This abstract was submitted to and presented at CCRC International Conference 2022.

Building the Metaverse: 'crypto states' and corporates compete, down to the hardware

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INTRODUCTION

Metaverse investor and writer Matthew Ball estimates the metaverse could be worth up to $30 trillion in the next decade (Knight, 2021). How "the Metaverse" is built and governed will determine societal outcomes in the near future and for generations to come. The Metaverse describes virtual worlds that break distinctions between digital and physical space (Dionisio, Burns, & Gilbert, 2013). The concept is aptly depicted in Neil Stephenson's 1992 Novel "Snow Crash" and the book turned film "Ready Player One" as virtual worlds where people and algorithms socialise, conduct commerce, and live (Cline, 2012; Stephenson, 1992). There are competing visions of the Metaverse. One is a privatised, centralised future where big corporates, such as Facebook's "Meta", determine how people "socialize, learn, collaborate and play" (Facebook, 2021b). The other is predicated on decentralised technological architecture, such as blockchain-based digital infrastructure, where distributed, objective-aligned communities known as "Decentralised Autonomous Organisations" (or DAOs) build their own worlds. One example of a distributed Metaverse being built is "KONG Land". KONG describes itself as a "crypto state", meaning a virtual polity which can collectively negotiate, fund, build, maintain, and reproduce without relying on external resources (Srinivasan, 2021). This piece argues that the battle for the future of the metaverse comes down to hardware, specifically, microchips. I explore the world building practices of KONG Land through the lens of the digital and physical, visible and invisible, and public and private. Using the ethnographic methods of digital ethnography and interviews, I identify the dynamics of threats and resilience in the concept of the metaverse and microchips as a public good. As the next generation of digital integration, research that uncovers the dynamics of network ownership and control in 'the Metaverse' is an important contribution to sociology and public policy.

LINKING DIGITAL AND PHYSICAL

An exploration of the risks and opportunities of "the Metaverse" and decentralised technologies would be incomplete without considering hardware. Sociologist Bruno Latour famously posits the question "Where Are the Missing Masses?", referring to the seminal importance of physical elements in the analysis of sociotechnical artefacts (Latour, 1992). Just as physical infrastructure such as roads and bridges undergird modern society, so too does digital infrastructure undergird society from software applications, to internet service providers, to computing hardware. Anthropological literature traces a range of ways that infrastructure is often "anything but invisible" (Larkin, 2013). In the same way, decentralised technologies are not only visible at the network layer in terms of public blockchain transactions on a "block reader", or content requests and servers on IPFS network but also at the hardware level. At the macro scale, this includes cryptocurrency mining hardware (servers that run software) and even satellites (Nabben, 2021b, 2021c). At the micro level, it

comes down to the silicon in microchips. Latour argues that physical artefacts are deliberately designed to shape and constrain human behaviour, including the decisions we make and the way we move through the world (Latour, 1992). This is also true of the way that access in and out of the metaverse is constructed and governed.

The two major competing visions for the metaverse are private versus public. "The metaverse" describes virtual worlds that break distinctions between digital and physical space (Dionisio et al., 2013). The metaverse has been described as "a massively scaled and interoperable network of real-time rendered 3D virtual worlds which can be experienced synchronously and persistently by an effectively unlimited number of users, and with continuity of data, such as identity, history, entitlements, objects, communications and payments" (Ball, 2021). The private metaverse is a centralized future where big corporates such as Facebook's "Meta", whereby value is extracted from users as consumers. This metaverse is both virtual reality accessed via headsets, such as "Oculus", that project a digital world, as well as augmented reality, accessed via face wear, such as glasses, that project digital things over the physical world. In contrast, the public metaverse is a vision of numerous, decentralized digital worlds that people can move between that are built and owned by participants. The public metaverse is predicated on open, interoperable decentralized technological architecture. It integrates a suite of crypto community innovations in decentralized finance (DeFi) for payments and NFTs for digital in-world items that hold real value. Furthermore, the public metaverse is governed and owned by networks of "decentralized autonomous organizations" (or DAOs) where distributed, objective-aligned communities collectively own, govern and work in digital worlds (Nabben, 2021a).

Facebook has made a number of attempts to co-opt and scale cryptocurrency community innovation. First, Facebook attempted a blockchain and cryptocurrency play with Libra (rebranded to Diem). Now, crypto people are once again riled up about Facebook for trying to steal and monopolize another Web 3.0 (the participatory web) idea and monopolize it, as Facebook announced that its metaverse will leverage non-fungible-tokens (NFTs) to represent and exchange digital assets (Morris, 2021; Tan, 2021). In response, an anonymous collective of crypto community members recently released a jointly signed "Declaration of the Interdependence of Cyberspace" ("A Declaration of the Interdependence of Cyberspace," 2021) that builds on the ideas in John Perry Barlow's famous "Declaration of the Independence of Cyberspace" from 1996, stating "Your cookies, copyrights and capital may centralize your control for a small time, but they will not work in a world that will soon distribute power," (Barlow, 1996) as a warning to Facebook (Declaration of Interdependence, 2021). Crypto communities are determined to collectively own the metaverse by building it themselves.

"KONG Land" is a "crypto state" is predicted on secure open hardware to link digital and physical worlds. KONG Land offers security and verification through cryptographically secure element micro-chip hardware known as "SiLos" (The Ambassador, 2021). By addressing individual ownership at the hardware level, these chips can then be embedded in virtually anything for people to securely interact across physical and digital space without an arbiter. "Non-fungible-tokens" (or NFTs) are utilised as unique cryptocurrency assets that enable people to interoperate between metaverses. This Metaverse is owned by "citizens" that acquire governance rights through early buy in, social graph distribution, or labour for tokens, and governed through a DAO, that co-exists with a network of other DAOs that it conducts commerce with. Against the threat of Facebooks proposal for a centralised, corporate metaverse, KONG Land early contributor Paul states that "The infrastructure of registering

real items with virtual items shouldn't be a private entity, it should be a public good". The emergent possibility of a decentralized metaverse offers an important area of enquiry into the risks and opportunities of cyber-civilization architecture and governance as the distinction between physical and digital spaces continues to erode.

VISIBLE AND INVISIBLE

The base, foundational layer of the metaverse is hardware, specifically, microchips. The metaverse is dependent on physical devices to access and interact with the metaverse. An integration between blockchain, augmented reality (AR) and virtual reality (VR) is spurring a convergence of cross-industry opportunities for new applications of these technologies (Cannavò & Lamberti, 2021). Facebook is pursuing hardware interfaces to the metaverse through the Oculus VR headset, which they acquired for $1.6 billion (Facebook, 2014), and an AR glasses partnership with Rayban (Facebook, 2021a). Artificial Intelligence capabilities are expected to further enhance how data is mined and leveraged to enhance people's experience of the metaverse (Hyun-joo, et. al., 2021). Hardware is a core enabler to make the metaverse possible (Ball, 2021), along with compute, networking, payment services and interoperability standards. Hardware is notoriously hard to do as a minor player in the industry. Infamous open hardware hacker Andrew "Bunnie" Huang states in a research interview that "hardware is all about supply chains", and a particular challenge in souring reliable supply, is microchips. Not only are chips not visible but neither is their politics.

The Politics of Chips

As the building blocks of computer hardware, microchip manufacturing and supply chains are a theatre of geopolitical tensions and economic statecraft (Meese, Frith, & Wilken, 2020). This has long been true of communications infrastructure (Hills, 2002, 2007; Winseck & Pike, 2007; Zajácz, 2019). The politics of infrastructure was also anticipated by influential "Cypherpunk" thinkers (Bey, 1985; Davidson & Rees-Mogg, 1999). Chips are extremely expertise and labor intensive. Factories cost billions to build and there are only a few in the world (Leswing, 2021). The largest and most advanced chip maker is Taiwan Semiconductor Manufacturing Co. (TSMC), which manufactures over half of the world's made-to-order chip supply, and the company is worth $550 billion (Campbell, 2021). These small, wafer sized chips power mobile devices, "internet of things" hardware, refrigerators, cars, 5G telecommunications networks and artificial intelligence. COVID-19 significantly disrupted supply chains due to lockdowns, shipping delays and supply disruptions with cancellations from some industries such as automotive, and increased consumption in others, such as consumer electronics.

Competition is not just for capital but also specialized equipment and research and development expertise. During COVID, the Trump Administration began regulating semiconductor sales to Huawei Technologies and other Chinese companies, causing Chinese firms to stockpile supplies (Reuters, 2020; Swanson & Kang, 2020; Vakil & Linton, 2021). The US is trying to strengthen its position in the market. Biden's $2 trillion plan to fix American infrastructure included $50 billion to boost semiconductor competitiveness and including new chip fabricator factories by Intel, TMSC, and Samsung (which will take at least five years) (HR-7178, 2019; Rivero, 2021). The US also has a partnership with the EU to set common manufacturing standards (BBC, 2021). The EU has announced the "chip act" to gain greater control over their chip making supply chain as a key component of the EU's overarching digital strategy. "We depend on state-of-the-art chips manufactured in Asia. So

this is not just a matter of our competitiveness. This is also a matter of tech sovereignty. So let's put all of our focus on it." states EU President Ursula von der Leyen (von der Leyen, 2021). Meanwhile, China will soon be the biggest producer by volume, having poured billions into the industry (Campbell, 2021). This leaves the technological advancement of nation-states vulnerable to supply chain shortages. These disruptions have revealed how fragile the microchip supply chain is, resulting in increased geopolitical tension between nation-states over microchip manufacturing.

Now, "crypto-states" also need to compete in the microchip industry to supply the essential hardware for the open metaverse. A16z's Balaji Srinivasan describes "network-states" and "cloud cities" as virtual political entities that can collectively negotiate, fund, build, maintain and reproduce without relying on external resources (Srinivasan, 2021). Blockchain-based DAOs are just this - in their ability to bootstrap a digital economy, collectively negotiate and crowdfund territory in the real world. These crypto cities and network-states are popping up everywhere (Buterin, 2021), including CityDAO buying land in Wyoming ("CityDAO," 2021), ConstitutionDAO aiming to buy and co-own an original copy of the U.S. Constitution (ConstitutionDAO, 2021), and Kong Land looking to mass manufacture open microchips (Kong Land, 2021).

PUBLIC AND PRIVATE

The KONG Land crypto state is the brainchild of serious open hardware hackers. Having successfully exited a physical door lock business in Silicon Valley, the co-initiators of Kong Land released the "ARX" whitepaper in 2018, which first articulated the vision for trust through open silicon chip manufacturing (Arx, 2018). In 2019, open chips were trialled in their first use case of physical hardware notes of "crypto cash." Known as "Kong Cash," the notes have a microchip embedded in them which links to a smart contract to verify and ultimately access cryptocurrency (Kong Cash, 2021). Experimentation in open chips has recently culminated in "Kong Land" (Kong Land, 2021) with the launch of NFT "citizen" tokens, which represent unique individual members of the KONG Land crypto state to build the community for a DAO whose objective is open chip manufacturing and create utilization of chips for an open metaverse. "Like any other country, Kong Land has citizenship requirements, a unique culture, a working government (a "DAO of DAOs") and a robust economy built on creating and exporting SiLo-factured crypto assets," states the projects blog (The Ambassador, 2021). At its core, Kong is about chip research and development and open innovation.

Kong Land is predicated on secure hardware at the silicon level through cryptographic key ownership which links to blockchain-based smart contracts to bridge the physical world to the digital world and usher in an open metaverse. Cryptographically secured microchips are a way for people to hold their own keys when it comes to hardware. "Through these chips you have a way to interact without an arbiter," stated Cameron, an early contributor to Kong Land. By addressing individual ownership at the hardware level, these chips can then be embedded in virtually anything, for secure access to digital assets and digital lands. Kong Land intends to do this through "silicon locked contracts" (or SiLos) to address digital and physical asset ownership at the hardware level. SiLos are low-cost, durable, secure element microchips that are cryptographically linked to a smart contract on a public blockchain. Each chip self-generates a cryptographic key pair, and the public key is added to a Kong registry contract. Using a smartphone, anyone can scan the microchip using a near-field communication (NFC) reader, to verify the private key and unlock access to the tokenized

assets stored in the contract, authenticate an identity, or even trigger real-world actions. Embedding a SiLo microchip into any physical item transforms it into a crypto asset that can be verified on chain, as well as interacted with in real life.

Kong Land chips have the potential for any use case you can think of. The Kong Land manifesto states that "At inception, Kong Land will export crypto assets for projects like stablecoins, identities and art ... Given sufficient funds, it will ultimately seek to continue research around more secure forms of physical crypto assets" (Kong Land, 2021). This metaverse is owned by "citizens" who acquire governance rights through early buy-in, sign a "Kongstitution" social graph distribution, or work for tokens in accordance with the Kong "green card" policy initiative. The goal is to digitize real-world assets with these secure element chips that match physical and digital goods. NFTs enable verified ownership of assets to port between the physical and digital, and back to physical (they assure me that this final step is hard), as well as genuine ownership of assets for interoperability between metaverses. "While traditional tech companies focus largely on bringing users into virtual worlds or augmenting reality with digital experiences, we envision a seamlessly intertwined metaverse that doesn't rely solely on wearable headgear," says the Kong Land "ambassador" in a blog post (The Ambassador, 2021). One example is "Metafactory," a "digital factory" for merchandise that is integrated with Kong Land microchips (Metafactory, n.d). This allows clothing items to be scanned by the NFC chip reader in a smartphone, to reveal an NFT and share metadata about the item. Another example is "Kong card" passports, a physical passport with a chip embedded that allows "citizens" of Kong Land to verify their citizenship at physical locations for access to special events. Provability of unique identity with the passport then solves problems back in the digital crypto state, such as the challenge of multiple fake identities to attack a network (known as "sybil attacks"), which can be a problem in governance voting. In the future, Kong imagines people being able to take NFTs and digital items, and port them back to physical representations through chips, which verify ownership of unique assets.

Kong Land's vision is to be a "DAO of DAOs" with an orbit of "sub-DAOs" that integrate microchips for anything they can imagine, effectively catalysing a constellation of open metaverses. With the chip manufacturing hub at its core, Kong's ambition to export their own secure element chips and eventually custom silicon research and development, this crypto state competes with Facebook's vision of a closed metaverse.

FINDINGS & CONCLUSION

The rapid experimentation of blockchain-based DAOs as crypto-cities and states is demonstrating innovative ways to link the digital and the physical. Fundamentally, the battle between a public, open, decentralized, crypto metaverse and a closed, private, extractive, corporate metaverse comes down to the hardware, as the entry point for people to access digital worlds. Kong Land is an example of a crypto state with the community, manufacturing capabilities and expertise to compete for an open metaverse.

As they develop, crypto projects that operate like states will compete with big corporates and nation-states as new political actors. As the distinction between physical and digital spaces continues to erode, the emergent battle for the future of the metaverse offers an important area of inquiry into the risks and opportunities of cyber-civilization. The crypto community will need to continue to emphasize the importance of open technical architecture and participatory governance to pursue its vision for "interdependence."

Of all the components that comprise decentralised technologies to enable crypto communities' vision of an open Metaverse, you would think hardware would be the most mundane. Yet, hardware is fore fronted in the technical functionality and politics of these ensembles to form an essential component of network functioning and ownership for the enablement of self-governance. As digital media becomes even more immersive, how the Metaverse is architected, down to who owns and control it at the hardware level, has material implications for people and society. The way that this infrastructure is architected and who controls it is becoming more imperative as everyday life increasingly becomes intertwined with the digital. In an anthropological sense, infrastructure in decentralised digital networks also provides insights into politics and sociality (Larkin, 2013).

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