Data stewards in service of Artificial Intelligence: Reimagining AI futures towards a participatory paradigm for technological innovation

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Abstract: The successful development and deployment of AI systems depends on access to data which is used to train models using several different techniques - from machine learning to automation. However, issues related to underlying datasets which are used to train algorithms and bottlenecks within organisations which undertake AI development result in AI-driven products or services that fail to scale due to concerns regarding bias, quality and unfair use of data. Who has access to the data used to build AI systems, what are the conditions under which the data is shared and who benefits from data use are some of the significant questions that remain unaddressed under prevailing logics of AI research and development. These systemic issues combined with prevailing power asymmetries in AI research and development result in arbitrary exclusion of individuals and communities - who are the primary producers of data - from participating in algorithmic governance and decision making. Regulation on how AI is researched and developed requires a paradigm change to push for responsible AI. Institutional frameworks for regulation of AI should adopt perspectives from procedural justice praxis to ensure that fundamental human rights are upheld and create space for public dialogue around AI deployment for specific contexts and purposes. It is this paper's contention that embedding data stewardship - an approach to data governance which unlocks data for responsible use without compromising the agency of individuals and communities that produce the data - can go a long way in advancing AI innovation through safe, trustworthy and fair mechanisms.

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Introduction

The successful development and deployment of AI systems hinges on access to data which is used to train models using various techniques[1] - from the more prominent machine learning (ML) and natural language processing (NLP) to automation, robotics and machine vision. In a sense, availability, accessibility and quality of data[2] are the primary drivers of the innovation potential of AI products and services.

In fact, AI integration is considered the foundation of the Fourth Industrial Revolution, purportedly ushering an era of prosperity that is fuelled by troves of data.[3] This data is produced by individuals and communities - digital footprints that humans leave in the wake of their interactions with technological applications and devices. A 2018 report by Forbes pegs the amount of data generated everyday at 2.5 quintillion bytes.[4] These traces of information have since transformed into crucial determinants of development and welfare in contemporary societies, with AI finding application across a variety of use cases in agriculture,[5] climate change,[6] finance,[7] healthcare[8] and law enforcement,[9] among others.

Who has access to this data, what are the conditions under which it is shared and who benefits from data use are some of the significant questions that remain unaddressed under prevailing logics of AI research and development. Broadly, problems encountered

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[1] Pedamkar, P. (n.d.). *Artificial Intelligence Techniques | 4 Techniques of Artificial Intelligence*. eduCBA. Retrieved April 25, 2022, from https://www.educba.com/artificial-intelligence-techniques/

[2] Digital Curation Centre. (2020, November). *The role of data in AI*. Retrieved April 25, 2022, from https://www.gpai.ai/projects/data-governance/role-of-data-in-ai.pdf

[3] Gerbert, P., Mohr, J.-H., & Spira, M. (2021, July 1). *The next frontier in digital and Ai Transformations*. India - EN. Retrieved April 25, 2022, from https://www.bcg.com/en-in/publications/2019/next-frontier-digital-ai-transformations

[4] Marr, B. (2018, May 21). *How Much Data Do We Create Every Day? The Mind-Blowing Stats Everyone Should Read*. Forbes Magazine. Retrieved April 25, 2022, from https://www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/?sh=20500aeb60ba

[5] Columbus, L. (2021, February 17). *10 Ways AI Has The Potential To Improve Agriculture In 2021*. Forbes Magazine. Retrieved April 25, 2022, from https://www.forbes.com/sites/louiscolumbus/2021/02/17/10-ways-ai-has-the-potential-to-improve-agriculture-in-2021/?sh=32458abf7f3b

[6] Snow, J. (2019, July 18). *How artificial intelligence can tackle climate change*. National Geographic. Retrieved April 25, 2022, from https://www.nationalgeographic.com/environment/article/artificial-intelligence-climate-change

[7] Schon, C. (2019, October 24). *AI in Finance: 5 Use Cases That Will Revolutionise the Industry*. Medium. Retrieved April 25, 2022, from https://medium.com/applied-data-science/ai-in-finance-5-use-cases-that-will-revolutionise-the-industry-7fc6b829f4a4

[8] Davenport, T., & Kalakota, R. (2019, June). *The potential for artificial intelligence in healthcare*. NCBI. Retrieved April 25, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6616181/

[9] Rigano, C. (2019, January). *Using Artificial Intelligence to Address Criminal Justice Needs (NIJ Journal 280)*. Office of Justice Programs. Retrieved April 25, 2022, from https://www.ojp.gov/pdffiles1/nij/252038.pdf

in AI development can be bucketed into two categories - issues relating to the underlying dataset used to train various AI algorithms,[10] and bottlenecks arising from designers of AI systems.[11] As a result, several AI-driven products and services have either failed or are unable to scale due to pervasive concerns around bias,[12] quality[13] and unfair use of data.[14]

It is this paper's contention that embedding data stewardship[15] - an approach to data governance which unlocks data for responsible use without compromising the agency of individuals and communities that produce the data - can go a long way in advancing AI innovation through safe, trustworthy and fair mechanisms. Underscoring such innovation is the need for holistic data governance frameworks that intermediaries such as data stewards are best positioned to deliver.

Fissures in the digital economy

The above mentioned challenges serve to foreground an insidious, but oft overlooked, aspect of AI research and development: the power asymmetries in the current digital economy which propel such unilateral innovation. These asymmetries manifest as opaque, insulated AI 'black boxes'[16] that arbitrarily exclude individuals and communities - who are the primary producers of data - from participating in algorithmic governance and decision-making.

In turn, the existing iniquities in the digital economy have produced renewed discussions around the political economy of data. More specifically, the way in which organisations - both public and private - amass data and capture its value for furthering

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[10] Marda, V. (2020, April 23). *Artificial Intelligence: Global Disparities, lack of protection: DW: 23.04.2020*. DW.COM. Retrieved December 1, 2022, from
https://akademie.dw.com/en/artificial-intelligence-global-disparities-lack-of-protection/a-53221533

[11] Jone, K., Buchser, M., & Wallace, J. (2022, November 25). *Challenges of ai*. Chatham House – International Affairs Think Tank. Retrieved December 1, 2022, from
https://www.chathamhouse.org/2022/03/challenges-ai

[12] Manyika, J., Silberg, J., & Presten, B. (2019, October 25). *What do we do about the biases in AI?* Harvard Business Review. Retrieved April 25, 2022, from
https://hbr.org/2019/10/what-do-we-do-about-the-biases-in-ai

[13] Vial, G., Jiang, J. J., Giannelia , T., & Cameron , A.-F. (2020, December 8). *The data problem stalling AI*. MIT Sloan Management Review. Retrieved April 25, 2022, from
https://sloanreview.mit.edu/article/the-data-problem-stalling-ai/

[14] Borgesius, F. Z. (2019, February 11). *Discrimination, Artificial Intelligence and Algorithmic Decision-making*. Retrieved April 25, 2022, from
https://rm.coe.int/discrimination-artificial-intelligence-and-algorithmic-decision-making/1680925d73

[15] Manohar, S., Ramesh, A., & Kapoor, A. (2020, June 24). *Data Stewardship – A Taxonomy*. The Data Economy Lab. Retrieved April 25, 2022, from
https://thedataeconomylab.com/2020/06/24/data-stewardship-a-taxonomy/

[16] von Eschenbach, W. J. (2021, September 1). *Transparency and the Black Box Problem: Why We Do Not Trust Ai - Philosophy & Technology*. SpringerLink. Retrieved April 26, 2022, from
https://link.springer.com/article/10.1007/s13347-021-00477-0 [Paywalled]

their interests, has become the subject of a number of investigations,[17] spurring the need for new regulations[18] and in a few cases, demands for redressal.[19] Scholars have highlighted the extension of conventional modes of capital accumulation[20] and rentiership in the digital economy[21], that hold data producers "captive"[22] with limited bargaining power or agency to dictate how their data is employed in AI development.

Moreover, current discourse on regulation of information markets is overwhelmingly preoccupied with data protection and consent as a means of authorising data sharing activities. However, this model of regulation - termed the "privacy model"[23] - is blinkered in as much as it cannot facilitate meaningful participation of data producers (individuals and communities) in decisions regarding AI development, use and deployment. It ignores potential implications such as "consent fatigue" engendered by incomprehensible cookie notices and terms of use, as displayed on digital platforms, that actively hamper the ability of data producers to provide informed consent. For instance, an investigation by the Financial Times revealed that 79% of health-tech websites surveyed deployed cookie notices that extracted sensitive information from data subjects and shared it with third-party advertisers as well as data brokers, without acquiring explicit consent required by the EU's General Data Protection Regulation.[24]

Such instances violate the "contextual integrity" of privacy,[25] as the normative "notice and choice" approach to collecting consent fails to afford data subjects with a reasonable explanation of what their data might be used for. Thus, under prevailing conditions of big data analytics, there exists grave harms to the autonomy of individuals

[17] Kelly, The Verge (2020), "Big Tech is going on trial". Retrieved April 26, 2022, from https://www.theverge.com/2020/7/28/21344920/big-tech-ceo-antitrust-hearing-apple-facebook-amazon-google-facebook

[18] Saran, Observer Research Foundation (2021), "Big Tech and the State: The necessity of regulating tech giants". Retrieved April 26, 2022, from https://www.orfonline.org/expert-speak/big-tech-and-the-state-the-necessity-of-regulating-tech-giants/

[19] Warren, Team Warren on Medium (2019), "Here's how we can break-up Big Tech". Retrieved April 26, 2022, from https://medium.com/@teamwarren/heres-how-we-can-break-up-big-tech-9ad9e0da324c

[20] Seven of the world's largest companies by market capitalization are tech companies. See https://companiesmarketcap.com/

[21] Mazzucato, Penguin Books (2017), "The Value of Everything: Making and taking in the global economy"; Standing, Biteback Publishing (2016), "The Corruption of Capitalism: Why Rentiers Thrive and Work Does Not Pay"

[22] Christophers, Bennett Institute of Public Policy (2019), "Rentier capitalism: The UK case". Retrieved April 26, 2022, from https://www.bennettinstitute.cam.ac.uk/blog/rentier-capitalism-uk-case/

[23] Patnaik, The Indian Express (2021), "Rethinking personal data regulation in India". Retrieved April 26, 2022, from https://www.newindianexpress.com/opinions/2021/feb/15/rethinking-personal-data-regulation-in-india-2264123.html

[24] Harlow, et al., Financial Times (2019), "How top health websites are sharing sensitive data with advertisers". Retrieved April 26, 2022, from https://www.ft.com/content/0fbf4d8e-022b-11ea-be59-e49b2a136b8d

[25] Nissenbaum (2004), Washington Law Review. "Privacy as Contextual Integrity". Retrieved April 26, 2022, from https://digitalcommons.law.uw.edu/wlr/vol79/iss1/10/

and communities who have limited avenues to engage with downstream uses of their data.[26] The General Data Protection Regulation, 2016, India's proposed Data Protection Bill, 2021 and Ghana's Data Protection Act, 2012 are some of the data protection legislations that follow the "privacy model" of regulation.

Growing realisation about the abiding extractive characteristics of the digital economy and the inadequacy of the current data regulatory ecosystem have recast fears about lack of trust and transparency in AI design and development.[27] Most crucially, the absence of any meaningful legislation to address harms arising from certain hazardous AI processes[28] and products[29] ensures that governance and public oversight over AI systems have been rendered virtually impossible to achieve.

Consequently, the ubiquity of algorithms and the problems they produce call for the radical reconstitution of relationships between individuals, communities and the organisations that process their data. Respect for human dignity and rights must be the lynchpin upon which emerging technologies, such as AI, should be founded on.

Reimagining AI futures

Progress in AI comes with immense transformative potential for human advancement, increasingly defining the solutions to world's toughest challenges in healthcare,[30] financial inclusion,[31] food security,[32] among others domains. But, research has demonstrated how even the most well-intentioned AI tools and technologies have disconcerting social, economic and political ramifications, manifesting as

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[26] Baruh (2017), New Media and Society - Sage Journals, "Big data analytics and the limits of privacy self-management". Retrieved April 26, 2022, from https://journals.sagepub.com/doi/abs/10.1177/1461444815614001

[27] Bloch-Wehba, H. (2021, June 17). *Transparency's AI problem*. Knight First Amendment Institute at Columbia University. Retrieved April 26, 2022, from https://knightcolumbia.org/content/transparencys-ai-problem

[28] Camargo, C. Q. (2020, November 14). *YouTube's algorithms might radicalise people – but the real problem is we've no idea how they work*. The Conversation. Retrieved April 26, 2022, from https://theconversation.com/youtubes-algorithms-might-radicalise-people-but-the-real-problem-is-weve-no-idea-how-they-work-129955

[29] Toews, R. (2021, December 10). *Deepfakes are going to wreak havoc on society. we are not prepared.* Forbes. Retrieved April 26, 2022, from https://www.forbes.com/sites/robtoews/2020/05/25/deepfakes-are-going-to-wreak-havoc-on-society-we-are-not-prepared/?sh=543b5a4b7494

[30] Davenport, T., & Kalakota, R. (2019, June). *The potential for artificial intelligence in Healthcare*. Future healthcare journal. Retrieved April 28, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6616181/

[31] Singh, A. (2020, October 9). *AI: A game-changer for financial inclusion*. The Financial Express. Retrieved April 28, 2022, from https://www.financialexpress.com/opinion/ai-a-game-changer-for-financial-inclusion/2101275/

[32] AI for Good. (2021, September 2). *Feeding the future: How ai can strengthen food security*. AI for Good. Retrieved April 28, 2022, from https://aiforgood.itu.int/feeding-the-future-how-ai-can-strengthen-food-security/

discrimination,[33] exclusion[34] and misery.[35] And herein lies the essential paradox of AI - a system which represents unparalleled human ingenuity and creativity but bearing unprecedented, alarming risks for human welfare and development.[36]

Amidst these promises and perils, it becomes incumbent upon public and private actors involved in AI research, development and deployment to examine the precarious foundations it relies on. Such reflexive praxis must take into consideration the dire intended[37] and unintended[38] consequences produced by thoughtless AI use and abuse, going beyond mere consideration of ethics to a rights-based AI paradigm for the future.

While some might argue that such a movement towards redefining the AI paradigm has already begun, it remains grossly inadequate and hegemonic, falling short of producing a meaningful mechanism for public oversight over AI systems.[39] The OECD AI Principles (2019),[40] Public Voice's Universal Guidelines for AI (2018),[41] World Economic Forum's AI Ethics Framework (2021)[42] are a few examples of legally non-binding principles and frameworks for 'responsible AI' development. More recently, the European Union has made an influential first step towards AI regulation through its Artificial Intelligence Act, 2021.[43] But scholars have been quick to point out that this Act risks adopting the "wrong

[33] Adams, R., & Ni Loideain, N. (2019, June 19). *Addressing indirect discrimination and gender stereotypes in AI virtual personal assistants: The Role of International Human Rights Law*. SSRN. Retrieved April 28, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3392243

[34] Kahn, J. (2020, April 6). *A.I. and tackling the risk of "digital redlining."* Fortune. Retrieved April 28, 2022, from https://fortune.com/2020/02/11/a-i-fairness-eye-on-a-i/

[35] Pilkington, E. (2019, October 14). *Digital Dystopia: How algorithms punish the poor*. The Guardian. Retrieved April 28, 2022, from https://www.theguardian.com/technology/2019/oct/14/automating-poverty-algorithms-punish-poor

[36] Pizzi, M., Romanoff, M., & Engelhardt, T. (2021, March 1). *AI for Humanitarian Action: Human Rights and Ethics*. International Review of the Red Cross. Retrieved April 28, 2022, from https://international-review.icrc.org/articles/ai-humanitarian-action-human-rights-ethics-913#footnote5_i9mwrc4

[37] Kamarck, E. (2022, March 9). *Malevolent soft power, AI, and the threat to democracy*. Brookings. Retrieved April 28, 2022, from https://www.brookings.edu/research/malevolent-soft-power-ai-and-the-threat-to-democracy/

[38] Webb, H. (2021, September 24). *Automated decision-making, and unintended consequences*. Orbit. Retrieved April 28, 2022, from https://www.orbit-rri.org/blog/2020/12/03/automated-decision-making-unintended-consequences/

[39] Oliveira, Cristina & Ruiz, Evandro. (February, 2021). *Why Talking about ethics is not enough: a proposal for Fintech's AI ethics.* Pre-print edition. Retrieved April 28, 2022 from https://www.researchgate.net/publication/349335642_Why_Talking_about_ethics_is_not_enough_a_proposal_for_Fintech's_AI_ethics

[40] OECD AI Policy Observatory. (n.d.). *The OECD Artificial Intelligence (AI) Principles - OECD.AI*. Retrieved April 28, 2022, from https://oecd.ai/en/ai-principles

[41] The Public Voice. (2018, October 23). *AI Universal Guidelines*. Retrieved April 28, 2022, from https://thepublicvoice.org/ai-universal-guidelines/

[42] World Economic Forum. (n.d.). *AI Ethics Framework*. Retrieved April 28, 2022, from https://www.weforum.org/projects/ai-ethics-framework

[43] European Commission (EU). (2021). *Artificial Intelligence Act*. EUR-Lex. Retrieved April 28, 2022, from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206

definition of AI",[44] greatly restricting its scope for well-rounded coherent application across industries and public agencies deploying a variety of AI systems. Elsewhere, lawmakers in the United States' Congress have introduced the Algorithmic Accountability Act, 2022[45] in a move to address the ubiquity of automated decision-making (ADM) in public life. However, researchers have criticised[46] the proposed legislation for several reasons, ranging from the un-reliability of self-assessments as a tool to address harms arising from ADM to lack of continuous monitoring and limited availability of public information and oversight.

Further, over-emphasis on AI ethics in the frameworks mentioned above draws attention to only a narrow, technical subset of problems and risks treating issues in AI research or development as mere "design flaws" that can be solved through revised business practices.[47] On the other hand, systemic concerns[48] such as dwindling social cohesion (ex: echo chambers on social media platforms), political abuse of AI systems[49] (ex: automated propaganda, bot farms, deep fakes, voter manipulation, etc), lack of diversity within AI research community, exploitative labour practices (ex: AI data labelling),[50] ecological costs of AI development (ex: energy consumption, mining of lithium and rare earth metals) and the social trade-offs[51] in AI deployment finds little mention within contemporary frameworks for developing 'ethical AI'.

Specifically, the problem of lack of diversity within the AI research and development community speaks to the power imbalance between the creators of AI systems and those who are impacted by it. The adverse impact is particularly egregious for

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[44] Bryson, J. J. (2022, March 2). *Europe is in danger of using the wrong definition of ai*. Wired. Retrieved April 28, 2022, from
https://www.wired.com/story/artificial-intelligence-regulation-european-union/

[45] Clarke, Y. D. (2022, March 2). *H.R.6580 - Algorithmic Accountability Act of 2022*. House of Congress. Retrieved December 1, 2022, from
https://www.congress.gov/bill/117th-congress/house-bill/6580/text

[46] Gursoy, F., Kennedy, R., & Kakadiaris, I. (2022, August 20). *A critical assessment of the algorithmic accountability act of 2022*. SSRN. Retrieved December 1, 2022, from
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4193199

[47] Hagendorff, T. (2020, July 28). *The ethics of AI Ethics: An evaluation of guidelines - minds and machines*. SpringerLink. Retrieved April 28, 2022, from
https://link.springer.com/article/10.1007/s11023-020-09517-8

[48] Ibid.

[49] Polonski, V. (2017). *The good, the bad and the ugly uses of machine learning in election campaigns*. Centre for Public Impact. Retrieved April 28, 2022, from
https://www.centreforpublicimpact.org/insights/good-bad-ugly-uses-machine-learning-election-campaigns

[50] Natarajan, S., Mishra, K., Mohamed, S., & Taylor, A. (2020). *Just and equitable AI data labelling*. Aapti Institute. Retrieved April 28, 2022, from
https://uploads.strikinglycdn.com/files/7d492f74-a51f-423b-bf5d-65c9f88eee06/AI_Data_Labelling_Report_DIGITAL_25FEB1033.pdf

[51] Lee, M. S. A., Floridi, L., & Singh, J. (2021, June 12). *Formalising trade-offs beyond algorithmic fairness: Lessons from ethical philosophy and welfare economics - ai and Ethics*. SpringerLink. Retrieved April 28, 2022, from https://link.springer.com/article/10.1007/s43681-021-00067-y

populations in the Global South - where vulnerabilities are amplified due to absence of institutional remedies[52] for harms arising from AI deployment. This is because most AI development is undertaken in the Global North with little comprehension of the developing world, ignoring critical perspectives of relationality and social context[53] in the process. Such privileged systems of knowledge production within the AI community not only exacerbate existing issues of bias, discrimination and exclusion as previously mentioned, but also replicate long-standing patterns of epistemic violence.[54] In doing so, AI research and development deftly bypasses dialogue from actors and entities that exist beyond the core, i.e the Global North, suggesting a carryover of colonial mentality.

Reimagining AI futures is critical to address the systemic issues outlined above. To achieve this, algorithmic governance and more broadly, regulation of AI must extend beyond insular 'technocratic discourse' dominated by so-called experts, primarily located in the Global North. A paradigm change is necessary to push conversations about responsible AI from an exercise in ethics mapping and self-regulation by industry to binding regulatory action by governments globally. To effectively guard against AI exceptionalism, public authorities must implement governance mechanisms that not only regulate how AI is researched and developed, but also create the space for public dialogue around AI use/deployment for specific contexts and purposes.

Institutional frameworks for regulation of AI should seek to adopt perspectives from procedural justice literature and praxis to ensure that fundamental human freedoms are upheld in AI research and development. Procedural justice is defined as, "...(the) idea of fair processes, and how people's perception of fairness is strongly impacted by the quality of their experiences and not only the end result of these experiences."[55] In turn, the successful incorporation of procedural justice principles in policy rests on four pillars:[56] i) Voice: individuals are provided an opportunity to express their views and participate in decision-making processes; ii) Respect: individuals are treated with dignity; iii) Neutrality: decisions taken are unbiased and guided by transparent reasoning; and iv) Trustworthiness: decision-makers convey honest motives and concerns about well-being of individuals impacted by their decisions.

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[52] Arun, C. (2019, July 15). *Ai and the Global South: Designing for other worlds*. SSRN. Retrieved April 28, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3403010

[53] Tan, J. E. (2020). *Imagining the AI we want: Towards a new AI constitutionalism*. A Digital New Deal. Retrieved April 28, 2022, from https://itforchange.net/digital-new-deal/2020/11/01/imagining-the-ai-we-want-towards-ai-constitutionalism/

[54] Rafanelli, L. (2022, February). *Justice, injustice, and artificial intelligence: Lessons from political theory and philosophy* . Big Data and Society. Retrieved April 28, 2022, from https://journals.sagepub.com/doi/full/10.1177/20539517221080676

[55] The Justice Collaboratory. (n.d.). *Procedural justice*. Yale Law School. Retrieved April 29, 2022, from https://law.yale.edu/justice-collaboratory/procedural-justice

[56] Ibid.

Although procedural justice primarily enjoys widespread application within research on criminal justice systems and law enforcement, it nonetheless holds valuable lessons for public policy and decision-making in science and technology. As Joss and Brownlea point out in their seminal paper,[57] procedural justice praxis is indispensable to gain community acceptance for specific public policy decisions and establish the legitimacy of institutions making those decisions. Additionally, Joss and Brownlea offer that:

"...there is a functional relationship between decision processes and decision outcomes: if those affected by a decision perceive the procedure of reaching that decision as fair (as opposed to unfair), they are, first, more likely to accept and endorse that decision even if it contradicts their own viewpoint and, secondly, they are more likely to entrust the decision-making institution over time. Thus, procedural justice contributes to the stability of both the decision and the institution in which it is made. The effect produced by this relationship has been called the 'fair process effect'."

Human input into the process of AI research, development and deployment is necessary to ensure that proposed and upcoming regulatory frameworks for AI systems are anchored firmly in the praxis of procedural justice. An approach to regulation that incorporates elements of public participation[58] and anticipatory governance that is informed by broad-based social discourse can have positive implications for trust and legitimacy of AI systems, as well as the actors building and governing it. Additionally, participatory approaches to AI systems governance can provide the much-needed regulatory scaffolding to ensure that decisional autonomy[59] of individuals and communities and their preferences over data use in AI are upheld through the AI value chain. Borrowing from a different context, India's rural employment guarantee programme provides a rubric for lawmakers contemplating legislations that embed participatory mechanisms for oversight into AI systems. The National Rural Employment Guarantee Act, 2005 provides for social audits[60] by members of the public to ensure accountability, transparency and citizen involvement in monitoring the performance of the programme.

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[57] Joss, S., & Brownlea, A. (1999). *Considering the concept of procedural justice for public policy and decision making in science and technology*. Science and Public Policy. Retrieved April 29, 2022, from https://www.researchgate.net/publication/250198614_Considering_the_concept_of_procedural_justice_for_public_policy-_and_decision-making_in_science_and_technology

[58] Tan, J. E. (2020). *Imagining the AI we want: Towards a new AI constitutionalism*. A Digital New Deal. Retrieved April 28, 2022, from https://itforchange.net/digital-new-deal/2020/11/01/imagining-the-ai-we-want-towards-ai-constitutionalism/

[59] Sinha, A., & Basu, A. (2021, August 13). *Why Metaphors for Data Matter » Bot Populi*. Bot Populi. Retrieved April 29, 2022, from https://botpopuli.net/why-metaphors-for-data-matter/

[60] *MGNREGA Social Audit*. MGNREGA Social Audit . (n.d.). Retrieved December 1, 2022, from https://nrega.nic.in/netnrega/SocialAuditFindings/sa_home.aspx

To this end, data intermediaries - 'a mediator between those who seek to make their data available and those who seek to leverage that data'[61] - constitute a promising avenue to accelerate AI innovation in a manner that respects the rights of data producers (individuals and communities), while making available accessible and quality data for AI research and development. Moreover, embedding data intermediaries within AI systems regulation is in line with the move from model-centric to data-centric approach[62] to develop AI. Data intermediaries can solve for twin issues of data availability, accessibility and quality on the one hand, and also through mechanisms for direct or delegated representation of data producers, data intermediaries can ensure adherence to the four core tenets of procedural justice and participatory governance of AI systems.

For individuals and communities, data intermediaries constitute critical conduits that negotiate data sharing agreements and vet data requesters to ensure that the former's data is used for predefined purposes only. This is an important function that promises to overcome the constraints of the prevailing "cookie notice" mechanism for privacy self management and opens doors for delegated consent.[63] In a similar vein, data intermediaries are better posed to serve the needs of data requestors (corporations, public agencies, research institutions) by providing value-added services such as anonymisation, pseudonymisation, standardisation and analysis of data making it amenable to use in AI development.[64]

Lastly, the inherent flexibility in structure and organisation afforded by data intermediaries surface a multiplicity of mechanisms to ensure equitable, human-centric models for data governance. These mechanisms range from data fiduciaries and data trusts to data collaboratives, data commons and data cooperatives.[65] Each of these mechanisms have differing legal statuses, structure, composition and modes for facilitating sharing of member data. A specific subset of intermediaries - termed 'data stewards' - are of primary concern to this paper. The subsequent sections will lay out the definitions and functions of data stewards, while drawing from the experiences of compelling use cases of interface between stewards and AI research in the larger ecosystem of data-driven innovation.

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[61] Janssen, H., & Singh, J. (2022, March 30). *Data intermediary*. Internet Policy Review. Retrieved April 29, 2022, from https://policyreview.info/glossary/data-intermediary

[62] Miller, K. (2022, January 25). *Data-Centric AI: AI Models Are Only as Good as Their Data Pipeline*. Stanford HAI. Retrieved April 29, 2022, from https://hai.stanford.edu/news/data-centric-ai-ai-models-are-only-good-their-data-pipeline

[63] World Economic Forum. (2022, February). *Advancing Digital Agency: The Power of Data Intermediaries*. weforum.org. Retrieved April 29, 2022, from https://www3.weforum.org/docs/WEF_Advancing_towards_Digital_Agency_2022.pdf

[64] Ibid

[65] Ibid

Stewards also face several limitations. Lack of enabling legislative instruments to further participatory mechanisms for data governance and absence of legal recognition for data stewardship pose significant bottlenecks to the sustainability and scaling of stewardship initiatives.[66] As also, databases or registers of data stewards demonstrate that most stewarding initiatives are overwhelmingly concentrated in the Global North.[67] This reflects an urgent need for diversifying the communities that find representation within stewardship initiatives, including voices from the Global South and that of marginalised communities in the Global North. Further as data stewards begin to achieve scale, they risk failing to represent[68] interests of all members, while floundering to manage individual and collective interests. This can lead to ineffective decision making and the consequent failure to manage community's data. Though nascent, disparate and with teeming challenges, the success of data stewards to deliver equitable outcomes hinges on the creation of enabling legislative, regulatory and technical pathways to effectively manage data for use in AI systems.[69]

Data stewards in service of AI

As previously discussed, data intermediaries encompass a variety of governance models for organisations that facilitate greater access to, or sharing of, data.[70] A data steward is a subset of data intermediaries which works on behalf of the member community to manage data, its governance and sharing.[71]

The Ada Lovelace Institute proposes a framework for 'participatory data stewardship', where people whose data is used or with which decisions are taken are meaningfully involved in how that data is used.[72] It is a 'responsible, rights-preserving and

[66] Girish, S. (2022, June 8). *State of Data Stewardship*. The Data Economy Lab. Retrieved December 6, 2022, from https://thedataeconomylab.com/2022/06/07/state-of-data-stewardship/

[67] Open Data Institute. (2022). *The Data Institutions Register*. Airtable. Retrieved December 6, 2022, from https://airtable.com/shrcAnkPGmlzW3YgD/tblgHg7H4jCDuxKZR/viwArWK3oMIBIMAPZ

[68] Nabben, K., Puspasari, N., Kelleher, M., & Sanjay, S. (2021, December 17). *Grounding decentralised technologies in cooperative principles: What can 'decentralised Autonomous Organisations' (DAOS) and platform cooperatives learn from each other?* SSRN. Retrieved December 6, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3979223

[69] Girish, S. (2022, June 8). *State of Data Stewardship*. The Data Economy Lab. Retrieved December 6, 2022, from https://thedataeconomylab.com/2022/06/07/state-of-data-stewardship/

[70] Centre for Data Ethics and Innovation. (2021, July 22). *Unlocking the value of data : Exploring the role of data intermediaries.* Retrieved May 27, 2022 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004925/Data_intermediaries_-_accessible_version.pdf

[71] Manohar, S; Kapoor, A; & Ramesh, A. (2020). *Understanding data stewardship: taxonomy and use cases.* Aapti Institute. Retrieved May 27, 2022, from https://thedataeconomylab.com/wp-content/uploads/2020/06/Understanding-Data-Stewardship-Aapti-Institute.pdf

[72] Ada Lovelace Institute (2021, September 7). *Participatory data stewardship : A framework for involving people in the use of data.* Retrieved May 27, 2022 from https://www.adalovelaceinstitute.org/report/participatory-data-stewardship/#_ftn44

participatory concept [which] aims to unlock the economic and societal value of data' in ways that empower communities to take the reins of their data.[73]

In effect, data stewardship aims to unlock the societal value of data, while upholding the data rights of individuals and communities to participate in decisions relating to the collection, management and use of data.[74] This is in line with Viljoen's 2020 paper which makes a significant argument for reorienting power relationships within the digital economy, in favour of communities that would enable them to exercise meaningful control over their data and dictate its downstream uses.[75]

Elsewhere, the Open Data Institute defines data stewardship[76] as the process of deciding who has access to data, for what purposes and to whose benefit, to realise the value and limit the harm that reckless use of data can bring. Specifically, bottom-up approaches to stewardship[77] can help to ensure that the design and governance of stewards reflects the experiences and interests of communities, improving the representativeness of the steward and more broadly, the data that feeds into AI systems. This can enable a higher degree of confidence that the systems used to steward data are fair and just.

Aapti Institute's work at the Data Economy Lab[78] aims to empower individuals and communities to play a pivotal role in data governance and has documented numerous examples of how this can be achieved.[79] Their research has delineated specific functional considerations that arise while attempting to build a data steward and have

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[73] Aapti Institute, Open Data Institute and Global Partnership for AI (2022). *Enabling data sharing for social benefit through data trusts.* Retrieved May 27, 2022 from https://gpai.ai/projects/data-governance/data-trusts/enabling-data-sharing-for-social-benefit-through-data-trusts.pdf
[74] Manohar,S; (2019).*Responsible data sharing for public good: Theoretical bases and policy tools,*Aapti Institute, Retrieved May 27, 2022 from https://thedataeconomylab.com/2020/07/31/data-sharing-for-public-good-theoretical-bases-and-policy-tools/
[75] Viljoen, S., (2020).*Democratic Data: A Relational Theory For Data Governance*. Yale Law Journal (forthcoming). Retrieved May 27, 2022 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3727562
[76]Open Data Institute (2021, June 25). *What are 'bottom up' data institutions and how do they empower people?* Retrieved May 27, 2022 from https://theodi.org/article/what-are-bottom-up-data-institutions-and-how-do-they-empower-people/
[77] Open Data Institute (2022). *Bottom up data institutions: Mechanisms for government support.* Retrieved from May 27, 2022 from https://theodi.org/wp-content/uploads/2022/03/ODI-2022-Bottom-up-data-institutions_Mechanisms-for-government-support.pdf
[78] For information about Aapti's research on data stewardship, please visit https://thedataeconomylab.com/
[79] A number of use-cases of operational stewards working across a variety of sectors have been documented as a part of Aapti's 'Tracking stewardship' series, accessible here - https://thedataeconomylab.com/videos/

coded the considerations in the Stewardship Mapper[80] and Navigator[81]- both of which constitute useful tools for AI researchers and developers looking to explore rights-preserving mechanisms for data governance.

Therefore, the problem of lack of diversity within the AI research and development community and its systemic concerns as previously mentioned can be addressed through data stewardship which is aimed at putting communities first and affording people greater agency in governance of their own data.[82]

Perspectives on 'data ownership'

Dominant discourse within the digital economy's regulatory landscape is riddled with metaphors that consider data to be a "resource" or "property" that can be traded or exchanged in return for services or money.[83] Thus, when users engage with digital service providers or platforms, data sharing is legitimised through "consent notices" and in effect, the ownership of data is transferred unto the data receiving/processing entity. But, such consent provisioning is widely critiqued as it fails to furnish users with meaningful control over their data, without a reasonable understanding or explanation of what their data might be used for.

Further, this narrow approach to data regulation risks commodifying data,[84] ignoring the power asymmetries that have come to characterise the digital economy. Data producers (individuals and communities) have little control over how their data is used by data holders (corporations, public agencies) within the rubric of this "ownership" approach in ways abrogate the rights of users over data.[85] This approach is also problematic inasmuch it considers that privacy and associate data rights can be owned and hence, are alienable - an implication that is essentially untenable when international law and jurisprudence have come to regard privacy as a fundamental and inalienable right.[86]

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[80] The Stewardship Mapper is available at https://thedataeconomylab.com/mindmap/

[81] The Stewardship Navigator is available at https://thedataeconomylab.com/tools-and-guides/#navigator

[82] Nanda, A; & Kapoor, A; (2021, July 22). *Understanding Non-Personal Data sharing : A principle-first approach.* The Date Economy Lab, Aapti Institute. Retrieved May 27, 2022 from https://thedataeconomylab.com/2021/07/22/understanding-non-personal-data-sharing-a-principle-first-approach/

[83] Singh, P. J., & Gurumurthy, A. (2021, July 8). *Economic governance of data: Balancing individualist-property approaches with a community rights framework*. SSRN. Retrieved December 7, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3873141

[84] Hugenholtz, P. B. (2018). Against 'Data Property'. In H. Ullrich, P. Drahos, & G. Ghidini (Eds.), Kritika: Essays on Intellectual Property (Vol. 3, pp. 48-71). (Kritika; Vol. 3). Edward Elgar. https://doi.org/10.4337/9781788971164.00010

[85] van de Waerdt, P. J. (2020, June 10). *Information asymmetries: Recognizing the limits of the GDPR on the data-driven market*. Computer Law & Security Review. Retrieved December 7, 2022, from https://www.sciencedirect.com/science/article/pii/S0267364920300418

[86] Diggelmann, O., & Cleis, M. N. (2014, September). *How the Right to Privacy Became a Human Right*. Oxford Academic Human Rights Law Review. Retrieved December 7, 2022, from https://academic.oup.com/hrlr/article-abstract/14/3/441/644279

> Scholars offer that the erosion of user control over data props up digital enclosures that ultimately disregard data's non-rivalrous nature.[87] Consequently, there is a pressing need to move away from the "ownership" approach to data regulation, in favour of a paradigm that recognises users' rights over their data. This rights-based approach focalises decisional autonomy[88] of users in ways that enable them to exercise control over who has access to their data, how it is used, for what purposes and to whose benefit. Data rights offers a much more comprehensive system of protection than ownership because these rights continue to exist even after users share their data with platforms or public agencies.[89] In such a context, data stewards can function as vehicles to realise one's data rights and enable data subjects to effectively exercise control over their data through a well defined system of participatory data governance.

Figure 1: Perspectives on 'data ownership'

Function and practices of stewardship within AI systems

The Govlab[90], an initiative that develops and tests prototypes for new pathways to leverage technology and data, defines responsibilities of data stewards to include collaborating with external parties to help unlock the inherent value of data,[91] managing data responsibly and preventing harms to data generators and other stakeholders, and ensuring relevant parties act upon the insights generated through data.

In fact, data stewards play several roles - from engaging with the community, conducting data audits and risk assessment, implementing a more responsive approach to reaching out to partners who wish to use data for specified and pre-approved purposes.[92] Data stewards also ensure higher levels of accountability, and consider the ethical implications of data use in specific circumstances and contexts, while participating in externally validated public impact measurements.[93]

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[87] Fia, T. (2021, April 1). *An alternative to data ownership: Managing access to non-personal data through the commons*. De Gruyter. Retrieved December 7, 2022, from https://www.degruyter.com/document/doi/10.1515/gj-2020-0034/html

[88] Sinha, A., & Basu, A. (2021, August 13). *Why metaphors for data matter*. Bot Populi. Retrieved December 7, 2022, from https://botpopuli.net/why-metaphors-for-data-matter/#:~:text=Metaphors%20propping%20up%20materialistic%20understandings,information%20it%20provides%20to%20states

[89] Viljoen, S. (2020, November 23). *A relational theory of Data Governance*. SSRN. Retrieved December 7, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3727562

[90] The GovLab (n.d). Retrieved May 28, 2022 from https://thegovlab.org/about.html

[91] Coyle, D., & Manley, A. (2021, August 5). *The social value of data*. Bennett Institute for Public Policy. Retrieved May 28, 2022, from https://www.bennettinstitute.cam.ac.uk/blog/social-value-data/

[92] Sridharan, Kapoor & Manohar (2021). Aapti Institute. *Health data stewardship: Learning from use cases.* Retrieved May 28, 2022 from https://thedataeconomylab.com/2021/09/29/health-data-stewardship-learning-from-use-cases/

[93] GovLab. (2020, March). *Wanted: Data Stewards*. The Governance Lab. Retrieved May 28, 2022, from https://thegovlab.org/static/files/publications/wanted-data-stewards.pdf

Furthermore, there is a need to build trust in the data ecosystem to enable data sharing for public benefit. Lack of user control over data leads to abuses of privacy and a resultant decrease in trust.[94] Further lack of transparency[95] on how data is used to train algorithms that feed into automated decision making serves to only further alienate users. Data stewards have the ability to build trust[96] in AI systems by providing users with insights on how their data is used and exercise meaningful control such that they are engaged throughout the value chain of data - rights from its collection, processing and sharing with third parties.[97]

Stewarding function	Explanation	Example
Ensures accountability	Build high quality datasets for analysis, assess the risks of AI deployment	Landing Lens enables ML engineers to collaborate, test, confirm and deploy deep learning models based on high quality and verified data. The platform manages many models, helps increase accuracy of the system, identifies issues and helps track the efficiency of AI projects.
Enables participatory governance	Create transparent and participatory mechanisms to provide individuals with meaningful control on how data is used	iNaturalist unlocks the social value of data by creating a wealth of knowledge about local biodiversity and harnesses deep neural networks on the database created with active help and participation of its member community.

[94] Open Data Institute. (2018). *ODI survey reveals British consumer attitudes to sharing personal data*. The ODI. Retrieved December 7, 2022, from https://theodi.org/article/odi-survey-reveals-british-consumer-attitudes-to-sharing-personal-data/

[95] Mulgan, G., & Straub, V. (2019). *The New Ecosystem of trust*. Nesta. Retrieved December 7, 2022, from https://www.nesta.org.uk/blog/new-ecosystem-trust/

[96] Pentland, A., & Hardjono, T. (2020, April 30). *Building the new economy: Data cooperatives*. Works in Progress. Retrieved December 7, 2022, from https://wip.mitpress.mit.edu/pub/pnxgvubq/release/2

[97] World Economic Forum. (2019). *Rethinking personal data*. World Economic Forum. Retrieved December 7, 2022, from https://www.weforum.org/reports/rethinking-personal-data/

Reduce bias	Create frameworks for data governance that is sensitive to institutional discrimination	Data for Black Lives has developed a governance framework with data scientists, technical experts and policy working groups to undermine the discriminatory effects of technology
Increases representation	Make datasets more representative to overcome the problem of siloed datasets.	Commonvoice[98],helps make voice recognition open and accessible to all by offering a public dataset of voices of volunteer contributors from around the world. The platform provides an open source database that may be used to train machine learning models and build innovative applications on top of it.

Figure 2: Functions fulfilled by data stewards

For instance stewards like OpenHumans[99] adopt a participatory approach to research on health and education wherein members of the platform are engaged through the lifecycle of a study - from framing research questions to being consulted periodically on the progress of the research while retaining granular consent frameworks to control access to their data. Members are free to withdraw from participating in a specific research project by revoking access to their data at any time. In the event of non-compliance with the pre-defined data governance protocols of OpenHumans, the specific research project is black-listed and de-platformed.[100]

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[98] Commonvoice (n.d) Retrieved May 28, 2022 from https://commonvoice.mozilla.org/
[99] Open Humans Foundation (n.d.). Retrieved May 28, 2022 from https://www.openhumans.org/
[100] Ball, Mad [Aapti Institute] (2021). "Data Economy Lab | Tracking stewardship: Open Humans - Empowering citizens, patients and researchers through data" [Video]. Youtube. Retrieved May 28, 2022 from https://youtu.be/L9GHP-u0gK4

Other examples include Data for Black Lives, an early-stage steward, which is working to bring recognition to the experience of Black communities who have been marginalised through the action of algorithms.[101] The steward hopes to subvert the discriminatory effects of technology by creating a framework for data governance that is sensitive to institutional discrimination. This framework is developed within the Data for Black Lives policy working group, providing a space for lawyers to work alongside data scientists and technical experts to actualise reliable pathways to data governance.[102]

In the context of AI, data stewards can assist in creating a secure data pipeline for research, preparing data for analysis, assessing challenges and risks of AI development as well as deployment, implementing steps to avoid potential bias and ensure greater accuracy of probabilistic systems. This is particularly instrumental for a data-centric approach to building AI systems, foregrounding the necessity for quality and reliable data that can be supplied by trusted stewards. For instance, Landing Lens[103] is a steward which offers a platform to build and operationalise AI solutions in the context of industrial automation and manufacturing. Landing Lens enables ML engineers to collaborate, test, confirm and deploy deep learning models based on high quality and verified data. The platform manages many models, helps increase accuracy of the system, identifies issues and helps track the efficiency of AI projects.

Similarly, Neptune[104] is a metadata store that was developed for AI researchers, data scientists and production teams wherein the hub logs, stores, displays, organises and compares all metadata generated in a machine learning cycle and helps keep track of the datasets used by a company.

iNaturalist[105] is another platform that allows a global community of naturalists and scientists to share their observations of nature. This platform responsibly stewards sensitive data and harnesses deep neural networks on a database of images that have been labelled by the site's community of experts. Lastly, iNaturalist unlocks the social value of data by creating a wealth of knowledge about local biodiversity with active help and participation of its member community.

Commonvoice[106], an initiative by Mozilla, helps make voice recognition open and accessible to all by offering a public dataset of voices of volunteer contributors from around the world. The platform provides an open source database that may be used to

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[101] Data for Black Lives (n.d.). Retrieved May 28, 2022 from https://d4bl.org/
[102] Ibid.
[103] LandingLens (n.d). Retrieved May 28, 2022 from https://landing.ai/platform/
[104] Neptune.ai (n.d). Retrieved May 28, 2022 from https://neptune.ai/
[105] iNaturalist (n.d) Retrieved May 28, 2022 from https://www.inaturalist.org/pages/help
[106] Commonvoice (n.d) Retrieved May 28, 2022 from https://commonvoice.mozilla.org/

train machine learning models and build innovative applications on top of it. Commonvoice attempts to free siloed datasets that are concentrated in a few companies, thus disrupting the power asymmetry that exists between data producers (individuals and communities) on the one hand and data users (corporations) on the other. Lastly, the platform also attempts to solve for underrepresentation of non-English speakers and people of colour by mobilising people everywhere to share their voice.

These use cases highlight the need for engaging communities and ensuring accountability in the process of data use by AI researchers and developers. They serve to demonstrate that development of AI systems is intricately wedded to data governance, setting the stage for participatory governance of AI systems itself. This argument corresponds to insights from an AI ecosystem survey[107] conducted by Alan Turing Institute[108] and AI Council[109]. Respondents stated that citizen needs should be embedded into the governance frameworks of emerging technologies which will help cement public trust around AI, reduce bias inherent to AI models and evaluate acceptable thresholds for errors in AI systems, if any.[110] Particularly, the survey surfaced the need to prioritise human engagement and social research into deployment of AI systems.[111] This reiterates the significance of adopting a procedural justice lens while contemplating frameworks for regulation of AI so as to democratise the value and benefits derived from such technological innovation.

The way forward

"Detective Thorn: It's people. Soylent Green is made out of people. They're making our food out of people. Next thing they'll be breeding us like cattle for food. You've gotta tell them. You've gotta tell them!"

- **'Soylent Green', (Dir.) Richard Fleischer, 1973**

Although one might wonder about the relevance of 'Soylent Green' - a 1973 futuristic dystopian thriller with foreboding implications for human existence - for AI governance, the authors of this paper argue that it bears crucial insights nonetheless. For one, the movie mounts a powerful critique of over-consumption engendered by exploitative

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[107] The Alan Turing Institute (2021, June). *AI Ecosystem survey: Summary Report.* Retrieved May 28, 2022 from https://www.turing.ac.uk/ai-ecosystem-survey-summary-report
[108] The Alan Turing Institute (n.d) Retrieved May 28, 2022 from https://www.turing.ac.uk/
[109] AI Council (n.d). Retrieved May 28, 2022 from https://aicouncil.org/
[110] Ibid
[111] Ibid

modes of production which treats human beings as mere 'fodder' for the larger capitalist machinery.[112]

More significantly, Soylent Green illustrates the violence inflicted upon humans who have been consistently and systemically disembodied and disempowered in ways that prevent them from taking control of their own lives. Herein lies a remarkable metaphor for human existence in datafied societies - people are organised and governed by their production of digital data through opaque and ill-advised ways by corporations and governments alike.[113] Their existence, often, is reduced to their digital footprints that are 'fed' into the training of AI models, invisibilizing their role as originators of data.

The account of epistemic violence explained above is characteristic of AI systems which is further complicated by technical issues within contemporary axes of research and development in AI. This is because AI builders are disproportionately concerned with manipulating the models and/or techniques used to build these systems. [114] This kind of limited focus on models used to train AI application calls into question the veracity of such applications. It risks ignoring a more fundamental artifice of AI development which is that AI systems are as worthy and reliable as the datasets used to produce it. As a result, there is less focus on acquiring and preparing the requisite datasets that underscore AI development.[115]

However, the move towards a participatory paradigm for data governance, such as data stewardship, promises to remedy the ills of existing methods of AI development and promote recognition for data rights of individuals and communities. Stewards, by virtue of their deep links with a diverse community of data producers, can curate, standardise and supply representative datasets to train AI models, reducing the scope for bias.[116] Due to their varied functional and operational structures, stewards can facilitate enhanced control over one's data, outlining the terms for data use in AI development and demand accountability from erring data users through well-defined mechanisms

[112] Yates, M. (2019, July 23). *Crisis in the era of the end of cheap food: capitalism, cannibalism, and racial anxieties in Soylent Green*. Taylor & Francis Online. Retrieved May 28, 2022, from https://www.tandfonline.com/doi/abs/10.1080/15528014.2019.1638125

[113] Dencik and Kaun (2020). Global Perspectives - University of California Press. *Datafication and the Welfare State.* Retrieved May 28, 2022 from https://online.ucpress.edu/gp/article-abstract/1/1/12912/110743/Datafication-and-the-Welfare-State?redirectedFrom=fulltext

[114] Miller, K. (2022, January 25). *Data-Centric AI: AI Models Are Only as Good as Their Data Pipeline*. Stanford HAI. Retrieved May 28, 2022, from https://hai.stanford.edu/news/data-centric-ai-ai-models-are-only-good-their-data-pipeline

[115] Ibid

[116] Sridharan, Kapoor & Manohar (2021). Aapti Institute. *Health data stewardship: Learning from use cases.* Retrieved May 28, 2022 from https://thedataeconomylab.com/2021/09/29/health-data-stewardship-learning-from-use-cases/

for grievance redressal.[117] Embedding data stewardship as a core tenet of AI governance frameworks is indispensable to ensure that community consent and participation, privacy protection and broad-based public benefit from data use are the guiding imperatives for AI research development.

The impetus to embed data stewardship finds resonance within contemporary policy discourse emerging from diverse quarters around the globe. To begin with, the European Parliament's Data Governance Act[118] embraces data intermediaries to "play a key role in the digital economy", facilitating "the aggregation and exchange of substantial information". Intermediaries are proposed as vehicles for data subjects to exercise their rights vested in the General Data Protection Regulation, 2016 and gain meaningful "control over data pertaining to them". Specifically, the Act makes reference to models of stewardship such as data cooperatives[119] as mechanisms for participatory data governance, so that individuals and communities can channelise data use for socially beneficial purposes. In this context, data intermediaries such as data stewards can significantly reduce the cost of data acquisition for AI builders while ensuring quality and standardisation of data for research and development. Most crucially, data stewards are critical conduits in the AI ecosystem that can enable responsible and trustworthy use of data, as seen through examples such as CommonVoice[120] and iNaturalist.[121]

Other European legislations such as the Artificial Intelligence Act, 2021[122] adopt a risk-based classification of AI systems, with accompanying obligations and enforcement tailored to the level of risk attributed to a particular system. Those AI systems classified as 'high-risk' applications such AI integration for credit scoring that results in denial of essential services or biometric surveillance for law enforcement come with significant compliance requirements - from ex ante AI Impact Assessments by multidisciplinary teams to conformity assessment audits by external parties and lastly, human oversight for post-market monitoring of the application.[123] In such a milieu, data stewards can perform the role of technically qualified and autonomous third parties who can not only participate in ex ante assessments, but also be continuously involved in the monitoring

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[117] Ibid

[118] European Parliament. Data Governance Act, 2021. Clauses 22 - 26. Retrieved May 28, 2022 from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0767

[119] Ibid.

[120] Commonvoice (n.d) Retrieved May 28, 2022 from https://commonvoice.mozilla.org/

[121] iNaturalist (n.d) Retrieved May 28, 2022 from https://www.inaturalist.org/pages/help

[122] European Parliament. Artificial Intelligence Act, 2021. Retrieved May 28, 2022 from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206

[123] Kop, M. (2021, September 28). *EU Artificial Intelligence Act: The European Approach to AI*. Stanford Law School. Retrieved May 28, 2022, from https://www-cdn.law.stanford.edu/wp-content/uploads/2021/09/2021-09-28-EU-Artificial-Intelligence-Act-The-European-Approach-to-AI.pdf

and evaluation of the social consequences produced by deployment of AI systems. Member communities steered by data stewards could prove to be a powerful source of human oversight into AI systems, enabling participatory governance of AI applications in the process. A steward, like Data for Black Lives,[124] is best posed to perform such an oversight role and mitigate the discriminatory effects of automated decision making systems.

Further, in India, policymakers are mulling the regulation of anonymised and pseudonymised data through the introduction of the Non-personal Data Governance Framework, 2020.[125] Among other things, the NPD Framework seeks to usher in an era of user-driven data sharing for use in policy making, planning and development, research and innovation in emerging technologies such as AI. Data in anonymised form is considered to be owned by communities which, through mechanisms of delegated representation, can direct the use of their data for specific purposes, including the development of AI applications.[126] Data stewards can function as representatives of communities and ensure that their anonymised data is used in accordance with their best interests, in ways that enhance collective welfare. Additionally, data stewards bear duties of care and loyalties towards their member communities, such that they are compelled to hold data users (like, builders of AI applications) accountable to the Framework.[127]

While these policy developments are encouraging and are suggestive of growing appetite for regulating AI, there is yet much to be done. It is imperative that lawmakers across jurisdictions abandon the prevailing top-down approach to regulating AI applications and engage with communities which are at the receiving end of AI's adverse ramifications. A truly reflexive, bottom-up praxis of policy making for AI has now been made possible through the practices of data stewardship outlined in this paper, delineating and securing a position for human beings in a world that seeks to treat them as mere 1s and 0s.

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[124] Data for Black Lives (n.d.). Retrieved May 28, 2022 from https://d4bl.org/

[125] Ministry of Electronics and Information Technology, Govt. of India. Revised Report by the Committee of Experts on Non-personal Data Governance Framework, 2020. Clause 7.1, 7.6, 7.7 Retrieved May 28, 2022 from https://static.mygov.in/rest/s3fs-public/mygov_160922880751553221.pdf

[126] Ibid.

[127] Ibid.