

Smart Borders Reimagined with Blockchain Technology

Introduction:

"Borders are no longer merely lines of demarcation separating distinct sovereign entities" (Mbembe 2019). Borders represent power. Borders represent the control on determining who is "normal" and who are the "outliers". Mere lines of separation are now being reimagined as smart with a decision-making takeover by the technological systems. Digital borders are such a techno-systemic framework where migrants are datafied and decisions on their migration rely on advanced deep learning technologies. Some examples include collecting asylum seekers' fingerprints for a database, classifying target groups based on the features of their data and moving towards AI systems being the decision makers in migration management (Booth, 2024).

The authoritative use of such technological systems in deep borders dehumanises and holds an indirect power over people who merely want to move across the "free world". This essay questions if such usage is the only norm in this fast-moving digital world and proposes an alternative technology with blockchain for better and fair construction of smart borders. Blockchain technology allows the migrants to be in control of their data while also promising the protection of the borders that authorities seek. Similar to any other technology, immigration-specific blockchain has its own advantages and limitations including planetary data turbulence. This essay aims to highlight all such with a core focus on the idea it stems from, which is the late 90's famous book "The Sovereign Individual" (Wikipedia, n.d.). The essay highlights the concept of decentralised power with the control over one's data which will also allow us to make kin with the machines. Ultimately, the essay gives a glimpse of making the future path dependent on the global acceptance of the techno-systemic frames which will either be enforcing historical inequalities or decentralising the continuing power of the modern world.

Digital borders:

Borders are treated as mediators as they emphasize the relationship between technologies and societies and the construction of entities and events situated between them (Dijstelbloem 2021 Chapter 1). However, borders themselves are movable entities as they can be redrawn and transformed when new control mechanisms are deployed (Dijstelbloem 2021 Chapter 1). That happens when there is hegemony: a global control of migration as there is a view of the planet as a site of

domination (Chouliaraki 2022 Chapter 1). Years back, the dominance was established by Western hegemonies by using physically violent intrusion detection systems such as electronic fences (Chaar-López 2019). At present, it is mainly established through indirect control over one's data, leaving them completely vulnerable and exposed to authority. The hypocrisy of such acts where the nation focuses more on migrant data while they relatively know less about the origins showcases the fantasy of power. Such surveillance through data stems from the symbolic border of "otherness" which implements exclusion and inequality (Chouliaraki 2022 Chapter 1). The data which will further be used in decision-making technologies will end up reinforcing historical prejudices (Amoore 2024). Practices like these which make the migrants rethink their want to move around the world at the expense of exposing many parts of their lives make us think about whether this will be the future of the technological world.

Datafication:

Datafication in borders themselves incorporates inequalities as they affect time. "For some travellers, automated borders at airports speed up checking in and passport control; for others, borders mean waiting for papers and queuing at embassies" (Dijstelbloem 2021 Chapter 1). It shows how automation increases efficiency and security but also reinforces power imbalances. It wouldn't be a serious concern of surveillance if it was a basic information exchange for verification. Anything and everything can become border data. An Israeli security company provides tools for smartphone data extraction to law and border enforcement agencies across the world. The smartphone data is used to identify, verify and map flight routes as well as identify smuggler networks (Pfeifer 2021). While these practices ensure high-tech security, they also demean and put down other target groups. The U.S. government implemented instant DNA testing at the border to show genetic kinship when a family arrives for prevention against human trafficking (GxJ Lab, n.d.). When the authorities turn to such datafication techniques, there emerges a resistance with examples such as Asylum seekers burning their fingerprints to escape getting into the databases (Harriet Grant, 2011).

Often time unfair, unnecessary data and its consequent resistance make us think about what leads to the building of such techno-systemic frames. The notion of bodies, tools, and institutions understood as endlessly optimizable makes a core part of this (McKelvey 2021). But are there no positive ways to optimize such technologies not only in terms of just efficiency but also in terms of fairness? The deep time of migration

infrastructures is indeed characterized by the intersections of what is built, done and thought (Leurs 2022). If there exists a vision of building technologies where the individual has the major control and such is built and implemented, fairness may indeed be achieved to some extent. Blockchain technology is one such possibly impossible solution to the border data problem.

Blockchain at Borders:

Blockchain is a distributed ledger technology [DLT] that allows secure, transparent and tamper-proof recording of data. Blockchain is famous for its secure way of storing immutable data as hashes with multiple copies of the data stored in different machines across the world. So the different copies need to be matched for the data to be valid. This promises the safety of the data as if someone tries to alter a record on one node/machine, the other nodes would prevent that from happening by comparing the block hashes. Since it also has the feature of recording all the events with timestamps, any break into the data can be traceable. This makes the storage of the data much more safer as it is hard to hack all the distributed nodes and leave without a recorded trace (Adam Hayes, 2024).

Due to all these high-tech features, blockchain and cryptocurrency bloomed in the late 2010s, particularly in the finance sectors. Countries like Estonia and Dubai have embraced blockchain in many sectors like health, finance etc, (U.AE, n.d.)(PWC n.d.). But how does such a technology show promise in border management? Blockchain when combined with a cryptographic method called Zero-Knowledge Proof (ZKP) ensures the safety of the individual's data and provides strong support against security threats. Zero-knowledge proof provides a verification mechanism where an individual can verify their data to the authority without actually revealing all their data. In this way, we can accomplish privacy on a public blockchain (Alex Williams, 2024).

In simpler words, on the governance side, the authorities can issue the passport/visa and store them as hashes on the blockchain. Each record will be timestamped and immutable, ensuring no unauthorized alterations. The copies of this data will be distributed and stored across multiple nodes worldwide. These features will help the border authorities instantly verify the traveller's document by comparing the document's hash on the blockchain and additionally, it will prevent fraud as any attempt to forge or tamper the immigration data can easily be detectable. On the travellers' side, the zero-knowledge proof comes into the picture. When crossing

borders, the migrant can just use cryptographic proof to confirm that their document is valid without revealing any data such as their address or travel history. This provides the travellers with enhanced data privacy and reduces the demeaning historical migrant surveillance process.

Advantages of the alternative techno-systemic frame:

Blockchain in border management is not a new concept. Many scholars have been envisioning the use of this technology in digital borders since the bloom (Htet 2020)(Panchamia 2017)(Binjola 2022). They have been quoting the many advantages of the technology which can be highly useful for fake passport/visa detection, improving speed and efficiency in borders and privacy of the data. The main advantage of blockchain over the current paperless immigration techniques such as eVisa is that unlike the authority storing huge migrants' data on a centralised database, this gives control to the migrant as to what to share and what not to. The current trend of datafication can be controlled with this decentralised technology, essentially also decentralising power.

Blockchain in borders promises enhanced security as it ensures data integrity and it promotes transparency thereby reducing fraud and corruption in the migration process. It removes intermediaries and reduces dependency on centralised authority. Efficiency and privacy of sensitive information are added benefits of this system.

Limitations of the alternative techno-systemic frame:

First and foremost, the distributed feature of blockchain technology leads to an increased technical complexity with a requirement of significant technical expertise and huge infrastructures. It also relies on the technical capabilities of individuals to accomplish the cryptography proof techniques in order to not reveal the exact data. Blockchain only promises enhanced security compared to current technologies as they can still be penetrable in certain circumstances. Difficulties may also arise if people lose access to their cryptographic keys. Due to blockchain's immutability, data permanence may also be a potential struggle if there's outdated or unnecessary information. Additionally, it can be slower than traditional systems in high-traffic situations like busy international airports. So current public blockchains may struggle with the volume of border data due to limited throughput and network congestion. Environment concerns such as energy consumption also impact the sustainability of the technology.

Above everything else, there will be planetary data turbulence (Lehuedé 2024) while deploying blockchain in the borders. Planetary data turbulence in this aspect is the friction caused by decentralisation and the turbulence caused by the struggle for mutual consensus. As the blockchain challenges centralised control, it creates friction with traditional power structures like governments and corporations. As it can either be struggles with the nations or struggles between the nations, it creates global friction. Such decentralised systems require mutual consensus among all the decentralised participants leading to conflicts and governance challenges. Bitcoins are one such great example of this turbulence. Similarly, borders involve global actors. Even if there is a great motivation for a decentralised system in one nation, it still may not be made possible in reality due to multiple points of conflict. All these potential conflicts make the blockchain at Borders vision a utopian world reality.

Artificial Intelligence:

Blockchain technology despite being popular in the late 2010s is being neglected now as most research and industries focus on Artificial Intelligence since OpenAI's breakthrough. Every field ranging from recruitment to immigration is incorporating AI systems, particularly in decision-making spaces in order to handle huge volumes of data and provide efficient outcomes. Many countries and organisations that had a blockchain strategy or roadmap, now have an AI roadmap. This shows us how the market easily shifts to the next new thing even if the older one shows potential. The use of AI may be a potential barrier for adopting blockchain technology in the border systems as AI systems thrive on data and blockchain is all about maintaining the privacy of the data. Additionally, AI systems are already being considered in the decision-making spaces to determine the migrant's approval based on the features of their data. If blockchain gets considered for implementation in borders, it severely challenges the current structure as it prioritizes travellers' data. Once again, as mentioned earlier in the essay, such conflicting technologies lead to global friction potentially undergoing a never-ending debate on what system to execute at the borders.

The Sovereign Individual:

The late 90's book the Sovereign Individual book (Wikipedia, n.d.) was a guide to how to survive and thrive during the collapse of the welfare state. The authors argued that with the rise of the information society, the individual would be freed from the

oppression of government and the drags of prejudice. The concept of sovereign individuals is that in the near future, there will be less dependency on authorities and more focus on productivity, sustainability and morality. It indicates the individual is trusted upon themselves to manage their identity in the emerging world. It is similar to Town's idea of how people envision media not just as a transport but as a medium for transforming themselves (Towns 2022). In these concepts, the individual holds the maximum power.

Blockchain on borders relies mainly on these ideologies that individuals can and should manage their own data thereby preserving their identities. The decentralisation of power in immigration reduces the dependency on historical power structures. Such a system creates a new form of ideology where the historically vulnerable ones will no longer continue to be one by challenging all existing power narratives. The importance should also be given to focusing on not creating a pseudo-individual empowerment ideology, instead fostering a fairer power distribution strategy.

Making kin with machines:

The indigenous view of advanced technology is to not fear them but to treat them with love as part of complex kin networks (Lewis 2018). This view may seem impossible in the current world where there are many mishaps with the help of machines. However, the key point here is that the mishappenings occur with the help of machines and not by machines themselves. The violence and discrimination at the borders with deep learning technologies are also due to the actors reinforcing the historical prejudices with dominance rather than the machines going against humanity.

Making kin with the machines will be always harder if there is no friendliness in the spaces which make use of these machines. But the vision might indeed be made relatively possible if the right technology is used in the right space in the right way. Hayles's words on a world with posthumans (Hayles 2000 Chapter 1) cannot be truer than for this situation. "My dream is a version of the posthuman that embraces the possibilities of information technologies without being seduced by fantasies of unlimited power and disembodied immortality, that recognizes and celebrates finitude as a condition of human being, and that understands human life is embedded in a material world of great complexity, one on which we depend for our continued survival". It makes us think that deploying advanced technological systems and constructing complex techno-systemic frames are indeed possible when the

complexity of human life is taken into account. Border systems can be humanised by maintaining the integrity of human life while not demeaning them to data points.

Path of the future:

PayPal co-founder and famous American entrepreneur Peter Thiel wrote the following in the preface of the 2020 edition of the Sovereign Individual book: "In truth, the great conflict over our megapolitical future is only just beginning. On the dimension of technology, the conflict has two poles: AI and crypto. Artificial Intelligence holds out the prospect of finally solving what economists call the "calculation problem": AI could theoretically make it possible to centrally control an entire economy...Strong cryptography, on the other pole, holds out the prospect of a decentralized and individualized world...The future may lie somewhere between these two extreme poles. But we know the actions we take today will determine the overall outcome."

Despite blockchain being a utopian dream, it could be the reality of many spaces including the borders in the later years just like AI in decision-making spaces now. If people are constructing closed-loop data centres and explainable AI for moral and environmentally safer systems, there is a possibility of blockchain research being implemented in a better and safer way across the world. This requires a planetary governance approach which many scholars are turning towards at present. Like Thiel said, the future indeed lies in the hands of global cooperation on taking the best and fair actions in deploying technologies thereby creating a societal growth rather than a selective one.

Conclusion:

Digital borders are a dominant techno-systemic framework of the present world where historical inequalities are being reinforced while trying to offer efficiency. The essay examined the complexities and injustices involved in the datafication and surveillance of the migration process. Current deep learning-based border technologies and centralised databases dehumanise migrants by reducing them to mere data points and potentially providing decisions on their migration with just their feature characteristics. The essay proposed an alternative, blockchain technology to reimagine migration management and make the process more fair.

Blockchain technology with its decentralisation, privacy and transparency features challenges the existing power structures. The design of a blockchain-based border

system aligns with the conceptual principles rooted in the sovereignty of individuals thereby ensuring fairness and accountability. This vision indeed has many limitations like any other technological system. It faces struggles with technical need and complexity, environmental concerns and ultimately navigating the planetary data turbulence created by decentralising traditional power structures. Furthermore, the dominance of AI systems in border management highlights the global priorities of technological innovation and use in crucial spaces.

However, despite all the limitations and utopian dream tendencies of blockchain, the future relies on the hands of global cooperation and acceptance. Creating a complex kinship network with the machines by choosing the right technology in the right space leads to reimagining existing power dynamics and creating equitable systems. Ultimately, the essay advocates for the pursuit of fairness in border technologies as not just a technical endeavour but also as a societal commitment to a future with shared prosperity. Such pursuits require a planetary governance mechanism where the focus will be on the holistic development of the planet rather than the centralised power development.

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