

TRUSTLESS PROPERTY SYSTEMS AND ANARCHY: HOW TRUSTLESS TRANSFER TECHNOLOGY WILL SHAPE THE FUTURE OF PROPERTY EXCHANGE

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A specter is haunting the modern world, the specter of crypto anarchy. Computer technology is on the verge of providing the ability for individuals and groups to communicate and interact with each other in a totally anonymous manner. Two persons may exchange messages, conduct business, and negotiate electronic contracts without ever knowing the True Name, or legal identity, of the other. Interactions over networks will be untraceable, via extensive rerouting of encrypted packets and tamper-proof boxes which implement cryptographic protocols with nearly perfect assurance against any tampering. Reputations will be of central importance, far more important in dealings than even the credit ratings of today. These developments will alter completely the nature of government regulation, the ability to tax and control economic interactions, the ability

to keep information secret, and will even alter the nature of trust and reputation.¹

Introduction

Life is full of uncertainty. How will our lives unfold? How will the economy perform in the near future? What conflict lurks just beyond the horizon? And yet, we go on, blissfully ignorant of the vexing uncertainty that embodies our very existence.

Some uncertainties are unavoidable, like a plane that falls out of the sky on a mundane September morning. But we are faced with countless uncertainties in daily life that are more difficult to recognize. Will that Amazon order reach your front door on schedule? Will an identity thief swipe your credentials from that smartphone you left in the taxi on Saturday night? Will all the prisoners escape from the nearby penitentiary? Favorable outcomes in these situations are not guaranteed, but we place our trust in the institutions that administer these tasks, and continue on with our lives without worry of all that could go wrong. Less obvious, however, is what we give up to maintain the perception of trust in the traditional institutions and social organizations that surround us.

The management of uncertainty is in part the management of trust.² On a basic social level, “trust is a relationship in which principles . . . invest resources, authority or responsibility in another [an agent] to act on their behalf for some uncertain future return.”³ The power of trusted agents lives in their privileged access to information or expertise that is not available to principles.⁴ “By definition, trusted agents are in positions of opportunity to act in ways and in situations where principles cannot.”⁵ In the information age, the concept of trust must evolve to meet the challenges of twenty-first century uncertainty, and technology is enabling a new generation of systems and protocols that eliminate the need for trusted agents all together.

Background

In our time, managing uncertainty is big business. Yet we rarely consider what’s handed over to “trusted” institutions in exchange for watching our backs in this chaotic world. The traditional institutions that

1. Timothy C. May, *The Crypto Anarchist Manifesto*, in CRYPTO ANARCHY, CYBERSTATES, AND PIRATE UTOPIAS 61-62 (Peter Ludlow ed., 2001).

2. David J. Phillips, *Cryptography Secrets and the Structure of Trust*, in TECHNOLOGY AND PRIVACY: THE NEW LANDSCAPE 244 (Philip Agre & Marc Rotenberg eds., 2001).

3. *Id.* at 243-44.

4. *Id.* at 244.

5. *Id.*

manage uncertainty, for example the banking and legal systems, are so fundamental to our concept of social order that attempts to describe legal regimes operating in the absence of centralized authorities become mostly academic. It is important to remember that firms and state sponsored organizations are not in the business of managing uncertainty for free. For example, credit card companies and online payment systems, like Visa or PayPal, charge transaction fees to verify and authenticate transactions, which allows in part for an offset of any losses from breaches of trust such as fraudulent activity.⁶ This burden is ultimately passed to the consumer or the vendor using the service.⁷ In the case of PayPal, for example, these fees can reach upwards of 3.5% per transaction.⁸

Most dear to the hearts of those reading this article are the generous transaction fees paid to enlist the services of a trusted legal advocate. Indeed the most striking example of how the public blindly assumes trust in an entrenched institution manifests in the context of the legal system. The law derives its power and authority from the state,⁹ which holds a traditional monopoly over the administration of trust, particularly in the area of property and ownership.¹⁰ The state represents the law,¹¹ and at its core a traditional legal regime is a centralized authority that administers property rights,¹² describing who is entitled to land or any number of the limited resources in a given state.¹³ The administration of property rights by the state gives individuals and citizens proof of ownership and a sense of accountability.¹⁴ If there is a dispute, contractual or otherwise, one must turn to the legal system for adjudication.¹⁵

The concept that the state is the ultimate administrator of property rights has its roots in the beginnings of civilization. For thousands of years,

6. For the PayPal transaction fee structure, see *Transaction Fees for Domestic Payments*, PAYPAL, https://www.paypal.com/za/cgi-bin/webscr?cmd=_display-receiving-fees-outside (last visited Oct. 12, 2015).

7. *Id.*

8. *Id.*

9. See generally ROBERT NOZICK, ANARCHY, STATE AND UTOPIA (1974) (Nozick's monograph on state theory explains the organization and emergence of state-like structures.).

10. See generally LAUREN BENTON, LAW AND COLONIAL CULTURES: LEGAL REGIMES IN WORLD HISTORY (2002).

11. NOZICK, *supra* note 9.

12. BENTON, *supra* note 10.

13. Joshua Fairfield, *BitProperty*, 88 S. CAL. L. REV. 805, 811 (2015).

14. NOZICK, *supra* note 9.

15. *Id.* at 14.

people have placed their trust in various centralized authorities in exchange for social stability and order.¹⁶ But recent advances in networked technology, especially in the area of digital cryptography, challenge the necessity for centralized property regimes.¹⁷ Technology has historically been a linchpin of social organization, and of social control and stabilization when utilized by the state.¹⁸ “Technology is culture made obdurate. It embodies, fixes, and stabilizes social relations. It provides mass and momentum to social systems. In studying the production and use of technological artifacts, we study the production and use of lasting cultural distinctions and relations.”¹⁹ Innovation in the area of cryptography is no exception to this maxim, and its effects are now tangible. Crypto systems provide an alternative to participation in traditional social institutions, enabling tech savvy citizens to align with the culture of cryptography, guided by a central libertarian tenant of distrust for “the man.”

Cryptography is simply a way of structuring trust.²⁰ It is a technique for managing secrecy, initially developed by the military to keep information secure.²¹ One trend in social organization via cryptography is the development of trustless transfer protocols that secure transactions over networked systems. Using cryptography to secure online transactions has the potential to drastically increase the speed and efficiency of property exchanges. Additionally, proponents of the tech’s unregulated development believe that it can solve complex issues of security and privacy and inject authenticity into digital information transfers, for example in the form of electronic signatures. Cryptography can meet the modern challenges of transacting online, but the tech also presents serious threats in the hands of criminals or terrorists, who can exploit the anonymous nature of crypto systems to promote terrorism, launder money, and for black market dealings.²² Thus, it is no surprise that governments across the globe have intensely monitored the deployment of crypto systems, especially applications that impact the financial sector. Advocates of unbridled crypto innovation, those dubbed “crypto anarchists,” argue that the

16. NOZICK, *supra* note 9.

17. Joshua Fairfield, *Smart Contracts, Bitcoin Bots, and Consumer Protection*, 71 WASH. & LEE L. REV. ONLINE 36, 40 (2014).

18. Phillips, *supra* note 2, at 248.

19. *Id.*

20. *Id.*

21. *Id.* at 244.

22. Dorothy E. Denning, *The Future of Cryptography*, in CRYPTO ANARCHY, CYBERSTATES, AND PIRATE UTOPIAS 88 (Peter Ludlow ed., 2001).

decentralization of traditional institutions is inevitable and unstoppable, and that the technology represents a logical shift toward a more efficient means of transacting.²³ The tension between the two camps over “the development, the oversight, and the management of cryptographic techniques are struggles over the social structure of secrecy, trust, and power.”²⁴

The crypto anarchists are right that even in the presence of heavy regulation it is inevitable that new gimmicks will present a perpetual whack-a-mole scenario for law enforcement attempting to stamp out nefarious uses of cryptographic and encryption technologies. And the potential risks associated with the widespread use of crypto systems must be weighed against the innovative impact of the tech’s legitimate uses. One exciting example of the power of cryptography is embodied in the Trustless Public Ledger (TPL) system, the unfolding technology that underpins the popular virtual currency Bitcoin.²⁵ TPL technology liberates individuals from the centralized institutions that moderate online transactions by creating a public, cryptographically protected transaction list that does “not rely on trust in a specific entity to curate the list.”²⁶ TPLs enable P2P digital transfers of property or cash, with no need for intermediaries such as banks or credit card companies. The most important innovation from Bitcoin is the ledger’s revolutionary method of tracking lists and rights, rather than Bitcoin’s application of the tech as a virtual currency.²⁷ TPLs allow for transactions between individuals in a completely decentralized space, where the community itself is incentivized to authenticate and protect the integrity of the system through a method of incorruptible mathematical proofs.²⁸ Transacting in this manner thwarts the efforts of identity thieves and protects individuals from the numerous types of fraud that are common when relying on third-party intermediaries.

This article assembles the relevant scholarship on TPLs, and draws on state theory traditions to argue that TPLs are self-sufficient property systems that operate effectively under conditions of anarchy. Further, this article demands a rethinking of the concept of property exchange over trustless transfer systems, and evaluates recent regulation and the law’s

23. Fairfield, *Smart Contracts*, *supra* note 17, at 40.

24. Phillips, *supra* note 2, at 244.

25. Fairfield, *Smart Contracts*, *supra* note 17, at 36.

26. Fairfield, *BitProperty*, *supra* note 13.

27. *Id.* at 4.

28. Satoshi Nakamoto, *Bitcoin: Peer-to-Peer Electronic Cash System*, BITCOIN, <https://bitcoin.org/bitcoin.pdf> (last visited Oct. 12, 2015).

capacity to achieve the compliance of crypto enthusiasts. Part I discusses forward thinking scholarship on TPLs, and argues that TPLs provide a scaffold for the development of extralegal property systems that rely on software to maintain compliance, rather than the rule of law. Part II explores the evolving concept of property exchange in a scheme where personal property connected to the network is catalogued and transferable over TPLs. Part III considers the issue of accountability, and examines recent regulation of the infant tech, before concluding that the long-term pervasiveness of crypto systems may render such regulation futile as highly motivated stakeholders in the crypto community continue to outpace law enforcement. In sum, this article echoes the growing sentiment among scholars focused on this area of study, that the implications of TPLs as tools for transacting are far too important to fall victim to short-sighted regulation as virtual currencies, but that their ultimate role in our social structure lives somewhere in the middle ground between crypto anarchy and the skepticism of traditional conservatism.

I. TPLS, AUTOMATION, AND ANARCHY

The traditional concept of property is framed by the relationship of people to physical objects, or simply, “who owns what?”²⁹ Individuals assert their ownership rights in some type of property, such as land, scarce resources, or goods, and a record or ledger is kept as a chronological proof of ownership.³⁰ A traditional property administrator, such as a bank or payment processor, requires a centralized authority to maintain these ledgers.³¹ As an inescapable consequence, individuals are forced to place their trust in centralized institutions. To maintain this trust, individuals must rely on (and pay) intermediaries to verify and authenticate transactions, a system that inextricably binds individuals with institutional and governmental control.³²

A growing body of scholarship, pioneered by Professor Joshua Fairfield,³³ advances a vision of a democratized alternative to centralized regimes, operating absent trust, which enables cheaper transactions and

29. Fairfield, *BitProperty*, *supra* note 13, at 807, 811.

30. *Id.* at 807.

31. *Id.*

32. Fairfield, *Smart Contracts*, *supra* note 17, at 40.

33. Joshua Fairfield is a Professor of Law at Washington and Lee University School of Law. His works discussing TPLs, smart contracts, and his retheorizing of property as digital information are mentioned throughout this article, and provide the bedrock for this article’s discussion of TPLs as trustless property systems operating under conditions of anarchy.

enforcement outside of the legal system.³⁴ In such a system, self-executing smart contracts adjudicate simple transactional disputes, replacing expensive legal remedies with automated software programs. The ingredient of anonymity within these systems presents difficult issues for law enforcement, and strategic policy making will be a necessary part of securing the safety of individuals and businesses that choose to transact over TPLs. However, as many scholars in this area of study have emphasized, a distinction must be drawn between trustless transfer systems and their application as virtual currencies like Bitcoin. The importance of the underlying tech lives in its potential to “shift the entire basis of trust” involved in any property or financial exchange.³⁵

A. *In Encryption We Trust*

The 2008 financial crisis, and numerous other instances of malfeasance in the financial sector, has “led to a widespread loss of trust in financial intermediaries of all kinds.”³⁶ Many crave an alternative to participation in traditional social and financial institutions. The crypto culture, which has achieved notoriety through the popularity of Bitcoin, provides a disruptive alternative to traditional methods of communicating and transacting. Although current renderings of robust trustless property regimes are largely academic, the role of the legal advocate will inevitably shift once automated software programs are utilized to resolve mundane transactional disputes more quickly, efficiently, and with more accuracy than their human counterparts.³⁷

In simple terms, a Trustless Public Ledger is a public list describing the chain of ownership of a given piece of property or something of value. The idea is similar to Napster or any peer-to-peer file sharing system, with the critical distinction being that each piece of property or unit of value on a TPL is unique, and once transferred can only be accessed by the righteous new owner. While a traditional digital property system, such as PayPal, acts as a trusted third party that moderates and completes a transaction, TPL technology removes the middleman, and enables users to exchange digital

34. *Id.*

35. Adrian Blundell-Wignall, *The Bitcoin Question: Currency Versus Trustless Transfer Technology* 3 (OECD Working Papers on Finance, Insurance, and Private Pensions, Working Paper No. 37, 2014).

36. *Id.*

37. Fairfield, *BitProperty*, *supra* note 13, at 841-42.

property securely and anonymously over the network without any prior relationship.³⁸ TPLs deploy a system of cryptographic proofs to secure each transaction.³⁹ On a TPL system, once a transaction is secured cryptographically, it is then published on a public ledger.⁴⁰ The infrastructure of the system is built on public-key encryption.⁴¹ This type of encryption uses two keys to complete a transaction, one public and one private.⁴² The public key operates as a given user's public address, like a mailbox or an email address.⁴³ The private key is used to access cash or property, and to approve payments.⁴⁴ The end result is a highly secure, decentralized method of transacting online that does not require intermediaries or state oversight.⁴⁵

One of the most controversial elements of TPLs, and of crypto systems generally, is the degree of anonymity in transacting. Since TPLs rely on trustless encryption for transacting rather than connecting valid legal entities, transactions can be kept completely anonymous. This propels most nefarious uses of the technology, and has been the catalyst for policy designed to stymie the efforts of criminals and organizations who exploit crypto systems as back channels for illegal activity. There are ways of structuring a TPL so that law enforcement can intervene with valid probable cause,⁴⁶ but for advocates of crypto systems the "guarantee of absolute privacy and anonymous transact[ing]" in a libertarian free market is a TPL's most attractive feature.⁴⁷

Property systems built on a TPL infrastructure can consolidate and reorganize current digital property regimes, making them cheaper and better equipped to handle the complex intricacies of global networked transactions.⁴⁸ The basic infrastructure for this technology is in place, but

38. Rob Wile, *Satoshi's Revolution: How the Creator of Bitcoin May Have Stumbled Onto Something Much, Much Bigger*, BUS. INSIDER (April 22, 2014, 11:55 AM), <http://www.businessinsider.com/the-future-of-the-blockchain-2014-4>.

39. Nakamoto, *supra* note 28.

40. Paul Farmer, *Speculative Tech: The Bitcoin Legal Quagmire & the Need for Legal Innovation*, 9 J. BUS. & TECH. L. 85, 88-89 (2014).

41. Nakamoto, *supra* note 28.

42. Farmer, *supra* note 40, at 89.

43. *Id.*

44. *Id.*

45. *Id.*

46. Denning, *supra* note 22, at 86. Dorothy E. Denning discusses the idea of "key escrow" in her essay. *Id.* In simple terms, key escrow allows for transactions to be held in escrow for a period of time so that identifying information may be retrieved if the transaction is compromised. *Id.*

47. *Id.* at 85.

48. Nikolei M. Kaplanov, *Nerdy Money: Bitcoin, The Private Digital Currency, and the Case Against Its Regulation*, 25 LOY. CONSUMER L. REV. 111, 172 (2012).

skeptical regulators are persistent in their efforts to slow the pace of innovation.⁴⁹ Although Bitcoin is the most successful deployment of TPL tech to date, one which certainly comes with its share of nefarious uses,⁵⁰ trustless transfer technology is too important to the long-term evolution of networked transactions to wither in its infancy in the face of short-sighted regulation aimed at virtual currencies. Further, as Part III of this article argues, regulation may prove to be futile, much like the failed attempt to regulate illegal file sharing.⁵¹

TPLs replace trusted agents with anonymous, incentivized third parties called “miners.”⁵² The role of a miner is very simple: in a trustless transfer system, miners encrypt each transaction and enter it into a public ledger.⁵³ For their role in securing the public ledger they are rewarded with a small amount of newly generated (“mined”) virtual currency.⁵⁴ They play the same role as any third party transferor of money, but are compensated with newly generated currency rather than taking a cut for their role in moving the cash.

The Bitcoin TPL protocol aggregates each transaction into a public ledger called the “blockchain,” a public list and ledger of every Bitcoin transaction.⁵⁵ The blockchain is nothing more than a transaction log,⁵⁶ and each transaction is authenticated and verified by a series of mathematical proofs which make it nearly impossible to either double spend (using the same piece of digital property or currency in two conflicting transactions), or to intercept or reroute payments in the middle of a transaction.⁵⁷ To illustrate the concept of double spending, consider the example of check fraud: “[c]heck fraud exploits a delay in the currency conveyance system

49. *Id.*

50. *Id.* at 126-27. Most notably, the anonymity of Bitcoin’s transactions makes it an attractive tool for criminal enterprise, such as money laundering or the sale of illegal drugs. *Id.*

51. Part III draws a comparison between users of crypto systems such as Bitcoin, and participants in the Napster revolution. *See infra* Part III. Napster completely shifted the music business economy by enabling P2P sharing of music downloads. The industry’s response to this innovative technology was an attempt to stifle the growth of the technology, and to call for draconian punishments for a handful of Napster users as a deterrent. These efforts had a minimal effect on the file sharing community, and the use of P2P services exploded unimpeded.

52. Nakamoto, *supra* note 28.

53. *See* Kaplanov, *supra* note 48, at 155.

54. Nakamoto, *supra* note 28.

55. Kaplanov, *supra* note 48, at 118.

56. *Id.*

57. Nakamoto, *supra* note 28; Fairfield, *BitProperty*, *supra* note 13, at 811, 838-39.

and enables the double spending of currency.”⁵⁸ A fraudster who passes a bad check can go on a shopping spree knowing she doesn’t have the funds to cover the purchases. This type of scam is impossible to replicate when transacting over a TPL such as the Bitcoin ledger, because once a piece of property or unit of value has been transferred to another user, the transferor no longer has access to the property or unit of value that was transferred.

The creators of the Bitcoin TPL “expressly noted that their design was an attempt to solve the double-spending problem without resorting to centralized authorities.”⁵⁹ This is an essential part of Bitcoin’s trustless enforcement regime; trusted third parties that have traditionally moderated property or money transfers are removed from the literal equation. This innovation is the true genius of Bitcoin’s TPL, the blockchain, and it is this aspect of the technology that will shape the future of encrypted trustless transfers in an economy where consumer security is a leading priority.⁶⁰

B. Enforcement via Smart Contracts

Any successful property system must deal with the issue of enforcement. When a transaction is completed, each party must be held to account on his or her end of the bargain. TPLs enable P2P transacting that utilizes software programs to incorporate traditional aspects of contract law into trustless transactions over the network.⁶¹ These programs, dubbed “distributed” smart contracts, enable individuals to form P2P agreements over TPLs.⁶² Smart “[c]ontracts don’t make anything possible that was previously impossible, but rather, they allow you to solve common problems in a way that minimizes trust. Minimal trust often makes things more convenient by allowing human judgments to be taken out of the loop, thus allowing complete automation.”⁶³ In simple terms, smart contracts are “computer programs that can automatically execute the terms of a contract.”⁶⁴ These programs address the issue of enforcement and accountability in a trustless system that operates outside the purview of the

58. Fairfield, *BitProperty*, *supra* note 13, at 811, 838-39.

59. *Id.*

60. Marc Andreessen, *Why Bitcoin Matters*, NY TIMES, http://dealbook.nytimes.com/2014/01/21/why-bitcoin-matters/?_r=0 (last visited Oct. 12, 2015).

61. Fairfield, *Smart Contracts*, *supra* note 17.

62. *Contract*, BITCOIN WIKI (Oct. 22, 2015, 7:47 PM), <https://en.bitcoin.it/wiki/Contracts>.

63. *Id.*

64. Jay Cassano, *What Are Smart Contracts? Bitcoin’s Killer App*, FAST COMPANY, <http://www.fastcolabs.com/3035723/app-economy/smart-contracts-could-be-cryptocurrencys-killer-app> (last visited Oct. 12, 2015).

state. This runs opposite to state theory traditions holding that only the state has the true power to enforce judgments.⁶⁵

Nick Szabo is widely credited with developing the idea of self-executing smart contracts.⁶⁶ Back in the mid-1990s, Szabo imagined smart contracts as utilizing simple “if-then” computer statements in a way that “interacts with real-world assets.”⁶⁷ “When a pre-programmed condition is triggered, the smart contract executes the corresponding contractual clause.”⁶⁸ Many startups, such as Codius,⁶⁹ have high hopes for entering the smart contract space, and are building businesses on top of TPL infrastructure, and writing programs that allow smart contracts to be used in novel ways.⁷⁰

One intriguing use of smart contracts, proposed by Professor Fairfield, focuses on how distributed contracts “can be used by automated software agents to protect consumers’ identity from theft and automatically enforce their contractual preferences.”⁷¹

Contract law is the law of bargained-for exchange, so a technology that enables direct exchange online will change the reality of online contracting. The current problem with consumer contracting online is that courts and companies have collaborated to create an online system in which consumers cannot bargain. Under the current regime, consumers have no choice but to click the “I Accept” button. Online, contract law is not the law of bargained-for exchange; it has become the law of company-dictated exchange. Smart contracts—automated computer programs able to execute trades through TPLs—may offer a solution.⁷²

Fairfield imagines a recapturing of consumer bargaining power in online contracting through smart contracts.⁷³ In this scenario, a consumer software agent would log onto a vendor’s web server, and offer specific contractual terms on which that consumer is willing to make a deal.⁷⁴ “For example, the consumer may have informed the web server that she is only

65. NOZICK, *supra* note 9, at 14.

66. Cassano, *supra* note 64.

67. *Id.*

68. *Id.*

69. Alec Liu, *Codius is Open Source*, RIPPLE (Aug. 4, 2014), <https://ripple.com/blog/codius-is-open-source/>.

70. *See id.*

71. Fairfield, *Smart Contracts*, *supra* note 17, at 39.

72. *Id.* at 35.

73. *Id.* at 39.

74. *Id.* at 42.

willing to deal with that server if the server respects her desire not to sell her personal data, by setting a ‘do not track’ flag.”⁷⁵ If the vendor’s web server has been made aware of the consumer’s terms, but refuses to follow them and concludes the purchase anyway, the consumer contract would not be enforceable according to its terms.⁷⁶

Smart contracts can be utilized to execute a wide array of basic contractual agreements. Once terms are agreed upon, they are captured in a simple program and executed automatically.⁷⁷

Let’s take a simple example, like a Super Bowl bet. Say you want to bet \$500—or roughly one bitcoin—that the Patriots will win, while your friend is betting the same amount that the Packers will take the title. Step one is for you and your friend to place your bitcoin in a neutral account controlled by the smart contract. When the game is over and the smart contract is able to verify via ESPN, Reuters, or elsewhere that the Patriots beat the Packers, the smart contract would automatically deposit your bet and your winnings from your friend back into your account.⁷⁸ Because smart contracts are computer programs, it would be trivial to add more complex betting elements like odds and score differentials into the mix. While there are services out there today that might handle this sort of transaction, they all charge a fee. The key difference with smart contracts is that it is a decentralized system accessible to anyone, that doesn’t require any intermediary party.⁷⁹

The need for outside enforcement dissolves when smart contracts are deployed using TPLs.

As another example, consider how a simple piece of property might be transferred over a TPL under a smart contract regime. Suppose “Wally,” an avid concert-goer, buys wristbands to a classy music festival but can no longer attend. He wants to sell his wristbands to “Junior,” and Junior wants to be sure that he’s not getting ripped off. Wristbands to most modern music festivals are imbedded with RFID chips that identify the purchaser when scanned at the turnstile. These modern wristbands are also connected to the network and allow concert-goers to track their activity and stay active online while they are at the show. Junior scans the wristband with his smartphone using software built on a trustless transfer protocol, and ownership in the wristband is instantly transferred from Wally to Junior using a form of public key encryption (which could utilize thumb print tech

75. *Id.*

76. *Id.*

77. Cassano, *supra* note 64.

78. *Id.*

79. *Id.*

on smartphones). Now, Junior is the only one who can use this wristband to enter the show, because it is aligned with his unique encryption key, which is identified when the wristband is scanned at the turnstile. The transaction is then published to the public ledger and Junior is in total control of the fate of the wristband, all without the need for a pricy intermediary such as Ticketmaster or StubHub.

The key idea is that encrypted protocols allow only the designated possessor of the public-private key pair to make use of the property, because the property is connected to the networked and catalogued on a public ledger. So in the example above, Wally can't scam Junior or try to resell a fake version of the wristband, because as soon as ownership is transferred on the TPL, the previous owner is locked out and can no longer interact with the property. There is no need for a formal agreement in this example; the transfer is administered and enforced by a smart contract.

C. *Anarchy and Cryptostates*

The enforcement of property rights by a centralized authority has its roots in state theory traditions.⁸⁰ The law has played a central role in keeping track of ownership rights throughout history, the state being the final arbiter of who has access to certain property or resources.⁸¹ The state is thus essential in resolving disputes regarding property, and resolution outside the law is inconceivable in this traditional scheme.⁸²

Presumably what drives people to use the state's system of justice is the issue of ultimate enforcement. Only the state can enforce a judgment against the will of one of the parties. For the state does not allow anyone else to enforce another system's judgment. So in any dispute in which both parties cannot agree upon a method of settlement, or in any dispute in which one party does not trust another to abide by the decision . . . the parties who wish their claims put into effect will have no recourse permitted by the state's legal system other than to use that very legal system.⁸³

The structure of state controlled property systems is rooted in "legal centralism," or the idea that "governments are the chief sources of rules and

80. See generally BENTON, *supra* note 10.

81. *Id.*

82. NOZICK, *supra* note 9, at 14-15.

83. *Id.*

enforcement efforts.”⁸⁴ The “quintessential legal centralist was Thomas Hobbes, who thought that a society without a sovereign, all would be chaos.”⁸⁵ Hobbes “saw no possibility that some nonlegal system of social control – [or decentralized enforcement] – might [have even] a modicum of order under conditions of anarchy.”⁸⁶ However, there is no dispositive reason why property systems cannot operate under conditions of anarchy, and trustless transfer technology demands a reimagining of the administration and enforcement of property rights without state oversight.⁸⁷

There is a diverse body of scholarship exploring property systems that operate in the absence of the law.⁸⁸ Professor David Fagundes describes one such system that has developed to promote intellectual property rights in the pseudonyms of roller derby girls.⁸⁹ “[D]erby girls have developed an elaborate, formal scheme of registration, regulation, and enforcement that requires ongoing modification and administration.”⁹⁰ Fagundes describes how intellectual property norms can develop in the absence of state-sanctioned law, and argues that stateless systems, such as the organic system created by the roller derby community to maintain the uniqueness of skaters’ names and identities, are highly effective property systems operating at minimal cost.⁹¹ Fagundes’ study concludes that the “volunteer character” of roller derby leagues, the majority of which operate without compensation, can help explain the development of its complex name regulation system.⁹² Similarly, an incentivized community of TPL miners maintains the ledger not to require compliance with the rule of law, but to protect the efficiency and integrity of a system in which they are key stakeholders. Part III of this article considers that the motivations of stakeholders in the crypto culture, such as Bitcoin miners, are driven not only by their own personal opportunism, but are also politically motivated and express mounting frustration with the status quo.

In his article, Professor Fagundes offers other examples of property systems functioning “in the shadow of the law.”⁹³ For example, Robert

84. ROBERT C. ELLICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* 138-39 (1991).

85. *Id.*

86. *Id.*

87. Fairfield, *Smart Contracts*, *supra* note 17, at 40.

88. David Fagundes, *Talk Derby to Me: Intellectual Property Norms Governing Roller Derby Pseudonyms*, 90 TEX. L. REV. 1093 (2012).

89. *Id.*

90. *Id.* at 1097.

91. *Id.* at 1095-98.

92. *Id.* at 1098.

93. *Id.* at 1094.

Ellickson's research details the social norms used by cattle ranchers in Northern California, whose customs regarding cattle trespass represent an organic system of rules and practices with remedies outside the realm of tort law.⁹⁴ Fagundes discusses other research that highlights examples of entire industries that have developed norms to govern business practices without reliance upon the legal system.⁹⁵ These examples challenge Thomas Hobbes' account of legal centralism, and trustless transfer technology built on TPL infrastructure takes this challenge to the next level.

The extralegal property systems described by Fagundes undoubtedly serve important purposes in their niche communities. TPLs, however, provide an infrastructure for the emergence of global property systems that can disrupt the traditional concept of property at the institutional level. Trustless systems challenge the need for sovereignty in cyberspace by cultivating democratized, libertarian free markets.⁹⁶ This is the version of anarchy promised by the crypto anarchists:⁹⁷ “[t]he leading idea is that as more and more of our transactions take place behind the veil of encryption, it becomes easier and easier for persons to undertake business relations that escape the purview of traditional nation states.”⁹⁸ While the crypto anarchists may hold an overly extreme vision of the role that encryption and cryptography will play in the future of property exchange, TPLs represent a substantial first step towards the creation of new extralegal property regimes that, by their very nature, have no use for either borders or the rule of law. Just as the derby girls in Fagundes' example “have developed an elaborate, formal scheme of registration, regulation, and enforcement” of unique IP,⁹⁹ TPLs rely on trust in mathematics, enforcement using smart contracts, and boast a similarly energized community that works together to protect the integrity of the system. The influence of norms within the crypto culture cannot be overstated. It is a central tenant of the crypto anarchists to operate outside the grip of the state.

94. ELLICKSON, *supra* note 84, at 40-64.

95. See Fagundes, *supra* note 88 (citing Lisa Bernstein, *Opting Out of the Legal System: Extralegal Contractual Relations in the Diamond Industry*, 21 J. LEGAL STUD. 115 (1992)).

96. Denning, *supra* note 22, at 85.

97. May, *supra* note 1, at 61.

98. Peter Ludlow, *New Foundations: On the Emergence of Sovereign Cyberstates and Their Governance Structures*, in CRYPTO ANARCHY, CYBERSTATES, AND PIRATE UTOPIAS 1, 4-5 (Peter Ludlow ed., 2001).

99. Fagundes, *supra* note 88, at 1098.

Freedom from the “shadow of the law” is extremely attractive to users of crypto systems such as Bitcoin. Yet these systems themselves may not be immune from the pattern of organization that leads to the centralization of authority. As a public ledger expands, such as Bitcoin’s blockchain, the emergence of centralized cryptostates becomes a looming reality. One of the main issues with the Bitcoin public ledger is scalability.¹⁰⁰ Each time a new Bitcoin transaction is verified and published on the blockchain, the entire history of all transactions must be recalculated.¹⁰¹ This leads to energy and computing issues that grow larger as the Bitcoin ledger scales.¹⁰² Some large-scale Bitcoin mining operations encompass entire warehouses full of “Bitcoin rigs.”¹⁰³ It is this type of data management issue that could lead to the centralization of authority within a TPL network, the very thing that the crypto anarchists seek to avoid. Additionally, some scholarship on cryptography points out that the “protection provided by encryption can [often] be illusory,”¹⁰⁴ in that if the crypto system itself is compromised, there is no authority (as of yet) to turn to for retribution. The issue of accountability may push developers of crypto systems toward some form of further centralization.

Robert Nozick, in his seminal work on anarchy and the state, describes the transformation of what he calls “private protective agencies” from bodies that are initially set up to escape the ominous grip of a state like organizational structure, to minimal states that operate in the presence of moral considerations and function under constraints similar to those that were to be avoided at the agency’s inception.¹⁰⁵ Put more simply, Nozick builds on John Locke’s “state of nature” theory to argue that the development of a state-like organizational structure is an inevitable aspect of an agency’s expansion, even when that agency was created to escape the shackles of an established regime. To the crypto anarchist’s dismay, crypto systems such as Bitcoin could suffer similar fates. As a particular trustless transfer system scales, a form of centralization and management will become necessary to meet the increased energy and computing needs of an expanding public ledger. The crypto culture as a whole may experience some type of centralization as unified normative beliefs solidify within the community. As Richard Epstein notes, “even persons whose own world

100. Blundell-Wignall, *supra* note 35, at 8.

101. *Id.*

102. *Id.*

103. A Bitcoin rig is a large-scale computer system built specifically for the commercial mining of Bitcoins.

104. Denning, *supra* note 22, at 87.

105. NOZICK, *supra* note 9, at 52.

views are widely divergent often share one common belief about their preferred norms: they all believe their norms should be . . . enforced.”¹⁰⁶

II. THE FUTURE OF PROPERTY EXCHANGE

With the infrastructure in place to administer property rights in the absence of institutional or state oversight, and enforcement left to self-executing smart contracts, a regime emerges in which property can be transferred or conveyed from person-to-person instantly without formal agreements. Recent scholarship retheorizes digital property systems as simple information trackers, organizing and tracking data on public ledgers (what Fairfield calls “property protocols”). When coupled with the increasing pervasiveness of ordinary objects connected to the network, a system structure takes shape where both digital and physical property can be exchanged using TPLs, without the need for formal contracts (or even handshakes). This climate represents a logical evolution in the efficiency of networked transactions.

A. *The “Property Protocol”*

Identical assets are often treated differently because one is attached to a physical object and the other resides online.¹⁰⁷ For example, an individual’s ownership rights in a CD or book are viewed as fundamentally different from the thinner rights given to ownership of a digital download or e-book. In both of these examples, the information contained in the physical object is exactly the same as the information that embodies its digital counterpart, and both can be copied and redistributed. Yet individuals’ rights in digital property are limited.¹⁰⁸ The conceptual distinction between digital and physical property must be removed in order to imagine the property systems of the future. From iPhones to apples, in the near future almost all property will be connected to the network.

Professor Fairfield proposes an elegant retheorizing of digital property systems in his article *BitProperty*.¹⁰⁹ His article highlights the inadequacy of current digital property management systems, and seeks to explain digital

106. Richard A. Epstein, *Enforcing Norms When the Law Gets In the Way*, 7 RESPONSIVE CMTY., Fall 1997, at 4, 7.

107. Fairfield, *BitProperty*, *supra* note 13, at 855-57.

108. *Id.* at 839.

109. *See generally* Fairfield, *BitProperty*, *supra* note 13.

property in terms of information, and the “property protocols” that keep track of who owns what online.¹¹⁰ Fairfield’s characterization of digital property as information or data, along with the protocols that describe the relationship between online identities and resources, creates a space for new, decentralized systems that can cheaply and efficiently track that information online, a task traditionally administered by centralized institutions.

Fairfield suggests an approach that imagines property as an information protocol.¹¹¹ More simply, “property is information: who owns what.”¹¹²

Property is the law of lists and ledgers. The vast bulk of owned wealth is recorded in systems that tell users who owns what. County courthouse land records, Uniform Commercial Code (“UCC”) security interest filing systems, . . . the stock clearing house system, the Mortgage Electronic Registration System (“MERS”), . . . bank accounts, intellectual property interests filed with the federal registries, and consumer-purchased music through iTunes—all are just entries in a ledger associating an identify with an interest in some resource.¹¹³

A property system, such as a record of land deeds, communicates information and transfers the resource upon completion of a transaction (real property in the land deed example) from one owner to its successor in ownership.¹¹⁴ Digital property systems do the same, and have similar centralized institutions that verify and authenticate transactions online.¹¹⁵ These examples demonstrate Fairfield’s idea of property systems as information trackers that contain the data necessary to determine ownership rights. TPLs administer these property rights without the need for third party or state intervention, making them self-sufficient and operative in the absence of any centralized authority.

B. *The Internet of Things*

The “Internet of Things” is a buzz phrase in the techy community that refers to the recent boom in connected devices and chattels.¹¹⁶ It includes connected and catalogued objects ranging from homes, smartphones, and

110. *Id.* at 854.

111. *Id.*

112. *Id.* at 811.

113. *Id.* at 807.

114. *Id.* at 854-55.

115. *Id.* at 855-56.

116. Gene Quinn, *The Race to Dominate the Internet of Things*, IP WATCHDOG (Feb. 15, 2015), <http://www.ipwatchdog.com/2015/02/15/the-race-to-dominate-the-internet-of-things/id=54698/>.

automobiles, to bikes, concert tickets, and even food. What the Internet of Things promises is individualized analytics that can identify and track how humans interact with their property. By 2020, the market for this industry is expected to rise to \$7.1 trillion.¹¹⁷ And by the year 2050, experts predict as many as 50 billion connected devices.¹¹⁸ This has wide-reaching implications for how people interact with their connected personal property. As an increasing amount of property transactions move onto networks, physical goods and personal property connected to the network can be exchanged over TPLs without the need for traditional contracts.

With the expanding infrastructure of the Internet of Things comes the prospect of cataloguing vast databases of ownership rights in physical personal property on the network. The Internet of Things simply tracks how an object is used, and who uses it. Likewise, trustless transfer systems such as TPLs are all about tracking “who owns what.”¹¹⁹ The gap is not wide between Fairfield’s property protocols that track ownership and property rights, and a climate where connected property, or even land, is tracked using a similar method. In such a scheme two parties transact over an encrypted trustless transfer network, and a smart contract transfers ownership in the connected personal property from A to B as securely and legitimately as exchanging a Bitcoin. Although the physical object cannot be conveyed over the ledger itself (the boom in 3D printing may challenge this maxim in the future), the ownership right in that physical object is attached to its description on the public ledger, and encrypted protocols ensure that only the unique possessor of the public-private key pair can interact with the physical property, rendering theft of the property useless.¹²⁰ The exchange would be executed using a smart contract, and the transaction would be published on the ledger in perpetuity for all to see.

C. *The Future of Exchange*

One tangible display of cryptography in action is the development of smartphone encryption that enables users to pay at the register using their

117. *Id.*

118. *Id.*

119. Fairfield, *BitProperty*, *supra* note 13, at 808.

120. *Id.* at 819-20.

phone as a wallet.¹²¹ This clearly represents an increase in efficiency, and provides consumers with the protection and the privacy they crave. In fact, new smartphone encryption has become so effective at protecting the private information contained on a phone, that it has caught the attention of federal law enforcement.¹²² FBI Director James Comey expressed his outrage at companies such as Apple and Google for enabling smartphones with encryption so strong that it may prevent law enforcement from eavesdropping on personal data such as call logs, instant messages and location history.¹²³ This tension strikes at the heart of the debate concerning crypto systems; the value of promoting efficiency, freedom and innovation must be weighed against the risks of enabling criminals or terrorists with tools for communicating and transacting in anonymity.

As this debate continues to intensify, forward thinking businesses are wasting no time developing innovative applications for TPLs. For example, London based startup Everledger has created a TPL protocol that maps the unique characteristics of large diamonds, and catalogues that information on Bitcoin's blockchain to track a diamond's journey from the mine to the end consumer.¹²⁴ Other innovative applications include MeXBT, a Mexico City based remittance company that allows money transfers to Mexico over the blockchain to be withdrawn as cash from ATMs, and companies in the syndicated loan space that are utilizing TPLs to process pooled corporate debts.¹²⁵ Even the Nasdaq is working on TPL applications for trading private shares of closely held corporations.¹²⁶

TPLs can solve many problems that have slowed the pace and efficiency of traditional business transactions. As another example, TPLs can be deployed to elegantly solve the problem of the first sale doctrine with respect to digital music downloads.¹²⁷

121. See Caitlin McGarry, *Apple Pay Aims to Replace Your Wallet With an iPhone*, MACWORLD (Sept. 9, 2014, 11:10 AM), <http://www.macworld.com/article/2604353/applepay-aims-to-replace-your-wallet-with-an-iphone.html>.

122. See Gabriella Demczuk, *FBI Chief Rips Apple, Google Over Smartphone Encryption*, DALLAS MORNING NEWS (Sept. 26, 2014, 7:14 AM), <http://www.dallasnews.com/news/local-news/20140925-fbi-chief-rips-apple-google-over-smartphone-encryption.ece>.

123. *Id.*

124. Blythe Masters, *Selling The Blockchain to Wall Street*, BLOOMBERG MKTS., Oct. 2015, at 49.

125. *Id.*

126. *Id.*

127. Jerry Brito, *Is Bitcoin the Key to Digital Copyright?*, REASON.COM (Feb. 24, 2014), <http://reason.com/archives/2014/02/24/is-bitcoin-the-key-to-digital-copyright>.

Particular music files could be associated with a particular user's public [TPL] addresses and encrypted in such a way that the user's corresponding private key is needed to play the songs. Selling, lending, or giving away a song or a book would be as simple as sending it to someone else's public address. At that point, only the recipient's private keys can unlock the file. And this would all be cryptographically provable, without requiring trust.¹²⁸

The explosive expansion of connected devices combined with TPL tech can also be harnessed to enable potential buyers of property with tools that precisely describe the history and past use of a connected piece of property. For example, an automobile connected to the network can accrue information on everything from engine conditions, to accident history, to GPS data. This type of history informs a potential buyer of the state and quality of the property and enables one to make informed decisions about purchasing the car. This would cut out third parties that do the same such as Carfax, and the entire history of the car's use and ownership is published on a TPL defining the true value of the property in perpetuity.

III. REGULATING CRYPTO CULTURE

Crypto anarchy promises liberation from state and institutional oversight, but it also carries with it very real dangers, and provides a means for a plethora of illegal activity such as tax evasion, money laundering, theft of trade secrets, and serious national security and terrorism risks. There are strong public policy reasons for regulating crypto systems such as Bitcoin, and some nations, such as Russia and China, have banned the likes of Bitcoin altogether. Yet, even in the face of very real and legitimate concerns, there is one side of the debate that believes any attempt to regulate crypto systems would be futile, just as regulation in the context of illegal file sharing has done little to thwart the efforts of the Napster generation from pirating music. The normative motivations of stakeholders in the crypto culture run much deeper than those of the music pirate. Participation in the crypto culture is a form of counter-culture and rebellious political expression, one that has developed in the vacuum created by repeated breaches of trust by the traditional institutions that surround us.

128. *Id.*

A. *Accountability: The Counter Argument*

While Bitcoin has been altogether outlawed in Russia and China,¹²⁹ policy makers in the United States have categorized the virtual currency as a commodity, and those that buy and sell Bitcoin are subject to the same laws and taxation as a trader of any security.¹³⁰ Bitcoin exchanges, which allow individuals to buy or exchange Bitcoins, are treated like banks for legal purposes. These exchanges, in their infancy, have serious vulnerabilities. And any fair and balanced analysis of the Bitcoin TPL must confront the issue of accountability in a decentralized regime.

In their early form, TPLs are vulnerable in this respect, and the case for heavy oversight and government regulation posit their attack on cryptography in terms of accountability.¹³¹ One of Bitcoin's most nefarious applications was the infamous black market trading platform called the "Silk Road."¹³² The Silk Road was akin to a black market eBay operating on an amorphous region of the Internet known as the "darknet" or "deepnet." Using a darknet directory, tech savvy hackers can utilize open sourced software to traverse the Internet in complete anonymity.¹³³ Simply finding a darknet directory can be difficult even for experienced programmers, but once you're in you can explore encrypted exchange platforms such as the Silk Road.¹³⁴ The Silk Road, which has sprung a perpetual flow of gimmicks, hosted a "utopic libertarian drug market" for pot, cocaine, LSD, heroin and numerous other drugs.¹³⁵ The website allowed users to trade only in Bitcoin to promote anonymity and avoid law enforcement.¹³⁶ Since the first iteration of the Silk Road was shut down, numerous other darknet sites that promote illegal activity have cropped up and have later been shut down, illustrating the perpetual whack-a-mole scenario mentioned in the introduction to this article.¹³⁷ Policing the

129. Ethan D. Jeans, *Funny Money or the Fall of Fiat: Bitcoin and Forward-Facing Virtual Currency Regulation*, 13 COLO. TECH. L.J. 99, 109 (2015).

130. See Fairfield, *BitProperty*, *supra* note 13, at 835, 837, 869.

131. See Robert McMillan, *The Inside Story of Mt. Gox, Bitcoin's \$460 Million Disaster*, WIRED (Mar. 3, 2014), <http://www.wired.com/2014/03/bitcoin-exchange/>.

132. See *id.*

133. Derek A. Dion, *I'll Gladly Trade You Two Bits on Tuesday for a Byte Today: Bitcoin, Regulating Fraud in the E-Conomy of Hacker-Cash*, 2013 U. ILL. J.L. TECH. & POL'Y 165, 166.

134. *Id.*

135. *Id.*

136. *Id.*

137. Graham Templeton, *Dark Market Massacre: FBI Shuts Down Silk Road 2.0 and Dozens More Tor Websites*, EXTREME TECH (Nov. 8, 2014), <http://www.extremetech.com/extreme/193821-dark-market-massacre-fbi-shuts-down-silk-road-2-0-and-400-other-tor-websites>.

darknet is extremely difficult for law enforcement, and requires the allocation of an immense amount of resources and discretion to federal law enforcement agencies. Moreover, the intense motivations of those who seek to utilize crypto systems to cultivate total libertarian economies will continue to outpace any response by law enforcement.

The most striking example of a failure of accountability for a business using TPL technology is of course the fabled demise of the Bitcoin exchange Mt. Gox, which mysteriously “lost” \$460 million of users’ currency to hackers in April of 2014 before filing for bankruptcy.¹³⁸ The exchange’s CEO, Mark Karpeles, offered a thin apology, stating that the exchange “had weaknesses in our system, and our Bitcoins vanished. We’ve caused trouble and inconvenience to many people, and I feel deeply sorry for what has happened.”¹³⁹ For those that got burned by the hack, and to those that would have cryptographic technologies heavily regulated, this vague accounting of the epic Mt. Gox hack fuels the argument for heavy regulation of crypto currencies.¹⁴⁰ But regulators must carefully distinguish between TPLs and their application as virtual currencies when considering new policies designed to thwart the efforts of pesky hackers.

Crypto anarchists paint a picture of a world where crypto currencies could break down even the most entrenched financial institutions, such as central banks. But some scholars identify one simple maxim that debunks this vision: everyone must pay taxes.¹⁴¹ Governments will only accept legal tender for this purpose, which is “precisely the leverage over the financial system that ensures that the government can affect interest rates in the entire economy.”¹⁴² While the crypto anarchists may have grandiose visions about virtual currencies and disruption at the governmental level, there is one camp of thinkers who argue that crypto currencies such as Bitcoin will not impact the ability of governments to control monetary policy because of taxation.¹⁴³

Unlike many of the infant businesses built using trustless technology, traditional institutions are (in theory) held accountable when mistakes are made, and will often mitigate the risk of fraudulent or illegal transactions by assuring that individuals’ assets are protected. If a thief swipes your Visa

138. McMillan, *supra* note 131.

139. *Id.*

140. *See id.*

141. Blundell-Wignall, *supra* note 35, at 7.

142. *Id.* at 12.

143. *Id.*

on a shopping spree in Beverly Hills, the funds will usually be returned to your account and a criminal investigation is launched. Law enforcement is then granted access to relevant transactional information in pursuit of the perpetrator. This type of accountability is extremely attractive in our modern chaotic world, but there are many associated transaction costs and fees. The state is also quick to intervene in the management of trust, which often leads to compromising government oversight, and sometimes even the exploitation of private transactional information by misguided law enforcement agencies.¹⁴⁴

B. The Futility of Regulation

Over the last several decades, the study of normative behavior has played a central role in describing trends in compliance with the law. Amitai Etzioni has pioneered this area of scholarship, and describes how legal scholars have “rediscovered social norms” in an attempt to understand how an individual’s social preferences can shape conceptions of the law’s legitimacy in a given context.¹⁴⁵ Etzioni argues that social norms shape predispositions, and are the “basis of individual choices.”¹⁴⁶ He goes on to assert that adherence to social norms depends on a risk analysis, and that people “will tend to violate the norms when the benefits of abiding by them are lower than are the gains of violating them and the risks of detection are low.”¹⁴⁷ The same concepts can be applied to participants in digital social

144. One example is the DOJ’s recent initiative dubbed “Operation Choke Point.” This federal directive was designed to “choke off” the funds needed for illegal industries to survive by targeting the financial institutions that provide services to such industries. See Todd Zywicki, “Operation Choke Point”, WASH. POST (May 24, 2014), <http://www.washingtonpost.com/news/volokh-conspiracy/wp/2014/05/24/operation-choke-point/>. “The general outline is that the DOJ and bank regulators are putting the screws to banks and other third-party payment processors to refuse banking services to companies and industries that are deemed to pose a “reputation risk” to the bank.” *Id.* This has resulted in the “choking off” of several businesses operating in legal industries including the “non-deposit lending industry, pawnbrokers, firearms and ammunition manufacturers and retailers, and tobacco retailers” among others. See David Stemler, *De-Risking and Operation Choke Point*, 12-14 MTGE. COMPL. LETTER 3 (2014). Financial institutions, in an effort to avoid being “buried under red tape,” will then “close bank accounts and refuse to process credit card payments for the business even if no impropriety has ever been alleged by any agency or legal entity.” *Id.* The result is that “the flow of cash to and from these businesses is “choked off” and the business dies.” *Id.* While most of the targeted industries are indeed controversial, entire legal enterprises have be destroyed using this method. See Zywicki, *supra*.

145. Amitai Etzioni, *Social Norms: Internalizations, Persuasion, and History*, 34 LAW & SOC’Y REV. 157, 157-58 (2000).

146. *Id.* at 163.

147. *Id.*

movements.

The case of Napster, and the attempted regulation of illegal file sharing, perfectly illustrates Etzioni's normative risk analysis. The Napster generation does not perceive any great risk involved in stealing music, and any tangible deterrence mechanisms are outweighed by the social utility of free downloads. For mischievous users of crypto systems, such as traders on the Silk Road or similar sites, deterrence via regulation and even the threat of heavy criminal prosecution is a minimal deterrent because the anonymous nature of the technology makes getting caught very unlikely.¹⁴⁸ Legitimate TPL users engage in a similar type of risk balancing: increased efficiency and reduced transaction costs are weighed against a perceived lack of accountability.

For those that have embraced Bitcoin, using the payment system represents a more efficient means of payment. But it is also a symbol of the libertarian, counter-culture attitude of participants and stakeholders. The attitudes and social norms of Bitcoin users are reflected by the outlets that are early adopters of the system. In 2014, many music festivals began accepting Bitcoin.¹⁴⁹ For example, Portugal's "Boom Festival," which bares the slogan "[n]o to corporate sponsors, corporate logos and VIPs, yes to independence, solidarity and creativity," allows concert-goers to pay for tickets using the virtual currency.¹⁵⁰ This message is a common theme for the Bitcoin user base, an "off the grid" community that desires to keep their financial information private. And while some research suggests that the Bitcoin community will most likely remain a niche market, approaching something like 5 million active users by 2019, the solidarity and strength of the crypto community is clear.¹⁵¹

The same study points out that there are several major impediments to mainstream adoption of crypto currencies such as Bitcoin.¹⁵² The predicted "niche" size of Bitcoin's user base conflicts with the crypto anarchist view

148. While the mastermind behind the Silk Road, Ross Ulbricht, was recently sentenced to life in prison, average users of the deepnet, and of encrypted transaction platforms such as the Silk Road, are extremely difficult to find and prosecute. For more on Ulbricht's draconian prosecution, see Chris Matthews, *The Silk Road Mastermind Appealed His Life Sentence*, FORTUNE (June 5, 2015), <http://fortune.com/2015/06/05/silk-road-ross-ulbricht-appeal/>.

149. Daniel Palmer, *The 6 Best Pro-Bitcoin Festivals of 2014*, COINDESK (Mar. 7, 2014), <http://www.coindesk.com/6-best-pro-bitcoin-festivals-2014/>.

150. *Id.*

151. See Everett Rosenfeld, *Bitcoin to Near 5M Active Users by 2019, Remain Niche: Study*, CNBC (Mar. 17, 2015), <http://www.cnbc.com/id/102512655>.

152. *Id.*

that cryptography will proliferate every aspect of business and communication. That's not to say that a small, motivated niche community, like Fagundes' roller derby girls for example, cannot be extremely effective in maintaining a successful property system that operates without the need for state oversight. And regardless of whether virtual currencies such as Bitcoin achieve mainstream use, these highly motivated communities will prove to be a perpetual thorn in the side of law enforcement seeking to deter nefarious uses of crypto systems.

As reflected in the examples in Part II of this article, there is a buzzing community of entrepreneurs who seek to develop useful, and legal, crypto systems that make doing business safer, more efficient, and more private. This community will build the trustless infrastructure of the future, and stifling their ability to innovate in response to the acts of a handful of underworld hackers projects a net negative. Further, laws that are widely unenforceable as applied to anonymous digital avatars do not deter those that use crypto systems for illegal activity. Thus, regulation will be largely futile, and should not be pursued at the expense of important social utility and advances in economic efficiency.

Conclusion

This article has laid out the major framework for the trustless property systems of the future. Trustless ledgers and smart contracts enable transacting outside of the state's control, and provide solutions to many problems plaguing traditional property systems. The concept of property exchange will evolve as the physical world and the objects we hold dear are seeded with interactive software and connected to the network. To echo the growing sentiment among scholars, policy makers lobbied by traditional institutions that are fearful of disruption in their sectors, must not pass short-sighted regulation justified by the acts of a handful of hackers who have abused trustless transfer tech as applied specifically to virtual currencies. While the crypto anarchist's vision of crumbling governments and powerless central banks is probably best suited for a sci-fi thriller, trustless transfer technology has the power to inject liberty and democracy into the networked economies of the future, and provides a powerful toolset for increased transactional efficiency, one that will shake the concept of property exchange in the years to come.

Edward D. Baker