Belkis and her community

The trustees agree to provide access to the data to humanitarian organisations, frontline defenders, other indigenous organisations, multilateral international organisations, government departments and their own indigenous communities

The data is used to undertake research into the causes of the floods, promote legislative changes to reduce the impacts of climate change on indigenous populations, advocated for increased land rights, and improve services for displaced indigenous populations

4.3.5. Legal underpinnings of the data trust

Peru first introduced the right to data protection in 1993, and established the Peruvian Data Protection Authority to oversee both past and subsequent legislation[188]. Since then, it has enacted several laws and regulations related to data rights and privacy including Law number 29733 on the Protection of Personal Data, Law number 30096 on Cyber Crime, and Emergency Decree Number 007-2020 which includes measures to guarantee confidentiality of information[189].

While these laws provide important legislative protection and rights to personal data, applying a data trust in this domain involves considerable challenges related to the sensitivity of both the data being collected and the population it is being collected from. In the Plan of Action on Gender and Climate Change in Peru, commissioned by the Peruvian Government, Indigenous communities were repeatedly identified as one of the most vulnerable populations to the impacts of climate change[190]. These vulnerabilities come from a series of factors including language barriers, access to resources, cultural differences, legislative barriers to land rights and Indigenous governance, and limited access to education. Indigenous Peruvians have also faced discrimination from both national and international governments as well as non-indigenous communities in Peru, including targeted and sometimes lethal attacks on Indigenous land defenders[191].

This raises significant concerns regarding potential risks to the personal safety of communities from whom data would originate. In general, while we believe that there is an opportunity to improve how data is stewarded in this domain, policymakers and other practitioners should seek to apply data trusts – an unproven form of stewardship – in other domains first.

However, if it did come to establishing a data trust like this in law, Peru has trust law through law 26702 the General Law of the Financial and Insurance Systems and Organic Law of the Superintendence of Banking and Insurance. This legislation does allow for settlors to transfer rights, stating 'the essential requirement of validity for the constitution of the trust is that the settlor has the power to dispose of the assets and rights to be transferred'[192]. In theory, this could support the rights of displaced people to transfer their data rights to a data trust. It is important to note however, that at this time, the legal frameworks around trust law in Peru pertain primarily to the financial and banking systems, leaving significant questions regarding how it may be applied to data. Due to this, it is possible that a data trust in this country would need to take on a different legal form, perhaps of a corporation.

[188] Tovar, T. & Buleje, C. (2021), 'Peru – Data Protection Overview', https://www.dataguidance.com/notes/peru-data-protection-overview

[189] Ibid.

[190] Ministry of the Environment, Ministry of Women (2015), 'Plan de Acción en Género y Cambio Climático del Perú (PAGCC-Perú)', https://www.climatelinks.org/sites/default/files/asset/document/2015_IUCN_Climate-Change-Gender-Action-Plan-Peru.pdf

[191] Global Witness (2021), 'Last Line Of Defence: The industries causing the climate crisis and attacks against land and environmental defenders', https://www.globalwitness.org/en/campaigns/environmental-activists/last-line-defence/

[192] Government of Peru (2010), 'Updated Text of General Law Of The Financial And Insurance Systems And Organic LAw Of The Superintendency Of Banking And Insurance', https://www.sbs.gob.pe/Portals/0/jer/regu_leygralbancseguro/LAW_december_2010.pdf

4.3.6. Potential trustees and decision making within the data trust

In this domain, the most suitable candidates for trustees of the data trust would be the Indigenous organisations already operating in the region, such as those mentioned in 4.3.2. These groups have extensive experience working with both national and international organisations, knowledge of data stewardship and drafting data sharing agreements, and a social responsibility of fiduciary-like duties towards their communities. Additionally, these organisations already have systems for electing Indigenous representatives to the organisations' boards, indicating that a similar process could be used for selecting organisation members to sit on the board of trustees of the data trust[193].

Participants in our co-design phase suggested that if any non-Indigenous representatives were to sit on the board, they would need to be selected by the Indigenous communities themselves, or by the representative organisations on behalf of their communities.

Trustees would have the responsibility of protecting the data and ensuring that any sharing and uses of it further the objectives laid out by the Indigenous communities. This would be especially important during times of displacement, when communities are most vulnerable. Many of these Indigenous organisations have experience negotiating data sharing agreements, collecting data, organising protection for data collection programmes and applying data to climate initiatives and objectives[194]. Indeed, it could be that an existing idigneous organisation could itself take on the role of the data trust.

One of our participants described that, based on their experience, Indigenous cultures in Peru may have wholly different understandings and outlooks towards community and decision-making than the practitioners and policymakers in the West working on data trusts. In practice, this could mean that decision-making within this context could involve elected representatives discussing data preferences at community meetings and then communicating them to trustees.

Outside of this domain, there is significant progress being made in Indigenous data governance and sovereignty, which could inform the design of the data trust's governance and decision making. Examples of Indigenous data stewardship across the globe – such as the First Nations Information Governance Centre (FNIGC) in Canada, the Te Mana Raruanga/the Māori Data Sovereignty Network in New Zealand and the Global Indigenous Data Alliance – are reference points for how data trusts could be governed[195,]. The CARE Principles for Indigenous Data Governance provide a starting point for Indigenous communities seeking to build their own data stewardship and governance models, addressing collective benefit, authority to control, responsibility and ethics[196].

[193] Asociación Interétnica de Desarrollo de La Selva Peruana, 'About us', http://www.aidesep.org.pe/index.php/quienes-somos-interno

[194] Åhrén, M. et al. (2021), 'State of the World's Indigenous Peoples', https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2021/03/State-of-Worlds-Indigenous-Peoples-Vol-V-Final.pdf

[195] Himmelsbach, E. et al. (2021), 'Data Landscape Playbook', https://theodi.org/article/introducing-the-odi-data-landscape-playbook/

[196] Research Data Alliance International Indigenous Data Sovereignty Interest Group (2019), 'CARE Principles for Indigenous Data Governance', https://www.gida-global.org/care

4.3.7. Digital infrastructure and technology

Participants in our co-design phase suggested that qualitative data could be collected through a smartphone or desktop app, or voice recording software. Several Indigenous communities are already working with data collection software such as Mapeo and Global Forest Watch, and organisations working on data collection with internally displaced persons have found accessibility to basic technology such as mobile phones and the internet to be common[197].

A concern presented to us was limited access to technology – such as virtual private clouds – to securely maintain and store the data, and capacity to build and deploy it. One participant described how, in some parts of Peru, 'to have information is super expensive'.

An area for optimism in this domain was the potential for a data trust to enable access to data at scale sufficient to apply natural language processing (NLP). GPAI Responsible AI Working Group's report on Climate Change and AI highlighted the potential for NLP techniques to allow AI application to qualitative data such as interviews[198]. However, the potential in this context may be limited due to the fact that over 26% of Peru's population do not speak Spanish as a first language, and a majority of those individuals are Indigenous[199]. This could provide an opportunity to create a language corpus, as discussed in GPAI Data Governance Working Group's report on the Role of Data in AI[200], and trustees could choose to donate data to initiatives like Common Voice[201].

4.3.8. Financial sustainability

Our participants found it difficult to pinpoint what a critical mass would look like for a data trust in this context. However, due to the qualitative nature of the data being collected, it was suggested that the numbers of interviews would likely be quite low. This could mean that a data trust in this context could require fairly small amounts of investment to get started and begin having impact (although storing audio and related data could increase costs over time).

In discussions of potential funding sources, most experts agreed that philanthropic investments were the most realistic route for establishing a data trust in this context, especially given that the types of organisations seeking to use data stewarded by the data trust would include non-profits – including legal agencies, humanitarian organisations, academic and research institutions and environmental advocates. However, this funding route would need to be approached with caution to ensure that it didn't jeopardise the integrity of the trust (such as by influencing the decisions made by trustees).

[197] Sánchez, N. (2021), 'Innovative Solutions to Foster Climate Action in the Amazon', https://hivos.org/news/innovative-solutions-to-foster-climate-action-in-the-amazon/

[198] The Global Partnership on AI, Climate Change AI, and Centre for AI & Climate (2021), 'Climate Change and AI: Recommendations for Government Action', https://gpai.ai/projects/responsible-ai/environment/climate-change-and-ai.pdf

[199] Translators Without Borders (2007), 'Language Data for Peru', https://translatorswithoutborders.org/language-data-for-peru

[200] Digital Curation Centre, Trilateral Research and The School of Informatics, University of Edinburgh (2020), 'The Role of Data in AI', https://gpai.ai/projects/data-governance/role-of-data-in-ai.pdf

[201] Common Voice, Mozilla, 'About', https://commonvoice.mozilla.org/en/about

4.4. Assessing the Feasibility of Data Trusts for These Domains

Based on the information generated through our co-design phase and documented in this section, we assess the feasibility of data trusts for the three domains as follows:

Criteria	A data trust for cycling in London	A data trust for small shareholder farming in India	A data trust for Indigenous climate migration in Peru
1. Is there an incentive for the community to come together to create a data trust?	+ There is demand for improved cycling infrastructure among the London cycling community and coalescing around a data trust has the potential to advocate for and impact that.	- We could not identify a clear incentive for small shareholder farmers in India to come together to form a data trust, especially in the context of other pressing challenges and priorities.	+ There is demand for increased control and use of data by Indigenous communities in Peru for a number of different purposes, including to advocate for increased land rights.
2. Do members of the community have the capacity to engage in the development and running of a data trust?	+ Londoners generally have a high level of digital literacy, and some cyclists are already generating and using mobility data through mobile apps and other services (although levels of capability will not be uniform and may vary by area of London).	- There is a distinct lack of digital literacy in the Indian farmer community, and limited internet connectivity also poses a significant challenge to data collection, sharing and use.	± There is growing use of data by Indingenous communities in Peru, however specific Indigenous nations and communities may have lower levels of digital literacy.
3. Is there a person, group or organisation who can credibly drive the development of a data trust with the community?	± We encountered organisations keen to support the development of a data trust to help improve cycling infrastructure, including Transport for London and the London Cycling Campaign).	± In theory, community-level farmer organisations and civil society organisations could take up the task of working with farmers to take the idea forward.	+ There are organisations with experience in data collection and Indigenous representation that could take the lead on building (and potentially hosting/ operating) a data trust.

4. Is there demand for the data among prospective users, with clearly bound use cases for it?	+ There is high demand for mobility data from those undertaking modelling and making decisions about London's cycling infrastructure, as well as startups, advocacy organisations and academia.	± There is some demand for more local farming data from research institutions and AgTech firms, including to develop tailored advisories and to support AI development.	- There is some demand from civil society organisations seeking to use the data to better understand migration patterns, and from indigneous communities themselves (but limited in the context of developing/ deploying AI).
5. Are there data rights in the jurisdiction that individuals from the community could delegate to the data trust?	± The UK GDPR recognises individual rights over data, but it remains to be proven whether those rights can be delegated to a data trust.	- There is no data protection legislation in India and therefore no rights that could be delegated to a data trust, and limited guardrails to experiment safely with this form of data stewardship.	- The current legislation regarding data rights and transfer is not substantial or clear enough to confidently support the transfer of rights.
6. Are there legal instruments in the jurisdiction that could be used to construct a data trust and establish fiduciary obligations to the community?	+ There are a number of organisational forms that could be used to construct the data trust such as the Company Limited by Guarantee, and the use of 'true' legal trusts could also be tested.	± While legal trusts in India are not suitable as a legal structure for data trusts, other organisational structures such as registered societies could provide a suitable basis to set up a data trust.	± Trust law exists in Peru, however it is unclear if this could be applied to construct a data trust.
7. Is it technologically possible for the data trust to exert control over the data it would be responsible for?	+ A mobile app could be used to collect GPS and motion data, similar to the way that other mobility services function (and porting data from other services/apps could also be possible).	± Tools like SurveyCTO to enable offline collection of data in areas of low internet connectivity, although interoperability driven by a lack of common data standards could inhibit efforts to aggregate and make use of the data.	± The qualitative data could be collected through a smartphone app or voice recording software, although access to virtual private clouds to securely maintain and store the data may be a barrier.

8. Is there access to sufficient funding to set up the data trust, and options to ensure its continued sustainability?	± Options for funding include philanthropic funders interested in community initiatives and/or data stewardship, and a data trust could experiment with different revenue models if it needed to sustain itself.	- We struggled to identify potential funding sources for a data trust, especially given that funding for data initiatives in agriculture in India is limited in general.	± Philanthropic funding could be a route for establishing a data trust in this context, although it's unclear whether there would be ways for it to become self-sustaining.

We came to the conclusion that applying the London Cyclist Data Trust would be the most feasible – largely on the basis of there being a clear incentive for the community of cyclists to engage, high levels of digital capacity in the community, an ecosystem of credible organisations interested in supporting its development, and clear uses for the data it would seek to bring together.

5. A Roadmap for Operationalising a Climate Data Trust

This roadmap is based on our design of the London Cycling Data Trust, but could be used to take forward a similar data trust in other locations[202]. It is not exhaustive, but we hope it serves as a useful reference for practitioners seeking to implement a climate data trust.

It is intended to be undertaken by a person or organisation who can credibly drive the development of the data trust with the given community (for example, in the context of the London Data Trust this could be the London Cycling Campaign), with sufficient funding.

While the steps are highly interrelated, we set them out across five streams:

Figure 8: Five streams to operationalise a data trust

Community:

- Conduct extensive engagement and user research with the cyclist community to develop a detailed understanding of their expectations and needs from the data trust.
- Evaluate and adjust for the variation in capacity and levels of engagement within the citizen group (for instance – how do the concerns and interests differ by gender, ethnicity or location?).
- Engage with prospective data users to understand the potential use cases and the data needed to undertake them, as well as the technological means of access they require.
- Consider how value and impact will be communicated back to the community as a result of the data collection and use (for instance, communicating when cycle lanes have been built or improved).
- Develop mechanisms for ongoing participation and decision making with the cyclist group regarding the overall nature and direction of the data trust.

[202] Building on previous work on the implementation of bottom-up data stewardship, including by the Data Trusts Initiative. See: https://datatrusts.uk/blogs/creating-a-pathway-to-successful-real-world-data-trusts.

Capacity:

- Identify and recruit for (or engage delivery partners with) the different skills required to set up and run the data trust, such as those with specialist knowledge and experience in compliance, operations, finance, technology, design, data stewardship and community engagement.

- Identify and recruit trustees, considering the diversity and balance of perspectives and interests to be represented to ensure responsible data stewardship.

Legal and governance:

- Further evaluate the potential legal forms the data trust could take, such as a legal trust or company limited by guarantee. Consider whether an existing organisation could host/take on the role of the data trust.

- Consider how the fiduciary responsibilities of the trustees can be made contextual and explicit, and sufficient in safeguarding the interests of the cyclists.

- Undertake appropriate privacy impact assessments, as well as consider the ethical implications of the data trust's activities (for example, using tools like the ODI Data Ethics Canvas[203] or Consequence Scanning[204]).

- Design a detailed set of terms for how the data trust will make different types of decisions (for example, granular decisions about which third parties can access the data it stewards, as well as strategic decisions about the revenue models it might need to adopt).

- Address the question of whether and how the delegation of data rights is possible (for example, in the context of the London Data Trust, if UK GDPR permits cyclists to delegate rights to the data trust).

- Develop legal agreements to use to constrain third parties' use of the data, and means of enforcement and redress.

- Register/incorporate the chosen legal form (for example, by registering the company limited by guarantee with Companies House and completing statutory documentation).

[203] The Open Data Institute (2021), 'The Data Ethics Canvas', https://theodi.org/article/the-data-ethics-canvas-2021/

[204] Doteveryone (2021), 'Consequence Scanning – an agile practice for responsible innovators' https://doteveryone.org.uk/project/consequence-scanning/

Technology:

- Develop, test and refine prototypes of the data trust's interface (in the case of the London Data Trust, building on the initial wireframes for the Positive Cycling app).
- Build back-end systems to securely ingress, host and combine data, if required.
- Build appropriate mechanisms to enable third parties, as deemed appropriate by trustees, to access the data (for example, using Trusted Research Environments or deploying Privacy Enhancing Technologies to restrict access). Consider means of auditing and enforcement to ensure data use are in line with the preferences of the community and as agreed by trustees.
- Explore different technological functions the data trust could itself take on, such as undertaking analysis or developing data visualisations.

Scale and sustainability:

- Identify (and if required, implement) approaches to generating revenue, such as charging some users for access to data.
- Undertake a campaign to make cyclists aware of the data trust and encourage them to get involved (for instance, in the case of the London Cycle Data Trust, to launch and advertise the Positive Cycle mobile app).
- Begin to consider options for scaling the data trusts, such as by increasing its geographical coverage or ability to responsibly steward other data types.

6. Conclusion

In the course of this research, we have identified several themes and reached conclusions about data trusts as a form of data stewardship:

1. On the feasibility and next steps for the three climate domains:

We're optimistic about the potential for a London Cycle Data Trust and other, similar data trusts to emerge to enable communities to use data to advocate for, and inform the design of, sustainable transport infrastructure. Existing initiatives such as Posmo.Coop and the Bike Data Project show that there is interest and motivation among communities and that there are defined uses for data in this context, as well as momentum behind the idea.

While the feasibility of data trusts for small shareholder farming in India or for Indigenous climate migration in Peru is less certain, there are clearly opportunities to improve how data is collected, used and shared in these areas and we hope this work serves to highlight them.

2. On the process of co-designing data trusts:

We set out to involve diverse groups of stakeholders in the co-design of the three data trusts. We were able to include participants with different perspectives and interests, and from different parts of the world. We hope that the combination of research and design methods we've used will help to move the discussion of data trusts from the theory (with the common placeholder of 'it depends') to a more specific discussion, anchored in tangible descriptions of how they could look and function in practice.

However, we're aware of the limitations of this co-design process. Given the timescale of the project, we used desk research and expert interviews to select the domains, rather than an open call. We did not pursue direct communication with London cyclists and displaced Indigenous communities in this project, and had limited exposure to smaller shareholder farmers in India. Therefore the three designs are based on the needs of these communities as documented in literature or as understood by stakeholders who work closely with them. We recommend that practitioners exploring data trusts in these domains – and in general, researching or designing data trusts – consider more participatory approaches over a longer period.

3. On the general feasibility of data trusts:

Data trusts differ from other approaches to bottom-up data stewardship by having a) independent trustees with b) explicit, contextual fiduciary obligations. We feel the significant discourse around possible legal instruments to apply these functions can distract from other important conditions necessary for data trusts to emerge. As our feasibility criteria describe, a clear incentive for a community to mobilise, capacity for them to do so and appropriate leadership are vital.

We're conscious that the concept of data trusts can sometimes become detached from existing bottom-up data stewardship initiatives, such as those we list in Section 2. Their existence shows that communities can be empowered around their data without the need for trustees with this particular type of duty. Therefore these functions are not only difficult to fulfil, but the need for them also remains to be proven. To do so, we perhaps not only require a real-world data trust to provide a comparison, but also for that data trust and a similar initiative to 'go wrong' to then be able to analyse the comparative outcomes (and validate that having trustees with fiduciary obligations provides increased protections).

This may be a long way off, potentially enabling data trusts to exist as a rich theoretical debate that detracts from the pragmatic and impactful work of real-world initiatives.

4. On other approaches to responsible data stewardship for AI:

Experimentation around data trusts and other forms of bottom-up data stewardship is important. However, data can be stewarded responsibly without requiring this level of individual control, which will not work for everyone. In general, as with this research, we are still exploring the contexts where these approaches to data are viable and useful.

Even where these approaches are feasible, such as in the case of the London Cycle Data Trust, data trusts are likely to grow slowly, and the collective dataset the cycling community creates may not ever meet AI practitioners' needs for data at scale. For policymakers and other actors interested in data stewardship as a means of supporting the development and application of AI, we recommend considering other approaches alongside data trusts. For example: platforms that enable people to donate data to create new data assets at scale (see Mozilla's Common Voice[205]); hubs that provide infrastructure that enable organisations to come together to share data with researchers securely (see INSIGHT Health Data Research Hub[206]); or organisations publishing data that can be used to train AI models (see Waymo's autonomous vehicles sensor data[207]).

5. On the role for policymakers:

The ODI and Aapti have been pleased to collaborate with GPAI's Data Governance Working Group in advancing understanding of the potential and requirements of establishing data trusts for social benefit. We understand that GPAI's Data Governance Working Group will take some time now in consider what directions it takes to build on our findings. As it does so, we would like to share these recommendations for the Working Group's consideration:

- undertakes work to imagine (and assess the feasibility of) other new forms of data stewardship, to inspire data governance practitioners and demonstrate the array of options open to them.
- documents initiatives that already steward data responsibly for AI development and application, to amplify best practices and bridge the gap between forward-looking research and the real world.
- provides access to long-term funding and other resources, to enable practitioners to attempt to implement data trusts (such as the London Cycle Data Trust) and other forms of data stewardship.
- consider further research into themes encountered in this work, such as data sovereignty and Indigenous data stewardship, and ethical business models for data access.

Other policymakers helping to advance the understanding and practice of responsible data governance may also consider these proposed next steps.

[205] Common Voice, https://commonvoice.mozilla.org/en

[206] INSIGHT Health Data Research Hub, https://www.insight.hdrhub.org

[207] Waymo, https://github.com/waymo-research/waymo-open-dataset

Methodology

Selecting Climate Domains to Focus on

In October 2021, we initiated this research which aimed to assess the feasibility of data trusts for climate action. We undertook a review of climate literature and conducted interviews with experts to deepen our understanding of the field and generate a longlist of climate challenges to start from.

The literature review examined scientific and grey literature. The goal of the review was to gain a broad understanding of the key issues in climate change, and how data and AI were being deployed to address them. We undertook 17 interviews with experts in this phase to supplement our review, with interviewees selected for their expertise in the areas of data stewardship, climate, data science and analysis, and artificial intelligence. The research team created topic guides to steer the interviews, and each interview lasted between 45 minutes and one hour.

Following this initial process, we generated the following, non-exhaustive longlist of climate challenges: city mobility; energy use; agriculture; community resilience; climate migration; water use; wildlife conservation; and air quality.

Rather than focusing on one challenge or trying to design one general-purpose climate data trust to tackle all challenges, we chose to narrow down to three domains. Using domains as case studies was intended to increase the likelihood of a data trust ultimately being built (that is, to 'spread our bets'), as well as broaden the range of things we would learn about data trusts as an approach to data stewardship. We developed a set of four criteria to aid the selection of three domains:

1. Can data play a critical role in tackling the challenges faced in this domain?

2. Can data from this domain be used to develop or deploy artificial intelligence?

3. Are there opportunities in this domain for bottom-up approaches that empower individuals to play a role in stewarding data?

4. Would focusing on this domain help us to explore privacy (and other rights) enhancing technologies?

We applied these criteria using RAG (Red-Amber-Green) ratings, using the information generated through our co-design process to summarise favourable (Green), neutral (Amber) and unfavourable (Red) values. We used the RAG ratings to inform the following decisions:

To combine the city mobility, water use, energy use and air quality domains under a new domain of 'city sustainability'. This change was made after recognising overlaps between several of the associated data types and systems, and the potential to focus the application of a data trust within a particular city or urban environment, which came through as a common theme in our expert interviews.

To narrow the agriculture domain to ‘small shareholder farming’. This choice was made after feedback from several stakeholders that the agriculture domain was too broad and that ‘big agriculture’ (encompassing large commercial farms owned by corporations) would offer
limited opportunities to explore bottom-up data stewardship.

To select the climate migration domain. Our research suggested that data trusts could represent a powerful tool for climate migrants that would ensure the data collected about them was protected and used in their interests, which unfortunately isn’t always the case currently.

We also sought to explore these domains through different geographic and jurisdictional lenses, to assess the feasibility of data trusts in diverse socio-economic and legal contexts. The following choices of locations also took into account practical considerations, such as the networks developed and prior research conducted by the ODI and Aapti Institute:

Within the city sustainability domain, London was chosen as the ODI has a deep understanding of and connections with the data ecosystem. Additionally, prior research conducted by Aapti Institute showed that trusts' institutional and legal origins in England and Wales make them the most suitable for instantiating data trusts through trust law[208].

Within the small shareholder farming domain, India was chosen due to Aapti Institute’s prior experience in evaluating the impact of data governance policies on the agriculture sector in
India[209]. This choice was also aided by India's legal system having a well documented and robust jurisprudence of various legal structures – such as trusts, societies, and companies – which could be leveraged to set up a data trust.

Within the climate migration domain, Peru was chosen because of its geographical location, climate and environment, which make it extremely susceptible to climate migration. Furthermore, while both the UK and India have common law systems, Peru provided us with the opportunity to explore legal structures for data trusts in a civil law jurisdiction.

At the end of October 2021, GPAI’s Data Governance Working Group confirmed the domains and their geographical locations: city sustainability (London); small shareholder farming (India); and climate migration (Peru).

[208] Aapti Institute and The Open Data Institute (2022), ‘Enabling data sharing for social benefit through data trusts’, https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf

[209] Kapoor, A. et al. (2022), ‘Impact of the Non-Personal Data Governance Framework on the Indian Agricultural Sector’, https://thedataeconomylab.com/2022/02/24/impact-of-the-non-personal-data-governance-framework-on-the-indian-agricultural-sector/

Co-designing Data Trusts

Between November 2021 and February 2022, we used co-design methods to understand and articulate what a data trust for each of the three domains could look like. The purpose of using a co-design methodology was to discover unique and varied perspectives, in recognition of the need to explore and develop participatory data stewardship initiatives in a collaborative way. As part of the process, we drew from frameworks for developing data trusts provided by Aapti Institute and Data Trusts Initiative[210].

We convened three sets of co-design participants, one for each domain. This included expert interviewees from our previous phase; respondents to our open call for participation[211]; and people and organisations we had encountered in our research or who had been referred to us.

We sought to balance domain expertise – those with an understanding of that climate area, such as its causes, challenges, main actors and current blockers to data collection, use or sharing – with expertise in data stewardship – those with knowledge of data trusts and other approaches to bottom-up data stewardship; hands-on experience in building technological systems to store data or using data to generate insights; or an interest in the use of different legal frameworks to underpin data stewardship. The full list of co-design participants for each domain can be found in the Acknowledgements appendix.

To facilitate the discussion and input of our co-design participants, we set up a series of design templates on Miro, a digital whiteboard software. This structure was used in both of the co-design workshops and participants were also able to contribute to the whiteboard independently. We used a variety of templates and design techniques within the Miro boards, including stakeholder mapping, logic modelling and data ecosystem mapping. The Miro boards – for city sustainability[212], small shareholder farming[213] and climate migration[214] – remain open for further contribution.

We undertook three main methods of co-design during this process:

Workshops. Workshops were held online at the end of January 2022 – one for each domain – and ran for two hours with an average of 12 stakeholders participating. These workshops used the Miro boards and curated design frameworks. The agenda for the workshops was tailored to each domain but broadly covered activities to improve stakeholders' understanding; identify the potential problems that a data trust could address; and design how it could function. These workshops also highlighted potential issues and barriers to the development of such a data trust. We also used Aapti's Stewardship Mapper[215] and Stewardship Navigator[216], and guidance and other materials from the Data Trusts Initiative, to brief, provide context and set some parameters for our participants.

[210] Montgomery, J. (2022), 'Creating a pathway to successful real-world data trusts', https://datatrusts.uk/blogs/creating-a-pathway-to-successful-real-world-data-trusts

[211] Open Data Institute (2021), 'Could 'bottom-up data trusts' help to tackle the climate crisis?', https://theodi.org/article/could-bottom-up-data-trusts-help-to-tackle-the-climate-crisis/

[212] City sustainability Miro board https://miro.com/app/board/uXjVOUkxzVk=/?invite_link_id=60804953151

[213] Small shareholder farming Miro board https://miro.com/app/board/uXjVOTo9EAs=/?invite_link_id=435678116175

[214] Climate migration Miro board https://miro.com/app/board/uXjVOU9eSMs=/?invite_link_id=850873371779

[215] The Data Economy Lab (2021), 'Stewardship Mapper', https://thedataeconomylab.com/mindmap/

[216] The Data Economy Lab (2021), 'Stewardship Navigator', https://tool.thedataeconomylab.com/get-started

1:1 design sessions. Following the co-design workshops, we followed up with workshop attendees to undertake individual discussions and co-design sessions using Miro. These sessions were recorded and analysed using thematic coding.

Independent work. The team also undertook independent research and design work. We engaged a member of the ODI's technology team to explore the high-level data architectures for data trusts; and a member of Aapti Institute's team with legal expertise, who considered the appropriate legal forms for each of the developing designs.

As a bottom-up form of data stewardship, data trusts should interact with the individuals from the community whose data they are to steward. This interactive component of data trusts is often overlooked in favour of discussion of their potential legal, technological or governance aspects. We sought to design what the user journeys and interfaces could look like for the data trusts, so worked with specialist user interface designers. For the city sustainability domain we developed speculative designs for a smartphone app that would interact with cyclists; whereas for small shareholder farming and climate migration we developed storyboards showing how communities could engage with a data trust.

This process produced designs for a hypothetical data trust in each domain. Ultimately, each is the product of different design choices, inspired by our interactions with participants and our research.

Developing and Applying the Feasibility Criteria

We had originally set out to first undertake the co-design of the data trusts, and then develop and apply criteria to assess their feasibility. In practice, this was a more iterative process whereby we learned about the elements of feasibility as we engaged with the domains and their co-design participants. For example, the need for a strong financial, reciprocal or altruistic incentive for a community to come together around a data trust became apparent as we learned about the reasons for individuals taking part in parallel city sustainability initiatives like Posmo Coop.

We therefore developed the feasibility criteria through the co-design process, and in February 2022, made conclusions about each domain's feasibility described in Section 4.4 . We applied the criteria using RAG (Red-Amber-Green) ratings, using the information generated through our co-design process to summarise favourable (Green), neutral (Amber) and unfavourable (Red) values. Our assessment of each domain's feasibility was then confirmed by GPAI at a red-teaming session[217]. This methodology could be adopted by similar projects wishing to explore the application of data trusts in a given context; in other, longer projects, each criteria could be the subject of extensive study.

Report Drafting

This report was drafted in February and March 2022, and launched for public consultation at AI:UK on 23 March 2022.

[217] Involving 'the practice of rigorously challenging plans, policies, systems and assumptions by adopting an adversarial approach,' https://whatis.techtarget.com/definition/red-teaming

Endnotes

About Aapti Institute, the Open Data Institute and Data Trusts Initiative

Aapti Institute is a public research firm that works at the intersection of technology and society, building policy-relevant and actionable insights on the digital economy. It was founded in 2019 in Bangalore, India. Through its Data Economy Lab, a flagship effort to rebalance power in the digital economy, Aapti supports research, conversation and experimentation around the practice of data stewardship.

The **Open Data Institute** (ODI) works to make data work for everyone by working with businesses and governments to build an open, trustworthy data ecosystem. It is independent, nonprofit and nonpartisan, founded in 2012 by Sir Tim Berners-Lee and Sir Nigel Shadbolt. From its headquarters in London and via its global network of startups, members and nodes, the ODI offers training, research and strategic advice for organisations looking to explore the possibilities of data.

The **Data Trusts Initiative** is hosted by the University of Cambridge's Department of Computer Science and Technology, and organised in collaboration with the University of Birmingham. Supported by a donation from the Patrick J McGovern Foundation, the Data Trusts Initiative funds research and engagement activities at the interface of technology, policy and the law, and seeks to shift discussions about data trusts from principle to practice.

The **Global Partnership on Artificial Intelligence** (GPAI) is a multi-stakeholder initiative which aims to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities. Built around a shared commitment to the OECD Recommendation on Artificial Intelligence, GPAI brings together engaged minds and expertise from science, industry, civil society, governments, international organisations and academia to foster international cooperation.

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