Chapter 4

Blockchain Dreams: Imagining Techno-Economic Alternatives After Bitcoin

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Introduction

According to its advocates, the blockchain, the distributed ledger system underlying bitcoin,[1] is poised to radically transform society. Indeed, it truly is difficult to overstate the claims made by some blockchain enthusiasts. *Blockchain: Blueprint for a New Economy*, a 2015 introductory handbook for the technology published by O'Reilly begins, "We may be at the dawn of a new revolution" (Swan 2015). It goes on to assert that the "economic, political, humanitarian, and legal system benefits" make it clear that blockchain is an "extremely disruptive technology that would have the capacity for reconfiguring all aspects of society and its operations" (Swan 2015). Similar predictions are made in countless TED talks, pitch meetings, industry conference keynotes, blog posts, "whitepapers" that outline new technical methods, and "manifestos" that launch start-ups.[2]

The visions conjured by blockchain dreamers are ambitious and dazzling. Equipped with this technology, as one enthusiast put it, "Young entrepreneurs have realized that the possibilities are only hindered by their own imaginations" (Yuan 2015). But blockchain projects are, at present, a form of utopian science fiction: they may

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[1] In general, I follow what has emerged as standard and do not capitalize the word bitcoin.

[2] Methodological note: this is the terrain of discourse that this research draws from. In addition to these documentary sources, I have been engaged in a multi-sited ethnography (Marcus 1995) of the networked field site (Burrell 2009) of bitcoin and blockchain systems and the communities that surround them since 2011, now close to five years. This includes interviews with participants and participant observation both as an observer and as a scholarly or critical expert at related events in San Francisco, New York, Los Angeles, Boston, Barcelona, London, Dublin, Amsterdam, and Sydney.

indeed map a coming reality, but for now, they are speculative visions. If blockchain dreamers are willing a future into being with their imaginations, what kind of future are they imagining?

This chapter investigates the alternative techno-economic future offered by these blockchain dreams. Even if these projects turn out to be vapor, the blockchain is meaningful as an inventory of desire. It is an engine of alterity: an opportunity to imagine a different world and imagine the mechanics of how that different world might be run. Embedded in those dreams is another question: How will this future be brought about? What is the link between today's vision and tomorrow's reality?

First, this chapter gives a short techno-social introduction to block-chain, including its emergence from bitcoin. It then maps the dissatis-factions and aspirations that are expressed in blockchain dreams, the alternative future world that just might be possible. Next, it compares these radical proposals to incorporative visions of blockchain within the finance industry. Finally, it draws from approaches in science and technology studies (STS) and alternative economic scholarship, to inquire after what the radical blockchain dream might learn from these less ambitious projects.

The bitcoin blockchain

Put most simply, a blockchain is a shared ledger. This concise defini-tion captures the essence of the concept while allowing for the ample flexibility with which it is used. In even the loosest of applications of the concept, a blockchain is, first, a write-only ledger: a list of recorded entries that can only be added to, not erased or changed. Second, a blockchain is shared: it is maintained and accessed by a number of parties without one central host. Each "block" is a set of records in the ledger. All parties can add blocks and can see when blocks are added, so the blockchain is a "chain" of "blocks."

The concept of a blockchain was, of course, developed not as a generic, multi-purpose ledger but for the purpose of assigning and transferring ownership of a new form of digital money, bitcoin. It was formally described by the pseudonymous Satoshi Nakamoto (2008) in "Bitcoin: A peer-to-peer electronic cash system," or, as it is most commonly termed, "the bitcoin white paper." The term "blockchain" does not appear in the white paper, but Nakamoto does describe bitcoin in terms of "blocks" and "chains." The blockchain envisioned in the white paper provides a decentralized ledger accounting for the

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ownership of every existing bitcoin. The bitcoin blockchain is the single record, shared and agreed upon by all nodes, of the ownership, past and present, of all bitcoins. In this way, Nakamoto describes "coins" as existing only as a "chain of digital signatures" (p. 2).

Ledgers are a common feature of most payment systems. In a highly simplified version of traditional payment systems, a centralized institution, like a bank, keeps account of who paid what to whom, crediting and debiting accounts accordingly. In contrast, with bitcoin, there is no bank keeping track of credits and debits. Instead, all node computers maintain the ledger of ownership of each bitcoin. To make a transaction, the owner broadcasts the transfer of a coin to all nodes. That transaction is collected into a "block," which is "chained" to all previously generated blocks to form the ledger hosted by all nodes. New bitcoins are generated for nodes as a reward for verifying blocks and adding them to the chain. The system protects against duplication or counterfeiting coins by verifying all blocks and ensuring that all nodes are in agreement. Each bitcoin is, in turn, really just an entry in the ledger. One trades in the rights to claim this bitcoin.

The bitcoin blockchain can be understood in terms of its social architecture as well as its technical features. The bitcoin blockchain is produced via a set of overlapping, sometimes inconsistent, ideological systems.

First, the bitcoin blockchain offers what Nakamoto calls a "new model of privacy" (p. 6). In the bitcoin blockchain, the owners and recipients of each bitcoin are pseudonymous, identified by cryptographic keys that function as addresses. Transactions, by virtue of being maintained on the blockchain ledger, are public, but the identities of the parties to the transaction are private, potentially even from each other. The publicity of bitcoin transactions stands in contrast to the traditional payment model, in which identities and transactions are kept private from the public by banks.

Previously, my collaborators and I have described the political values motivating the design of bitcoin as "digital metallism" (Maurer et al. 2013). There is no central authority, like a government, that issues bitcoins, instead, they are "mined" according to an algorithm that is thought to mimic a scarce natural commodity like gold. There is a limited number of bitcoins that become harder to mine at a steadily increasing rate. The value of bitcoin is "decentralized," allowing users to trade without reference to a central authority that underwrites the terms of the transaction. In metallism, these autonomous market transactions produce a broader, more total sociality of individual sovereignty and peership.

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More recently, I have elaborated the theory of money and society implicit in bitcoin to include the concept of "infrastructural mutualism," which describes the way some enthusiasts value the ability to mutually build and support a collaborative platform upon which to transact, free from the prying eyes and inference of corporate intermediaries (Swartz forthcoming). Infrastructural mutualism tied to the long history of peer production like free software, peer-to-peer production, and commonsing practices (see Benkler 2003; Bauwens 2005; Kelty 2008).

Both digital metallists and infrastructural mutualists share an investment in decentralization and autonomy. However, for digital metallists, the primary feature of bitcoin is the "coin," a value-bearing gold-like entity, which enables decentralized and autonomous value and therefore decentralized and autonomous market relations. For infrastructural mutualists, it is the blockchain, a decentralized, autonomous infrastructure with shared utility produced and maintained by all participants.

The blockchain after bitcoin

Beginning in late 2013, public attention seemed to shift from bitcoin as a currency to the underlying blockchain and other potential applications for it. By 2015, hype about the blockchain seemed to have fully subsumed that of bitcoin. The cover of Bloomberg Markets ran the headline "It's All About The Blockchain" (Robinson and Leising 2015). One observer wrote, "In the eyes of many the blockchain is seen as this disruptive piece of technology while Bitcoin is portrayed as a Napster-like experiment" (Ghalim 2015). Erik Voorhees, a well-known bitcoin entrepreneur, wrote on his blog, "2015 was the year the narrative changed. Bitcoin is out, blockchain is in" (2015).

Some of this interest was centered on so-called "Bitcoin 2.0" projects, that is, methods for extending the bitcoin blockchain. For example, there have been efforts to use the bitcoin blockchain to store information of all kinds – from marriage declarations to property records to sensitive information leaked by whistleblowers – in its immutable ledger. Other blockchain projects involved entirely new systems, functionally independent from bitcoin. Ethereum, perhaps the leading and most ambitious of the newer blockchain projects, is an ongoing effort to develop fully programmable, multi-use blockchain. As it is often explained, "Whereas Bitcoin could be described simplistically as a 'global spreadsheet,' Ethereum could be described

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as a 'global spreadsheet with macros,'" referring to the mini bits of code that can be embedded to automate in programs like Microsoft Excel.[3]

Many blockchain projects are oriented toward revolutionary social, economic, and political change. I term these "radical" because they attempt to use the blockchain to bring about a new techno-economic order. Most of these initiatives are aligned with bitcoin's political themes: decentralization, autonomy, and privacy. Some are clever, simple repurposing of the blockchain. For example, there is Namecoin, which proposes to use a blockchain to operate a decentralized, domain name system for websites, outside of ICANN's governance (Isgur 2014). Other radical projects are more ambitious, aiming to produce holistic systems of decentralized, non-hierarchical, autonomous self-governance. For example, one start-up, Backfeed, proposes to produce a "distributed governance system for blockchain-based applications allowing for the collaborative creation and distribution of value in spontaneously emerging networks of peers" as well as "tools that enable large-scale, free and systematic cooperation between thousands of people without the coordination of any central authority."[4]

The spectrum of ideological commitments present in these projects resonates with values that have been present in bitcoin since its earliest days: digital metallism and infrastructural mutualism. In the digital metallist mode, blockchain produces the ultimate market mechanism, one that can trade in any form of value and exists beyond the domain of governments and the existing financial system. In the infrastructural mutualist mode, the goal is to produce peer-to-peer information systems that distribute resources and organize a new open networked commons.

In addition to these radical blockchain projects, there are also efforts to use blockchain technology to innovate within the existing financial system. One project is the Distributive Ledger Initiative launched in 2015 by innovation firm R3CEV, which has the support of large banks, including Bank of America, Barclays, Citi, Deutsche Bank, J.P. Morgan, Goldman Sachs, and HSBC (Stafford 2015). These initiatives pose challenges to the way that financial technology is currently implemented and propose to remake the backend infrastructure of banking. I term them "incorporative" because they do not necessarily seek

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[3] See, for example, https://www.quora.com/What-is-Ethereum-in-laymans-term/answer/James-Z-2?srid=uEQu
[4] See http://www.backfeed.org

to change the underlying financial system from a political or social perspective; instead, they seek to incorporate the blockchain into the existing system to make that system more efficient.

Incorporative blockchain applications benefit from the "revolutionary" aura of the radical projects, but for blockchain advocates who have more radical ambitions, these incorporative projects are seen as far afield of the original goals of bitcoin. When all the "peers" in a network are traditional financial institutions, can the network really be considered "peer to peer"? As Voorhees (2015) puts it, "Moving from a permissioned financial network between banks, to a permissioned financial network among banks, is no great step for mankind." But, perhaps ironically, no industry is more interested in or supportive of blockchain than banking, the one bitcoin was designed to circumvent.

Interest in the incorporative blockchain emerges from a milieu – the "fin tech" moment – where the financial and technology industries blur. Many of these projects exist as "start-ups," "accelerators," and "innovation labs" inside, or closely related to, large financial institutions. Behind some of this is what one engineer at a workshop described to me as "C-Suite FOMO" – the idea that high level executives may suffer from "Fear Of Missing Out" on the next big thing. At a time when industry analysts suggest that Wall Street is losing the best and the brightest to Silicon Valley (see, for example, Duffy 2013; Egan 2014; Greenberg 2015), blockchain provides a fun, fascinating challenge to lure young talent back to Wall Street. The banks, eager to avoid being "disrupted," have summoned their ample resources toward blockchain innovation. In addition, there are plenty of bitcoin and radical blockchain aficionados who have professionalized their expertise and become evangelical fin tech consultants.

The distinction between radical and incorporative blockchain projects is not clearly defined and, in practice, there is a continuum between the two ideological modes. Because of its origin in bitcoin and continued relationship to cryptographic currencies, a blockchain is well-suited to keeping track of a moving money. It's not difficult to imagine how the leaders of libertarian radical blockchain projects may find themselves pursuing their (albeit short-term) rational self-interest by assisting a bank in the pursuit of more ordinary capitalism.

Similarly, while some radical blockchain initiatives are non-profit organizations or free and open source software projects, many are start-ups, and many of these start-ups receive support from many of the same funders and accelerator programs that support incorporative blockchain start-ups. Like the "sharing economy" before it, which

began with visions of peer-to-peer commerce and quickly became platforms for on-demand task work, it's easy to see how start-ups with utopian visions might "pivot" (to use industry parlance) toward business models different from or even in opposition to their original goals.

Radical and incorporative blockchain projects represent different dreams about the future of value and society. Advocates of radical blockchain projects dream of a future in which institutions are disaggregated into millions of microsocial obligations backed by computerized contracts. They rarely articulate the intermediate steps through which such a future comes into being. While the dreams of incorporative blockchain advocates tend to lack the long-range vision of their radical peers, they focus instead on the short-term challenges of implementation. Concerned with the material constraints of the present, incorporative blockchain dreamers offer a vision of institutions transformed rather than destroyed.

Radical blockchain dreams

In one of the clearest descriptions of the radical blockchain dream, Noah Thorp, co-founder of blockchain start-up Citizen Code (2015), writes:

> People of the free internet, we now have the opportunity to create a world where we choose to work a 4 hour work week at our whim, collaborating globally with whom we like, freely choosing compensation in currency or equity, frolicking in our hyper-creative and artistic, fractally self-organized fluid work groups, protected from catastrophic risk by a basic income provided by our egalitarian peer to peer protocols. In this vision the tragedy of the commons is stamped out like polio by a collaborative network of trust and enforced by a consensus-based cryptographic protocol that ensures our aligned incentivization towards the expression of our personal and collective purposes.

This is a vision of an alternative society made possible by blockchain, a technological infrastructure. This infrastructure, like the society it is meant to power, is incipient, a powerful vision that feels to believers as though it already exists. It springs into being seamlessly, then persists seamlessly, providing a similar seamlessness to the relations it animates.

I characterize the radical blockchain dream by three components: futurity; decentralization and disintermediation; and autonomy and automation, which are elaborated in the followed sub-sections.

Dreams of futurity

Blockchain dreamers are in a hurry to accomplish the future, which, as sociologist Anthony Giddens (1991) puts it, is always being "colonized" rapidly. If they don't dream the future now, someone else will. It is now "no longer optional," as one blockchain start-up founder put it, to passively await its coming (Swarm 2015). As soon as a proposal is offered – whether as a white paper, a slide deck, or a blog post – it is treated as though it already exists, ready to go. Indeed, blockchain projects exist in a particular temporality and have their own sense of the past and future, of change. It performatively leans into a future, always just around the corner, which might as well be here already.

Despite these heady visions, few post-blockchain projects currently exist, strictly speaking, in a fully functional form. Blockchain projects are regularly described as being fully ready to go, even though, so far, that is certainly not the case. In her introductory book, Swan (2015) describes an evolution from Blockchain 1.0 to 2.0 and 3.0, each of which relate to a more complex set of functions and a more comprehensive set of applications, but only Blockchain 1.0, the bitcoin blockchain, is currently implemented. The section entitled "Bitcoin 1.0 in Practical Use" numbers just three paragraphs. The rest of the book goes on to describe potential and theoretical applications, always in implied present tense.

This is technological fetishism with the implementation of that technology as almost an afterthought. As one journalist put it, "letting yourself get giddily far ahead of reality may be a requirement for participation in the blockchain revolution" (Rosenberg 2015). Perhaps this is the degree of audacious belief required to usher in a new techno-economic order. Their impatience mirrors the general future orientation of the Silicon Valley tech industry, amplified. Even in Silicon Valley, where technology is always one step behind its promises, blockchain advocates are unusually willing to operate as though a speculative future has already arrived in the present.

Dreams of decentralization and disintermediation

Many radical blockchain dreams envision new formations like decentralized autonomous corporations (DACs), decentralized autonomous organizations (DAOs), and decentralized autonomous societies (DASs). As Vitalk Buterin, founder of Ethereum and celebrated blockchain visionary, half-joked, "DAOism" is well on its way to becoming

a quasi-cyber-religion" (2015). What kind of society is decentralized, autonomous? Or at least made up of decentralized autonomous organizations and corporations?

Nearly all blockchain believers agree that the key problem of our era is the role of "intermediaries" in all areas of society. According to this perspective, today's Internet is a tremendous disappointment. It is controlled by centralized platforms, marked by business models dependent on the collection of personal and social data, and complicit with state agencies like the NSA in the surveillance and flow of information. These systems are gently coercive, and there is no Internet outside of them. The individual is simply obliged to engage via these "trusted third parties" for all communication.

Blockchain, on the other hand, would do away with the need for this trust. It would be an infrastructure that is "decentralized and controlled by a multitude of people, in a vast peer-to-peer network" and thus can "altogether elude government regulations and controls" (Lujan 2016). As Ethereum's Stephan Tual describes it, "We just want to take the Internet to its logical conclusion: total decentralization" (Volpicelli 2015). Blockchain decentralization is seen as both an evolutionary next step and a return to an Internet free from intermediaries and therefore freer generally.

A key feature, then, of the blockchain dream is a network of peers. Instead of the increasingly centralized Internet, enthusiasts imagine a "huge number of decentralized devices that work together in a distributed mesh network, . . . decentralization on steroids" (Yuan 2015). Blockchain has been characterized as "radicalizing infrastructure": in its ideal form, gone would be the "monolithic resources with prohibitive barriers to entry, the quintessential server farmhoused in some distant industrial estate" in favor of "something immaterial and dispersed, or managed through flexible and transient forms of ownership" (O'Dwyer 2015).

In the blockchain dream, individuals will no longer "pay" to use intermediaries with data by passively working in what scholars call "the social factory" (see Gill and Pratt 2008). Instead, there will be no intermediaries because we will all be intermediaries, mutually producing a shared, trustless infrastructure and incentivized to do so with crypto-coins like bitcoin. If all individuals connect with each other directly via blockchain, the Googles, Facebooks, and Amazons will be made obsolete.

But the blockchain dream of decentralization is more expansive than just the disruption of the business models of intermediaries. It is also a dream of disintermediation, a dream of direct communication.

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In the radical blockchain dream, decentralization and disintermediation are entangled and interdependent. Ethereum founder Vitalik Buterin (2014a) gives the example of book publishing:

> In the 1970s, if you wanted to write a book, there was a large number of opaque, centralized intermediaries that you would need to go through before your book would get to a consumer. First, you would need a publishing company, which would also handle editing and marketing for you and provide a quality control function to the consumer. Second, the book would need to be distributed, and then finally it would be sold at each individual bookstore. Each part of the chain would take a large cut; at the end, you would be lucky to get more than ten percent of the revenue from each copy as a royalty. Notice the use of the term "royalty," implying that you the author of the book are simply just another extraneous part of the chain that deserves a few percent as a cut rather than, well, the single most important person without whom the book would not even exist in the first place.

It's hard to see what isn't an intermediary to blockchain visionaries like Buterin. The work of publishing, of distribution, of bookseller each becomes just a chain of middlemen taking "cuts," adding friction.

Like publishing, almost all infrastructural components of existing information systems and economies are seen as, to use some of the terms that appear again and again, creaky, clunky, antiquated, byzantine, Kafkaesque. They are either predatory, incompetent, or both. Therefore, they are ripe for total disruption, destruction and rebuilding from scratch with the blockchain. There is an almost moral disdain for mediation and the centralized infrastructures that enable it. And there is an almost moral obligation to decentralize and, presumably, disintermediate.

At the heart of the blockchain dream, then, there is a yearning for ever more direct communication. Ethereum takes its name from the classic element of aether, the quintessence that fills the universe. As communication scholar John Durham Peters (1999) points out, the cybernetic tradition of signal processing and the spiritualist tradition of telepathy meet in the ethereal dream of perfect communication. Ethereum promises peer-to-peer communication beyond the hassle of imperfect communication and, indeed, beyond the drudgery and domination of imperfect communication work.

But what is the infrastructural work of intermediaries, what service do they provide? Mediating, interfacing, making interoperability, smoothing interactions – this is all work itself. It is exactly the work that the blockchain dream is meant to obviate. And yet, the dream of

directness is dependent on an ecosystem of hardware and software, all of which must be produced and maintained by someone.

In the one fully existing blockchain-based system, bitcoin, decentralization remains a challenge. Instead of developing capacities for lightweight protocols optimized for home computers or small-scale collectives to host the blockchain, metallist speculation in bitcoin the currency has lead to centralization of the infrastructure. Blockchain hosting has consolidated in the form of industrialized "mining" operations, with the top two pools operating 57 percent of the blockchain and five mining pools operating 80 percent.[5] There is the common suspicion that some of these pools might be owned by the same operator, which would mean further consolidation (Otar 2015).

Similarly, instead of transacting directly via the blockchain, most people use bitcoins via a new class of bitcoin-specific intermediaries: wallets, exchanges, debit cards, other payment portals. These do the work that financial intermediaries have always done: broker settlement and clearance, make equivalence between exchange rates, manage risk and fraud. What bitcoin entrepreneurs who have built these applications on top of the blockchain have discovered is that direct financial communication – like all communication – does not happen by magic. Bitcoin entrepreneurs have wound up rebuilding most of the payment system from the ground up.

By wishing away infrastructural work, the bitcoin ecosystem has become as centralized and mediated as existing systems. There is no reason to expect that newer blockchain projects will be any different.

Dreams of the autonomous and the automated

The word "autonomous" as it is used in the blockchain dream is polysemic and evocative of past dreams of alterity. It calls to mind the autonomia approach of anti-authoritarian left-wing theories and activists who sit at the intersection of socialism and libertarianism (see Lotringer and Marazzi 2007). It also evokes the liminal autonomy found in places, like Occupy encampments and Burning Man, which are seen by some participants as able to exist outside present society as a prefigurative site of alterity (Castells 2013; Turner 2009). It also references bitcoin, which was meant to function autonomous of states or banks. But in the new blockchain dream, autonomous means both something more and something else.

Although the term is slippery and controversial, blockchain

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[5] See https://news.ycombinator.com/item?id=6894320 and https://blockchain.info/pools

enthusiasts have converged on the definition of a "decentralized autonomous organization" as something like a blockchain-based entity run without any external control, instead guided by a set of incorruptible rules and powered by smart contracts, markets in cryptocurrency, and AI (artificial intelligence) agents. Human stakeholders create smart contracts and use markets to express their preferences, and the AI enforces the execution of those contracts and market preferences. Autonomous, then, becomes not just about autonomy from authority, but automation. In the blockchain dream, the two are interconnected, the former dependent on the latter.

As Cameron and Tyler Winklevoss, eclipsed Facebook co-founders and bitcoin and blockchain entrepreneurs describe it (emphasis original):

> Crypto-currencies will also enable the first forms of *artificial life* ushering in a "*Second Machine Age*." While computers, machines and things (e.g., refrigerator) cannot open a bank account today, they will be able to plug into the Bitcoin protocol and behave like *rational economic actors* in the future. These computers known as *autonomous agents* (e.g., self-driving cars, drones) will own themselves, and if profitable, spawn children to create families or *autonomous corporations*. A *Trade Singularity* will occur, whereby trade between machines, computers and things, will exceed trade between humans. Uncreative tasks will become primarily automated causing goods and services to become much cheaper and living standards to rise.[6]

Fast Company describes blockchain entrepreneurs interested in DAOs as "the humans who dream of companies that won't need us" (Pangburn 2015).

Indeed, the problem, it seems, is people. As one enthusiast writes, "A smart contract automates the rules, checks the conditions and then acts on them, minimizing human involvement" (Frisby 2016). Again, inherent in this dream is the obviation of trust. The DAO makes it unnecessary to trust each other or a centralized third party because it automates all the processes that could be potential points of human maleficence or ineptitude. As Buterin puts it, "it's not even possible for the organization's 'mind' to cheat" (2015).

There is no need to try to cooperate, only engage in systems of consensus. Rather than "drafting, disputing or executing a traditional contract," even the most complicated business arrangements can be "coded and packaged as a smart contract" (Frisby 2016). Consensus is achieved through coordination via the automated capture,

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6 See https://winklevosscapital.com/money-is-broken-but-its-future-is-not/

quantification, and execution of social signals. Blockchain start-up founder Noah Thorp (2015) describes it:

> In my mind's eye the invisible streams of value soon to be represented by emerging protocols became visible. Beyond dollars and yen, the whole spectrum of reputation currencies, app coins, and machine economies streamed before my eyes in a rainbow of currency, equity, and distributed accounts.

These "machine economies," these "rainbow" of bitcoin-like cryptographic value tokens, become a perfect market to take care of everything, anything. This is a trust in markets as the primary drivers of automation. It is well beyond that of mainstream economists, most of whom at least implicitly recognize that market devices are designed by people to perform as much as measure the world (MacKenzie 2006). This is more aligned with what some are calling "fully automated luxury communism" or FALC.[7] As one major proponent of FALC put it, "There is a tendency in capitalism to automate labor, to turn things previously done by humans into automated functions. In recognition of that, then the only utopian demand can be for the full automation of everything and common ownership of that which is automated" (Merchant 2015).

When the blockchain dream is fulfilled, those tokens will circulate, and those who contribute in various ways will be incentivized by a market for those tokens, which become a form of equity in society in itself.[8] All of this will be automated, self-organizing, self-regulating, immune from human error or corruption, and therefore fair. In the meantime, however, these tokens can also be purchased. Joel Dietz (2015), founder of blockchain start-up Swarm says, "Unlike past revolutions, this is a revolution not to be joined, but to be owned." Early investors are purchasing stock in the very means of participation in the coming society.

In the blockchain dream, automation produces autonomy from hierarchies and institutions. This vision draws simultaneously from the far past and the far future, a kind of techno-primitivism. It is often described in terms of "swarms," "fractals," and other naturally-occurring complex patterns. As scholar and "chief alchemist" of Backfeed Primavera De Filippi said in her 2015 TED talk:

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[7] See Fully Automated Luxury Communism. Tumblr: http://luxurycommunism-blog.tumblr.com/

[8] Ethereum began with a 42 day pre-sale for "ether," the coin-like "crypto fuel" that "powers" Ethereum (Buterin 2014c). In its first 12 hours, the pre-sale raised 3,700 bitcoins, which was, at the time, priced at US$2.3 million (Tanzarian 2014).

The animal kingdom contains numerous examples of individuals cooperating with one another to achieve impressive outcomes without the need for planning, control, or even direct communication between agents – examples are bees, ants, and schools of fish. Humans, however, have only been able to achieve goals cooperatively through the imposition of organizational hierarchies, centralized coordination, and rules. Blockchain technologies offer a new approach, allowing us to achieve large-scale and systematic cooperation in an entirely distributed and decentralized manner.

Julian Feder (2016) elaborates this idea on the Backfeed blog, explaining that blockchain allows "networks to arise spontaneously" that will "naturally" drive participants into coordination, "just like the simple response to pheromone exchange does for insect colonies." Blockchain is meant to provide humans with a kind of augmented hyper naturalness, a technological extension of an innate but alienated ability to self-organize. Achieving this future would mean a discovery of a more authentic human-ness. This is a perfected vision of humanity through both technology and markets.

But like the dream of decentralization, the dream of automation remains elusive. Without an existing functional blockchain to capture complicated ideas and negotiations, these groups must use communication technologies that do exist. Swarm, which described itself as poised to create "Civilization 2.0," used a Google Doc to publically brainstorm its plan for "fractastical distributed governance" (Swarm 2015). Despite big, present-tense promises, blockchain has not yet disintermediated Google, let alone the messy, frustrating processes of collective brainstorming.

The bitcoin project, again, the most fully realized blockchain implementation, is also struggling to use the blockchain for automated consensus. Beginning in 2015, there was strife in the bitcoin community over how to enable bitcoin to process more transactions more quickly. Several fixes were proposed, and consensus would be achieved by settling on the one that was run by the most miners and therefore "won." Crucially, this was not about "voting" because, as one forum leader wrote, "One of the great things about Bitcoin is its lack of democracy."[9] That is, no one could be "democratically coerced" into using one version of the protocol or another; instead, they would make the rational economic decision to run the version of the software the majority were running, or not. At present, the issue

[9] https://www.reddit.com/r/Bitcoin/comments/3rejl9/
coinbase_ceo_brian_armstrong_bip_101_is_the_best/cwoc8n5

has not yet been resolved. Bitcoin has not been scaled up sufficiently. For one leading core developer, Mike Hearn, who left in the wake of the debacle, this marked "the resolution of the Bitcoin experiment" in "failure" because it demonstrated that "the mechanisms that should have prevented this outcome have broken down" (Hearn 2016). Nevertheless, the dream of automated market consensus over the difficult work of cooperation remains.

The incorporative blockchain dream?

While it by no means has revolutionary aims, the vision of incorporative blockchain within the financial industry contains its own alterity. Precisely because its aims and context are so different, the incorporative orientation of blockchains as "fin tech" can perhaps provide a useful comparative. Indeed, as J.K. Gibson-Graham (2008) suggests, studying the economy as it is can surface and perform practices of an economy otherwise. The incorporative blockchain dream gives us some insight into what might be missing from the radical blockchain dream.

The incorporative blockchain dream isn't really a dream at all. It is boring. Despite the residual hype from the radical blockchain dream, incorporative blockchain projects do not seek to holistically remake society. Instead, they offer, as consulting firm Accenture Insights (2016) put it, a "platform to remedy existing pain points in the current banking landscape." The report describes potential applications, such as "Introduce unprecedented cohesion to the internal bookkeeping processes; Show a record of consensus with a cryptographic audit trail of transactions; Create near real-time settlement; Strengthen risk management through stronger auditability and counterparty ties" as well as "KYC/AML (Know Your Customer/ Anti-money Laundering data sharing), trade surveillance, regulatory reporting, collateral management, trading, settlement and clearing." This list is typical of the kind of applications being imagined for the incorporative blockchain. Nevertheless, it is a key convening for the financial services industry, a "once-in-a-generation opportunity to reimagine and modernize its infrastructure to address long-standing operational challenges" (DTCC 2016).

The incorporative blockchain offers a vision directly opposed to that of the radical blockchain in terms of futurity; decentralization and disintermediation; and autonomy and automation. Whereas the radical blockchain dream is marked by futurity, the incorporative

blockchain dream is slow-moving and risk averse. Whereas the radical blockchain dream values decentralization and disintermediation, the incorporative dream insists on governance and surfaces the work of intermediaries. Whereas the radical blockchain dream seeks autonomy built on automation, the incorporative blockchain dream imagines automation as a tool, not a replacement, for human work.

A slow blockchain?

Unlike the radical blockchain dreamers who bound enthusiastically toward the future, those interested in incorporative uses of the blockchain within financial institutions are slow moving and cautious. A 2015 report from the consulting firm McKinsey is representative: "The full potential of blockchain technology will only be realized through cooperation among market participants, regulators and technologists and this may take some time." A May 2016 report by the SWIFT institute notes that many in the industry were concerned that while blockchain technology may have potential, it is accompanied by an excess of "unrealistic expectations" with "relatively little short term pay off" (Mainelli and Milne 2016).

Again and again, at workshops and conferences on the blockchain, industry representatives ask whether or not implementing it will be "worth the cost of migration," question what the "added value" of doing so would be, and suggest that blockchain might just be a "solution in search of a problem." Beneath this corporate speak there is a critique of futurity and of technological fetishism. Beyond high-level enthusiasts and evangelical consultants who have crossed over from the radical blockchain, many people whose jobs it will be to implement blockchain are concerned with what it can actually do, and they are not in a particular rush to overhaul their entire system in the name of a technology that is very much in an early phase. As one industry consultant put it, "This is going to take a lot of work" (Peabody 2016).

This is precisely the lack of "agility" for which Silicon Valley regularly criticizes Wall Street, but it's a slowness and risk aversion rooted in an ethic of fiduciary care. Put another way: financial technology systems have to work. They can't be vaporware. The kind of wizardry like credit default swaps and high frequency trading might be valued on the trading side of big banks but it is not welcome in terms of the infrastructure that moves money around and keeps track of it. The following two sections describe the slowed temporality of

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the incorporative blockchain dream in terms of the fiduciary labor it surfaces: the work of negotiating decentralization and automation.

But first, as a provocation, I want to consider for a moment the way in which the banking industry offers an alternative to the futurism of Silicon Valley and the radical blockchain. Perhaps ironically, because "the corporate banking revolution is a marathon, not a sprint," it may have more in common with the temporalities of many alternative economic practices and activism groups, who celebrate the virtues of slow (PYMNTS 2015). The incorporative blockchain, oddly enough, might share a mantra with the Spanish Indignados movement: "We are going slow because we are going far" (Roos 2011). Of course, the financial industry has the leisure of being the incumbent – indeed, perhaps the most powerful hegemonic system on the planet – yet the question is still posed: What would it mean to shift the temporality of change, to have a radical "slow blockchain" movement?

Centralization and intermediation

The vision for the incorporative blockchain is not, philosophically or practically, fully decentralized. Even leading incorporative blockchain evangelicals Blythe Masters recognizes that total decentralization of infrastructure and authority would be "anathema to an industry in which client confidentiality is sacrosanct" (Robinson and Leising 2015). Instead, she advocates what have become known as "private" or "permissioned" blockchains (see Birch et al. 2016). In most proposals for this kind of blockchain, the nodes in the network are not voluntarist miners incentivized by mining cryptographic tokens, but servers maintained by member organizations. The result would be more like the Sabre Global Distribution System (GDS), a universal reservation database used by most major players in the travel industry, than anything imagined in the radical blockchain dream. This will not mean more decentralization; on the contrary, it will likely mean centralized ledgers produced by industry partners.

Incorporative blockchain would therefore be cooperatively produced platforms upon which to compete. Indeed, the payments industry has long been cooperative in many ways. The VISA network is one such site of "coopetition" – cooperation plus competition. It is an interface between merchants and customers who need not have accounts at the same bank (Stearns 2011). It is a functional method of negotiating the tensions between centralization and decentralization in practice. Blockchain technology itself still needs to be developed, but many in the industry note that "the harder work lies elsewhere,

in the domains of governance, rules development, regulatory change, back office optimization, and standards development" (Peabody 2016). This is not the work of disintermediation, it is the work of mediation.

The blockchain, then, becomes a site upon which to convene around problems and find solutions. Many interested in industry applications of the blockchain are agnostic about the technology itself. Instead, they are interested in easing "existing pain points" that make their work frustrating, and they are open to potential blockchain-based solutions. One financial technology columnist accounted for interest in blockchain in the following way:

> 1) It is dumb and bad for reasonably standard market transactions to take 20 days to settle because archaic procedures require market participants to fax each other documents and perform ancient incantations.
> 2) Market participants should get together and agree on a way to fix that.
> 3) That way should probably involve computers (Levine 2015).

The goal here is not to disintermediate the financial system but to determine how to be better intermediaries.

These conversations quickly zoom out, away from the specific affordances offered by the blockchain. Talk shifts from "blockchains" to "shared ledgers" to "shared databases" and onto a much larger range of technologies and practices. Soon, instead of talking about their "blockchain strategy," representatives of financial institutions are talking about pre-existing research on methods that accomplish what the blockchain promises. As one engineer told me, "We've been working on secure multi-party computation for a while, and calling it blockchain doesn't make it work any better, but it does make my boss more interested." The blockchain is more useful as rhetorical strategy than technological strategy.

The incorporative blockchain technology is creating an exciting context for the cooperative work of coming together to design a shared infrastructure, set standards, and decide on practice and protocol. As one employee of a major bank who works on a blockchain initiative told me, "Do I think it's going to change the world or even fin tech? I don't know. But it's a really exciting time to do what I do. No one has ever thought that rethinking these processes was interesting. Now it's all over the news."

The incorporative blockchain dream surfaces the infrastructural work of banking, and reorients the locus of excitement away from the trading floor and onto those who build information systems that

have long been considered frictional and expected to be seamless and invisible. The embrace of centralization and intermediation offers a provocation to radical blockchain dreamers: *What if, instead of making decentralization and disintermediation goals unto themselves, we imagined what it would be to take seriously the hard work of infrastructural cooperation, of sharing?*

Not autonomy, not automated

Incorporative blockchain projects, by nature, are not autonomous from existing institutions. They are formed out of partnership within and between existing financial services companies. They engage existing regulators, both state and industry. While they sometimes envision using crypto "coins" in the operation of the system, they are not trying to move away from state currencies entirely, if at all. The incorporative blockchain dream doesn't offer social autonomy, nor does it offer personal autonomy predicated on automation. What the incorporative blockchain does offer, however, is a view of demystified automation.

Incorporative blockchain projects do not eschew automation entirely. Unlike radical projects, the goal is to create modernized information tools to confront the complexity of modern finance, not create systems that replace human inputs. There are no radical dreams of autonomy here, no independent "machine economies" or "companies that don't need us."

One representative example of an incorporative blockchain project is Nasdaq Private Market. In 2015, NASDAQ, in partnership with blockchain company Chain, announced this pilot project using blockchain technology to manage shares in private companies (Shin 2015). Historically, the process of managing shares in private companies has been time-consuming and labor intensive. Despite and because of this, documentation often lags behind reality, and as a result, records are often inaccurate. The blockchain method would streamline and automate much of this. Unlike proposals for DAOs, NASDAQ Private Market does imagine blockchain automation as a basis for enacting an entirely new paradigm, but as a more faithful recording device for an already existing complex environment.

Many incorporative blockchain projects focus on the development of "smart contracts," protocols that facilitate and enforce the negotiation of an agreement. Economist Susan Athey, who sits on the board of Ripple Labs, a shared ledger company, explains that the main utilities of smart contracts on a distributed ledger are, first,

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that they "allow you to write a set of rules" and, second, that those rules would be executed on trusted information infrastructures (Shin 2014). The emphasis is on the work of figuring out how to write the rules, how to do the work of automation.

When automation is a professional rather than utopian practice, it's regarded as craft, as work: *techne*, not *episteme*. This is work for standards engineers, for those whose work involves the boring, bureaucratic labor of creating shared systems of operations and communications. As one consultant to the industry told me, "It's not magic beans, it's just software." At least for now, incorporative blockchain projects are focused not on doing away with work, but on the work of engineering new processes: automation as an interactive tool, managed by people.

Many in the industry are concerned that the blockchain, and automation in general, will empower engineers over MBAs and drive profits from banking to tech firms. This is likely to be true, and it may reflect a larger trend in society toward automation of the tasks performed by lower level employees that is far from unproblematic. But, these incorporative proposals do provoke questions for radical dreamers: What would it mean to imagine a blockchain that does not aim to replace people but is instead an extension of existing relations between people?

Conclusion

The biggest difference between the radical and the incorporative blockchain dreams is that the former has audacious goals to remake society for, as they see it, the better; whereas the latter has no such ambition. Beyond this obvious distinction, the incorporative vision prompts us to ask what a radical blockchain could do if it didn't insist on futurity, if it played a longer, slower game. What if it didn't have to altogether obviate trust between people; that is, if it were not fully decentralized and it didn't have to be autonomistic?

The incorporative blockchain surfaces the work of maintaining the blockchain. This isn't the work of big dreams, it's the work of sorting out the details. Lone geniuses, the Mark Zuckerbergs, Satoshi Nakamotos, and now the Vitalik Buterins, are celebrated for dreaming up new information infrastructures, but we are rarely invited to think about – much less celebrate – the everyday mundane work that maintains these infrastructures day after day.

Scholars of technology and society have called for greater attention

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to this work of "maintenance" (see, for example, Jackson 2015; Downey 2015; Vinsel 2015). From system administration to regression testing to data cleaning, the information industries are made up of countless positions that are not only kept invisible but routinely dismissed and degraded as mere "friction," an inconvenient bug to be automated, outsourced or wished away. This isn't the veneration of "hard work" and productivity for its own sake. It's a rethinking of IT work as the part of labor that, when allowed to go unnoticed, perpetuates the techno-economic status quo.

I would like to suggest that invisible work of the development maintenance of technological systems, by virtue of its invisibility, can be seen as a form of infrastructural care work. As J.K. Gibson-Graham (2008) suggests, if we can learn to see the seamful work in seamless systems, we can glimpse the "diverse economy" in which we are enmeshed, one that includes the capitalist and non-capitalist.

In this way, the incorporative blockchain contains its own radical alterity. What would it mean if the radical blockchain dreamers found inspiration in the hidden cooperation that global capitalism is built on top of, instead of just imagining that market mechanisms work as if by magic? What would it mean for the radical blockchain moment if it were allowed to be boring?

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