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**NAVAL
POSTGRADUATE
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MONTEREY, CALIFORNIA

MBA PROFESSIONAL PROJECT

**UNDERSTANDING BITCOIN AND ITS UTILITY
FOR SPECIAL OPERATIONS FORCES**

March 2022

By: Michael C. Pero

Advisor: Amilcar A. Menichini

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC, 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 2022	3. REPORT TYPE AND DATES COVERED MBA Professional Project	
4. TITLE AND SUBTITLE UNDERSTANDING BITCOIN AND ITS UTILITY FOR SPECIAL OPERATIONS FORCES			5. FUNDING NUMBERS	
6. AUTHOR(S) Michael C. Pero				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) <p>In just over 12 years, Bitcoin rose from an obscure idea posted to a cryptographer's mailing list to a globally-recognized asset class with market cap of over \$1 trillion. This paper examines Bitcoin and the blockchain technology on which it is based from two distinct angles: 1) its long-term viability as money or a durable unit of exchange, and 2) its potential applications within U.S. Special Operations Command (USSOCOM) to enhance operational effectiveness.</p> <p>As a unit of exchange, Bitcoin contains the fundamental properties of money—durability, portability, divisibility, uniformity, and limited supply—but lacks one important characteristic: acceptability. Bitcoin's odds of reaching this final milestone are threatened by the basic psychology of power, fear, and sovereign nations' ability to exert control over its money supply.</p> <p>Within USSOCOM, early adoption of Bitcoin can provide a suite of tactical tools and options to counter Chinese expansion, enable human intelligence operations, and modernize frontline payment methods with the use of digital tokens and e-wallets.</p>				
14. SUBJECT TERMS Bitcoin, U.S. Special Operations Command, SOCOM, cryptocurrency, money, Web 3.0, Web 3, Chinese smart cities, opium wars, century of humiliation, decentralization, stablecoins, altcoins, steganography, Austrian economics, death spiral, El Salvador, digital yuan, e-wallet, digital payment			15. NUMBER OF PAGES 57	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

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**UNDERSTANDING BITCOIN AND ITS UTILITY
FOR SPECIAL OPERATIONS FORCES**

Michael C. Pero, Lieutenant, United States Navy

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
March 2022**

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ABSTRACT

In just over 12 years, Bitcoin rose from an obscure idea posted to a cryptographer's mailing list to a globally-recognized asset class with market cap of over \$1 trillion. This paper examines Bitcoin and the blockchain technology on which it is based from two distinct angles: 1) its long-term viability as money or a durable unit of exchange, and 2) its potential applications within U.S. Special Operations Command (USSOCOM) to enhance operational effectiveness.

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Within USSOCOM, early adoption of Bitcoin can provide a suite of tactical tools and options to counter Chinese expansion, enable human intelligence operations, and modernize frontline payment methods with the use of digital tokens and e-wallets.

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LIST OF ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
CCP	Chinese Communist Party
CERP	Commander's Emergency Response Fund
DOD	Department of Defense
ESG	Environmental, Social & Governance
FOO	Field Ordering Officer
GDP	Gross Domestic Product
GPC	Great Power Competition
GWOT	Global War on Terror
HUMINT	Human Intelligence
MB	Megabyte
NDS	National Defense Strategy
NGO	Non-Governmental Organization
OBOR	One Belt One Road
OPFUND	Operational Fund
PA	Paying Agent
SOCEUR	Special Operations Command Europe
SOCOM	Special Operations Command
SOE	Special Operations Executive
SOF	Special Operations Forces
TTP	Tactics Techniques and Procedures
USD	U.S. Dollar
UW	Unconventional Warfare

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I. INTRODUCTION

A. MONEY IS TECHNOLOGY

At face value, money is a simple concept. When asked, most people would describe it as a medium of exchange or a unit of account. The dictionary defines it as “something (such as coins or bills) used as a way to pay for goods and services and to pay people for their work” (merriamwebster, n.d.). Like any commodity, it has essential characteristics that define its usefulness: durability, portability, divisibility, uniformity, limited supply and acceptability (stlouisfed, n.d.). For physical examples of what it is or has been, one can turn to history: cattle, seashells, large stones, small stones, glass beads, salt, spices, metal coins, paper notes, ledger entries and most recently, electrons on computer screens. As civilization changed and developed, the invisible hand of those economic principles shaped money’s pedigree. Cattle were portable and durable but not divisible. Seashells and glass beads were divisible, portable and durable but lacked scarcity or acceptability across cultures (Bhatia, 2021).

As money evolved beyond the physical, it became inextricably rooted in human psychology: money stores value, creates wealth, provides security, and represents the most common metric to measure worth or deprivation. Perhaps the best way to think about money is as technology; an applied use of knowledge and development. Just as technology often transcends the physical to become an idea, money can be simultaneously a thing to hold and an abstraction; it is continuously shapeshifting to the ever-evolving demands of its human creators. Like any endeavor rooted in the imperfect and fraught incentives of mankind, each new form of money ascended by its merits and failed by its flaws—most commonly an incompatibility with the aforementioned principles or exposure to human manipulation (Wray, 2012). Its development is driven by innovation and the relentless appetite for improvement, betterment and efficiency.

B. THE GOLD STANDARD

Gold is money. Everything else is credit.

—J.P. Morgan to United States Congress in 1912

Eventually, gold emerged as the world's preferred form of money. The process was organic, market driven and was due in large part to gold's adherence to the basic principles (Bordo et al., 2007). It was durable—ancient coins retrieved from underwater wrecks are virtually unchanged from their original state. It was malleable and could be easily formed into uniform coins of different weights and sizes. Most importantly though to its utility as money, it was scarce and hard to produce. The laws of supply and demand would suggest that once gold became generally accepted as money, production would rise to meet demand and this would ultimately reduce the value of commodity. But finding, mining and refining gold requires such a high amount of labor and capital, the cost becomes prohibitive increased production. Also, because it is durable, most of the gold ever mined in the world still exists so even an above average year of gold production is not able to make a large percentage difference on the global stockpile (Ammous, 2018). By the mid-1800s, most of the world was on some form of gold standard with their individual currencies backed up by gold reserves. Eventually, for reasons we will explore, that link was broken and the world transitioned to the current model of fiat currency.

C. THE RISE OF FIAT CURRENCIES

World War I was responsible for breaking the link between money and gold (Dalio, 2021b). The reason was simple in hindsight: the belligerents ran out of gold to finance the war but refused to let this slow them down. With surrender off the table, they simply broke the promise to redeem their sovereign notes for gold, floated their currencies and funded the war with loans denominated in their inflated currency. So began the rise of fiat, or government issued, money. Since then, control over the supply of money has been a function of the central banks of the leading global economies (Crabbe, 1989). This means that, without the direct backing of any asset held in reserve, money today, be it cash, credit, loan or Treasury Bill is, in its most basic form, simply a promise. It is a promise made in good faith, backed by the implicit credibility of a sovereign nation's economic engine, military might and extensive tax base but it is still a promise which inherently requires something very important from the end user: trust.

D. DIGITAL MONEY AND THE EMERGENCE OF BITCOIN

In late 2008, an anonymous computer programmer presented a sketch for a completely new type of money, one designed to fix common complaints with fiat money, one not reliant on trust or central banks. At the time, the global money machine was melting down and trust in financial institutions was in short supply. Additionally, the extraction plan from the mess, which central banks were charting on the fly, was adding unprecedented debt to an already overburdened global financial system and sowing the seeds of an even bigger financial crisis in the future (Dalio, 2021b). To Bitcoin's creator Satoshi Nakamoto, the technology of money was ripe for another disruption.

1. Why Bitcoin?

Bitcoin, according to its Nakamoto is, “a system for electronic transactions without relying on trust” (Nakamoto, 2008). Trust seems like an odd word when discussing a new technology based in computer science and cryptography but it is critical to understanding Bitcoin and the blockchain technology that provides its structure. Before explaining *what* Bitcoin is, it is prudent to understand *why* it was created and what problems Nakamoto was attempting to solve. Bitcoin's original value proposition to its founders and early adopters were simple principles of decentralization, transparency and individual financial sovereignty—essentially it seeks to provide a purely peer-to-peer payment system without a trusted third party or middleman (Chohan, 2017). However, its rising popularity, boosted by stories of exponential wealth and cyber-crime, conflated these values in common parlance with more sensational and nefarious ones so that now a popular mystic exists around cryptocurrency as a whole which muddies the story of its genesis.

But Bitcoin's adoption rate, explosive growth and survival through many downturns suggests that Nakamoto was not alone in his dissatisfaction with modern money and a belief that its flaws could be circumvented with an entirely new form (Johnson & Green, 2019).

Nakamoto's whitepaper was published in late October, 2008, and the macroeconomic context into which it was released provided a dramatic example of issues

it sought to correct. By January of that year, it was clear the U.S. housing market was in trouble and in March, the Fed began bailing out mortgage lenders. When Lehman Brothers collapsed in September, the world panicked (Amadeo, 2020). To Nakamoto and many of Bitcoin's early adopters, the Great Recession was merely the latest symptom of a systemic problem in the global financial system; namely, that money, through the process of credit creation and other powers maintained by central banks, is elastic and fails to meet the criteria of limited supply. Bitcoin, coded to have a fixed supply, emerged in protest to the easy-money, bail-out policies of central banks that many blamed for encouraging bad investments, speculation, risk taking and a general moral decay (Ammous, 2018). It is reliant on a decentralized network—power is spread out and diffused—countering the traditional centralized model which holds that power (governance, recordkeeping, control), be maintained by a trusted third party such as a central bank or credit card company. Trust in Bitcoin correlates to a lack of trust in those third parties. By creating it, Nakamoto was attempting financial revolution: take power from those he felt had abused it and distribute it to users and direct stakeholders.

2. How Bitcoin Works

Although the purpose of this paper is not to explain the technical details of how Bitcoin works, the following summary on Bitcoin's basic components and operational functionality will hopefully serve as a simple primer for any reader unfamiliar with the cryptocurrency. When thinking about what Bitcoin is and how it works, it is helpful to understand the difference between Bitcoin the asset and the Bitcoin network. *A Bitcoin—Bitcoin the asset, Bitcoin the token—is simply a unique key, a password, that designates ownership to a data file (Pysh, 2021).* The Bitcoin network, on the other hand, refers to the sum of all computers running the same software protocol, all interacting to build and maintain a common ledger or permanent record of work. This is known as blockchain technology and is the basic foundation of Bitcoin (Zheng et al., 2017). The basic principles of blockchain which, when combined, replace the need for a trust are disintermediation, decentralization, transparency and immutability (Bischoff & Seuring, 2021). Network users fall into two categories: nodes and miners. For simplicity, nodes are more common and are characterized by any machine running the Bitcoin software

and interacting with the network. Miners are specialized nodes that perform a more involved process of confirming transactions and distributing new Bitcoins (Braiiins, 2021). The process of mining involves solving cryptographical problems embedded in the protocol and attaching new blocks of data *permanently* to the chain. Solving the problems require large amounts of processing power and for their effort, miners are rewarded with transaction fees and new tokens. Conversely, verifying a correctly solved problem, an important function performed by the more common nodes to ensure integrity, requires very little processing power. A helpful way to conceptualize this process is by thinking about a large jigsaw puzzle—putting it together takes hours or days of focused attention but verifying completeness can be done with a casual glance (Pysh, 2021).

a. Decentralization

Decentralization, the idea that power and control are distributed throughout a network or system, is an important part of the Bitcoin value proposition. This is accomplished by two things. First, identical copies of the blockchain are held on every node which also contributes to its immutability (Zheng et al., 2017). Second, any effort to change the software through which all nodes transact requires a consensus—there is no one company or board able to unilaterally change the code. As an example, efforts by Bitcoin users to increase the block size from its original one megabyte (MB) size have all failed because of a lack of consensus among users (Laumeister, 2020). This is an important distinction between Bitcoin and other cryptocurrencies. The blockchain, with all the transaction history, is commonly known as the ledger. A distributed ledger across an increasing number of nodes lowers the chance of a node or a group of nodes teaming up to modify the ledger for their own benefit. Modifying the blockchain requires over 50% of the nodes in the network to simultaneously insert false information into the network. This is commonly referred to as a 51% attack and, to date, has not happened to the Bitcoin network (Nahar, 2021).

b. Incentive

Nodes within the Bitcoin network are incentivized by the value of Bitcoin to remain honest and preserve the integrity of the network. Bitcoin's value is directly

correlated to the perception that the network works as advertised, that the ledger will remain immutable and that coins cannot be hacked or stolen (Kroll et al., 2013). This amounts to trust. If trust is damaged, Bitcoin's value will presumably decrease which incentivizes honesty among network participants (Pysh, 2021).

3. Alternative Cryptocurrencies

According to the website Statista.com, as of November 2021 there were over 6000 cryptocurrencies in circulation although the top 20 make up over 90% of the market (Statista, 2021). These alternative forms of cryptocurrency (aka "altcoins," cryptocurrencies other than Bitcoin) or "stablecoins" (tokens pegged to fiat currencies such as the U.S. Dollar (USD)) share the same basic building blocks as Bitcoin but may use different consensus mechanisms to validate transactions or were created to add functionality unavailable with Bitcoin (Frankenfield, 2021). The important distinction between the two, however, is that altcoins lack the same decentralization and immutability as bitcoin. Ultimate control or influence over these coins is usually held by a team of public creators, inventors, or programmers who can change aspects of the coin, including supply, if needed. In 2016, Ethereum, the world's second largest cryptocurrency, was compromised by a programmer who exploited a loophole in the code to syphon off \$55 million worth of the cryptocurrency. (Leising, 2020). Known as the "DAO Attack," once discovered, Ethereum creators worked to close the loophole and fix the problem which saved further theft but demonstrated that control could be exercised at will by a team of insiders (Mehtar et al., 2019).

II. LITERATURE REVIEW

As a thing worth devoting academic rigor to, Bitcoin is a relatively new and lightly populated subject. The sparse collection of serious books and peer-reviewed journal articles on the topic is partly due to the short lifespan (12 years at the time of writing) but also likely due in part to it being a fringe topic—one that presents a potential risk to the career of any respected economist or social scientist. In what could be described as a symptom of the world into which Bitcoin was birthed, alternative sources of information such as podcasts, interviews, blogs and online videos on the topic, however, are plentiful. This presents a challenge to the researcher who must right-size an optimal sieve with which to sluice the slag piles for truth. This literature review is an attempt to sift fact from faith, science from speculation. The sources and names mentioned are either undisputed members of the historical ledger or ones whose work have generated enough momentum and/or critique to where it becomes evident that they have tapped an underlying social or scientific vein and by doing so, advanced the field.

A. THE BITCOIN WHITEPAPER

On October 31, 2008, a whitepaper with an unassuming title *Bitcoin: A Peer-to-Peer Electronic Cash System*, was published to a mailing list for those interested in cryptography. In Bitcoin's initial thesis, author Satoshi Nakamoto makes a brief case against the trusted third parties necessary for all modern financial transactions and gives a pragmatic explanation of his solution: an electronic cash that relies on computational power and a chain of digital signatures to eliminate the trusted third party. The paper is written in outline form and covers just the basics: transactions, timestamp servers, proof-of-work, networks, incentives, reclaiming disk space, simplified payment verification, combining and splitting value, privacy and calculations (Nakamoto, 2008).

At first blush, the paper reads like a technical manual from some new experiment—complicated, quirky, dry. But, when examined deeper, with a careful eye on how the subtext of the introduction sets against the pending collapse of the global

banking system in 2008, we see a three-dimensional protest screed against modern money-meddling emerge from the contextual contrast (Johnson & Green, 2019).

B. BITCOIN'S CULTURAL GENEALOGY

Nakamoto, it turns out, was a pseudonym and to this day his identity is still unknown, but if one traces Bitcoin's lineage through a synapse network of its creator's initial interactions with other cryptologists and 'cypherpunks' a clearer picture emerges of the culture that birthed Bitcoin. We see a community with anarchic tendencies, a strong dissatisfaction with central bank interference, libertarian values, one eager to create and promote a new form of money that adhered to their preferred principles of hard money and personal autonomy (Ammous, 2018).

In the years following Nakamoto's white paper, Bitcoin's earliest adopters paint a useful picture of that community. Hal Finney was the recipient of the first bitcoin transaction on January 12th, 2009. Finney was a computer programmer and ran the first-ever cryptology-based online newsletter. He was the first one to download Nakamoto's software and received 10 Bitcoins from the creator as a test (A. Peterson, 2014). Wei Dai, creator of a Bitcoin predecessor, b-money, is a computer programmer who self-identifies as a cypherpunk—a loose collection of individuals who advocate for cryptography and privacy enhancing technologies as a means of social and political change. According to *A Cypherpunk's Manifesto*, author Eric Hughes writes in 1992:

We the Cypherpunks are dedicated to building anonymous systems. We are defending our privacy with cryptography, with anonymous mail forwarding systems, with digital signatures, and with electronic money. (Hughes, 1992)

Nick Szabo and Gavin Anderson were early adopters as well. Szabo attempted to create a digital currency in 1998 with 'bit gold' and in 2015 the New York Times made the case that he was the real Nakamoto (Popper, 2015), a claim that he denies. Anderson, a software developer, held the title of lead maintainer of the bitcoin network until 2014.

Based on both their words and actions, these characters shared a common trait—they were all mistrustful of centralized authority, believing that individuals as a collective, deserved ultimate autonomy over their own financial assets. It was a

completely fringe idea however so it comes as no surprise that it was relegated as such by the mainstream. When the Dark Web and Silk Road became synonymous with illicit and illegal activity, Bitcoin was castigated in lockstep as an enabler of their debauchery (Ditamore, 2018). In 2011, when the biggest Bitcoin exchange at the time, Mt Gox, was hacked and the price of Bitcoin plummeted, the mainstream shook its collective head and respected journalists filed its eulogy amongst the annals of other asset bubbles (Cheung et al., 2015).

C. BITCOIN'S ROOTS IN ECONOMIC THEORY

A common thread binds the original literature on Bitcoin: early authors, founders and entrepreneurs all champion the economics of hard or sound money, similar principles that characterized the gold era (Ammous, 2018). The corresponding elements of fixed supply, transparent rules and decentralized control represent a rejection of the basic operating fundamentals of modern central banks. To better understand the Bitcoin community's historical perspective and that of modern central banks we will now turn our attention to competing views of macroeconomics.

1. Keynesian and Monetarist Schools of Economics

John Maynard Keynes, born in England in 1883, was a civil servant and economist, best known for economic theories that supported government intervention to combat recessions or unemployment. In *The General Theory of Employment, Interest and Money*, the book that would become his seminal work and change the trajectory of modern central banking, Keynes made the case for a strong centralized government asserting itself during economic downturns with spending policies aimed at stimulating growth (Keynes, 1936). The book, written during the Great Depression, was largely a rejection of conventional wisdom at the time which favored a laissez-faire approach only slightly tempered by public policy. Keynesian economics, as they became known, sought to smooth out bumps thought to be natural aberrations of the economic cycle with active government intervention. The basic tenant: spending = growth and saving (thrift), especially during recessions, hurts the economy by depressing jobs and wages (Bhatia, 2021).

As the post-Keynesian world evolved, so did mainstream economic views. The Monetarist school of thought, which emerged in the late 1900s by way of American Nobel-prize winning economist Milton Friedman, counters the Keynesian belief that government spending eliminates unemployment, preferring a more free-market approach and tax cuts vs. spending to stimulate the economy. (Ammous, 2018). In their magnum opus, *A Monetary History of the United States*, Friedman and Schwartz illustrate the role of monetary policy in creating and worsening the Great Depression (Friedman & Schwartz, 1993). While Monetarists and Keynesians disagree on *how* government can best use its power to influence the macroeconomy, they both embrace the notion that it *should* by way of increasing the money supply in order to stimulate growth and prevent deflation (Ammous, 2018).

2. The Austrian School of Economics

In order to better understand origins of Bitcoin and the mindset of its cypherpunk creator culture, we must turn our attention to classical viewpoint of economics that runs counter to modern central bank playbooks. While the arguments behind the Keynesian and Monetarist schools are based generally in statistics, data and mathematical models, the Austrian School is rooted in thought and understanding phenomena by way of logic and causality (Ammous, 2018). The Austrian school holds that economic choices are subjective—what may be rational for an individual might not be for his neighbor—and that the free market will ultimately chart the best course as it reflects the sum of all rational decisions by participants (J. Peterson, 2021). On the idea of money, Karl Menger, often credited with being the father of the Austrian school, stated that money emerges organically in a market as the most marketable commodity and most salable asset—something that will hold value over time (Menger, 1892). This school was codified during the late 1800s, a period known as the “Golden Age” or “La Belle Époque,” because of the unprecedented gains made by Europeans across all fields of civilization—science, art, literature, etc. In this era, (roughly 1870–1915), most of the world relied on gold as currency. Gold (and the qualities that make it sound money), combined with a *lassie faire* attitude by governments at the time are credited by Austrian economists for this period of global prosperity. At its most basic, the Austrian school rejects fiat

currency and the idea of any government control over money due to the axiom that power corrupts. They also reject the idea of institutionalized inflation and hold that growth in the economy should only be a result of an increase in real productivity (vs speculative investment fueled by easy credit) (J. Peterson, 2021). Austrians embrace the idea of a hard or inelastic money supply. As Murray Rothbard, another founding father of the Austrian School puts it:

A world of constant money supply would be one similar to that of much of the 18th and 19th centuries, marked by the successful flowering of the Industrial Revolution with increased capital investment increasing the supply of goods and with falling prices for those goods as well as falling costs of production. (Rothbard, 1976, pp. 160)

D. THE BITCOIN BULLS

Bitcoin emerged from a modern economic subculture very much opposed to Keynesian theories on growth and elasticity of the money supply (Johnson & Green, 2019). The ground rules Nakamoto lays out in his initial white paper seem to agree with theories of Menger and Rothbard and the other founders of the Austrian School: fixed supply, transparency, portability across time and space. It should come as no surprise that the early academic and industry proponents of Bitcoin and digital currency ground much of their reasoning in the Austrian philosophy. We will briefly turn our attention to a few of them now.

Dr. Saifedean Ammous wrote *The Bitcoin Standard* in 2018 in which he makes a case against Keynesian theories employed by central banks and how Bitcoin has potential to stand as a better alternative. The book provides a good introduction and ‘so what’ for the Bitcoin-curious of the world. In *Layered Money*, author Nik Bhatia takes the conversation a step further by discussing decentralized finance and how complex credit and lending systems can be built on a solid foundation of Bitcoin tokens in similar way to how the modern financial systems grounds itself with the global reserve currency USD (Treasury Bills) (Bhatia, 2021). In *The Price of Tomorrow* (2020), entrepreneur Jeff Booth makes the argument that technology is inherently deflationary—that it causes a rise in productivity while decreasing costs—and that a deflationary future requires sound money to store value.

E. THE BITCOIN CURIOUS

In January of 2021, Ray Dalio, chief investment officer of the world’s largest hedge fund, Bridgewater Associates, wrote:

It seems to me that Bitcoin has succeeded in crossing the line from being a highly speculative idea that could well not be around in short order to probably being around and probably having some value in the future. (Dalio, 2021a)

Dalio, a longtime skeptic of cryptocurrencies, credited the 10+ year history of Bitcoin as impressive and instrumental in changing his mind. There is evidence that other institutional investors are changing their minds as well and quietly buying Bitcoin as a hedge against inflation as public sentiment begins to warm (Bourgi, 2021).

F. THE BITCOIN BEARS

As with every emerging technology, Bitcoin is not without its sceptics. Over its ten-plus-year lifespan, it has been dismissed and ignored by most mainstream audiences as a fringe activity. For the first part of the 2010s, it was largely unheard of in modern American society. Even for those who were aware of its existence, it was a peripheral awareness—an occasional muse when stories about tokens and hackers and pizza purchases activated mental heuristics of internet scams and classic bubbles. That began to change as its adoption, utilization rate, and value began to increase in the late part of the decade forcing critics to pay attention and take a public stand. Warren Buffet has been one of Bitcoin’s longest and most vocal bears, famously calling it “Rat poison squared” during a 2018 shareholder meeting (Theron, 2021). Four years prior, before its meteoric surge in price and interest, he gave a less glib assessment:

It’s not a currency. It does not meet the test of a currency. I wouldn’t be surprised if it’s not around in 10 or 20 years. It is not a durable means of exchange, it’s not a store of value. It’s been a very speculative kind of Buck Rogers-type thing and people buy and sell them because they hope they go up or down just like they did with tulip bulbs a long time ago. (Theron, 2021)

Rigorous and scholarly critiques of Bitcoin and cryptocurrency, however, are rare with the majority of public criticism casually focused on its similarity to any other asset

class in a bubble. Initially positive on Bitcoin as insurance over government-controlled money, *Antifragile* author Nassim Nicholas Taleb reversed his stance on the matter, publishing a technical critique titled *Bitcoin, Currencies and Fragility*. In it, he uses quantitative analysis to deflate some of the most common positive attributes touted by Bitcoin bulls. He takes aim at Bitcoin's volatility as evidence that it is not an inflation hedge and makes the claim that if there is even the slightest possibility of Bitcoin's value going to zero at some point in the future, it's present value must be zero as well (Taleb, 2021).

His most compelling argument is against the common claim that Bitcoin is a safe haven for wealth. As evidence, he highlights how the price of Bitcoin, relative to the major stock indices, dipped lower than equities during the 2020 COVID-induced crash, recovering only when the Fed stepped in with an unprecedented liquidity injection. As the bear market of 2020 is the only major crash in Bitcoin's relatively short lifespan (all of which took happened during a historically long bull market), it serves as a warning that Bitcoin's value, ironically, could very well be artificially inflated by the same easy money detested by Bitcoin's founders (Taleb, 2021). If true, the implications would suggest that the meteoric rise in the price of Bitcoin (and other cryptocurrencies which are more or less pegged to Bitcoin's price) are fueled by the same speculative forces that ran up housing in 2006 or dot coms in 1999 or, as Buffet suggests, tulip bulbs in the late 1600s. Taleb's other relevant argument against cryptocurrencies as a long-term store of value is that, unlike gold, they require a sustained interest and investment in the way of both energy and resources to even exist. Because of their sensitivity to these forces, the *Antifragile* author labels Bitcoin as categorically fragile (Taleb, 2021).

It is easy to see how conventional, intelligent investors such as Buffet or his mentor, Benjamin Graham, can view the recent frenzy of Bitcoin from a distance, from an elevated bulwark constructed from a lifetime of value investing and recall words from John MacKay's history of early financial bubbles, *Extraordinary Popular Delusions and the Madness of Crowds*:

In reading the history of nations, we find that, like individuals, they have their whims and their peculiarities; their seasons of excitement and

recklessness, when they care not what they do. We find that whole communities suddenly fix their minds upon one object, and go mad in its pursuit; that millions of people become simultaneously impressed with one delusion, and run after it, till their attention is caught by some new folly more captivating than the first. (MacKay, 1841)

G. NPS LITERATURE ON BITCOIN

A search of the Naval Postgraduate School's Calhoun database under Theses and Dissertations returns 65 hits under keyword "Bitcoin" and 54 under "cryptocurrency." The preponderance of these focus on blockchain technology from a logisticians or computer scientist lens and will be omitted from this paper. Three of them, however, are relevant to this study and are summarized next.

In *Cryptocurrency and State Sovereignty*, author Ryan Frebowitz studies the phenomena of cryptocurrency from a nation-state governance perspective and attempts to answer the question: can the two coexist harmoniously? He makes the claim that state governments have three legislative levers to pull regarding cryptocurrency: prohibition, regulation and adoption. Harmony, he concludes, can exist, but only within the context of aggressive and forward-leaning policy making combined with a global standard of best-practices (Frebowitz, 2018).

Regulatory challenges surrounding Bitcoin and cryptocurrencies was also the subject of Stephen Ditamore's thesis titled *A Bit of Recent Growth: The Evolving Risk of Terrorist Use of Virtual Currency*. The study concludes that the assessment by U.S. security officials that cryptocurrency use by terrorist groups will not reach critical mass may be flawed. Relevant to this paper, he predicts that the use of Bitcoin and other cryptocurrencies by terrorist organizations or nation states such as Iran looking to avoid sanctions will only increase (Ditamore, 2018).

In the final thesis summarized here, *Bitcoin, a Technology-Influenced Social Movement*, authors Johnson and Green use the Social Movement Theory framework to make the case that Bitcoin's increasing levels of adoption and use represent a mass global protest against the modern financial industry built on unsound principles of central banks. In their final chapters, they advocate for U.S. Special Operations Command (SOCOM) to

invest in cryptocurrency training and infrastructure to: 1) be able to understand and counter adversarial state-sponsored cryptocurrency use designed to circumvent sanctions and financial surveillance and, 2) enhance battlefield operations. They illustrate the second point with a vignette of a Civil Affairs team who's operational funds (OPFUND) and commanders emergency response program (CERP) funds are interchangeable with cryptocurrency in order to maximize utility in deployments to countries prefer cryptocurrency payments to dollars (Johnson & Green, 2019). This work borrows from some of their research regarding the genesis of cryptocurrency but then diverges with new and updated tactical use case scenarios for blockchain technology.

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III. CASE STUDY IN EL SALVADOR

A. BACKGROUND

On June 8, 2021, president of El Salvador, Nayib Bukele, signed a law making Bitcoin legal tender, becoming the first centralized government to do so. On September 7, the law was implemented and so began the world's first, live social experiment with cryptocurrency as currency. The modern monetary history of El Salvador, up until 2001 was fairly standard—the typical tale of a central bank tweaking the nation's fiat currency (the colón) to meet domestic needs, with boom and bust cycles generally mimicking global macroeconomic trends (R. Huang, 2021). In 2001, after two decades of political instability and American intervention (to counter both communist influence in the region and the flow of drugs and migrants into the US), El Salvador adopted USD as their national currency. The push for dollarization was attributed to stabilizing interest rates, controlling inflation and aligning the domestic trade network with the global economy (R. Huang, 2021). Another unique factor to the Salvadorian economy are remittances—money sent home by migrants to family members (Hanke, S et al., 2021). The U.S. contains a large population of Salvadorian immigrants and, in 2016, remittances (money sent home by migrants to family members) from the U.S. to El Salvador totaled \$4.6 billion—equivalent to 17% of the country's Gross Domestic Product (GDP) (Grillo, 2017).

B. ARGUMENTS FOR AND AGAINST

Sending fiat currency across borders is expensive due to the cost of conversion. Proponents of the Salvadorian switch to Bitcoin claim that sending the digital currency will save these families money in the form of transaction fees, as well as providing an inflation hedge and better long-term store of value. Critics claim that President Bukele is trying to wrestle back monetary control and obfuscating the move in the widely misunderstood technicalities of transacting in Bitcoin (more on this later) (Gerard, 2021). Regardless of the motive, all parties agree that the move carries a tremendous amount of risk across a wide swath of stakeholders. If the experiment succeeds, the dollar's position

as a global reserve currency could be in jeopardy as other countries keen on transacting in currencies they can control may follow suit. A Bitcoin win in El Salvador will shake the global world order (Dalio, 2021b), a loss could instigate a humanitarian crisis which would resonate throughout the Americas. To better predict if Bitcoin will emerge from this experiment as a viable unit of exchange, we will now dig into the technicalities and attempt to identify potential inflection points and trip hazards.

C. THE SPECIFICS OF IMPLEMENTATION AND WHY THEY MATTER

Article 7 of El Salvador’s Bitcoin law mandates that all merchants must accept Bitcoin as payment (Roy, 2021). While clear at face value, Bitcoin’s volatility combined with slow transaction speeds currently make it a sub-optimal method of exchange and disincentives merchants to accept it in raw form. Article 8 covers the state-sponsored solution to this dilemma:

...the State shall provide alternatives that allow the user to carry out transactions in bBitcoin and have automatic and instant convertibility from bitcoin to USD if they wish. (Roy, 2021)

For now, that alternative is “Chivo,” a government-sponsored e-wallet owned by a private company with little transparency (Alvarado, 2021). Through Chivo, Salvadorian migrants can send Bitcoin-denominated remittances to family members with only the associated Bitcoin network fees which are less than the average 3% transaction fee from dollar-denominated wire or bank transfers. But Salvadorians, so far, have rejected Bitcoin as method of exchange with 92% of respondents to a June, 2021 survey saying they did not agree with the Bitcoin law and over 93% of them stating they did not want to receive their salaries in Bitcoin (Hanke, S et al., 2021).

1. Parallel Cryptocurrencies Create a Backdoor for Control

This desire by the public to continue transacting in dollars combined with a general ignorance and mistrust of Bitcoin presents an opportunity for a government-sponsored bait-and-switch where Salvadorians sell Bitcoin in exchange for crypto “dollars” of a fixed amount (Hanke, S et al., 2021). Hard details are scarce as the company behind Chivo is private and not subject to international freedom of information

acts but the conceptual premise is simple: Salvadorians, afraid of volatility, sell their Bitcoin to the government at the spot price of the day for “dollars” that retain their value. However, the “dollars” in their wallet are not actual USD but dollar-pegged, Salvadorian-controlled stablecoins, a brand new cryptocurrency of the government’s design (Engler, 2021). In July, 2021, El Salvador announced plans to create a national stablecoin, the “Colón-Dollar,” which they claim would mimic the value of the U.S. dollar (Arauz, 2021). With this construct, Bitcoin-denominated remittances and international payments flow into the central bank by way of the wallet. The central bank keeps the Bitcoins and then issues out the spot-price equivalent in its own stablecoin in their stead. In this transaction, Bitcoin is the harder of the two assets as it is outside any control from the Salvadorian treasury. The system, although technologically different, is a near carbon copy of traditional fractional reserve banking systems. The evidence points the observer to the natural conclusion that a Salvadorian central bank with the means to lend fiat currency (Colón-Dollars or stablecoin de jour) backed by a legitimate global asset (Bitcoin) will fall prey to historic temptations of overleveraging, increasing supply, decoupling the value relationship between asset and fiat, or generally wreaking havoc in their domestic currency market by manipulation (Bhatia, 2021).

2. Control Inserts Trust Back into the System

The value of Bitcoin as decentralized money, free from government manipulation and interference, is negated in this case by the financial architecture El Salvador has imposed on it. For success under the current construct—for Bitcoin-backed stablecoins to maintain their value over time—Salvadorians need to believe that Bukele and his successors will never engage in rate adjustment or devaluation or any other methods of money supply manipulation that have been core to the central bank playbook.

D. SUMMARY

Bitcoin proponents have cheered the Salvadorian switch and claim volatility concerns are temporary growing pains to a better global system of money. They point to the fact that if citizens maintain custody of their own Bitcoin and used it regularly to transact, this would mitigate interference efforts by the central bank (McCormack, 2021).

But with the fledgling nature of the payment system, price volatility, and a skeptical lack of public trust predicated on previously untrustworthy regimes, the experiment appears to be wobbling. It doesn't help that world financial institutions have also signaled their disapproval. In July 2021, the International Monetary Fund warned El Salvador about risks they view as inherent with Bitcoin, citing macroeconomic and legal issues and refusing to help with the Bitcoin rollout (Webber et al., 2021).

In summary, unless Bukele defies precedent and commits his government to a strategy that prioritizes citizen custody of Bitcoin over the central bank, the Bitcoin experiment in El Salvador is at risk of following the same well-worn track of gold experiments from history. The long-term viability of Bitcoin as a common means of exchange depends on adoption of its founding principles, not just the technology of its token and distributed ledger.

IV. CRYPTOCURRENCY'S UTILITY TO SPECIAL OPERATIONS FORCES

In World War II, the Allies buoyed a tenacious French Resistance with cash and equipment delivered through innovative techniques. Both were dropped by parachute behind German lines and funneled through elaborate human networks of spies and sympathizers (Foulk, 2019). Planning and execution of the external support fell to the British Special Operations Executive (SOE) and the successful effort became a grounding case study for future SOF Unconventional Warfare (UW) strategy (Foot, 2004). But while the Tactics Techniques and Procedures (TTP) of UW have evolved since then to accommodate developments in technology, the process for delivering financial support to resistance networks in occupied territory has remained largely unchanged.

During the editing process for this study, Russia shocked the world by invading its neighbor Ukraine in what is now the largest conflict in Europe since the second World War. For several years preceding the invasion, U.S. Special Operations Command Europe (SOCEUR) quietly operated a small training base outside of Kyiv, where U.S. Special Operators trained and mentored Ukrainian SOF forces in an effort to counter malign Russian influence in the area (Vandiver, 2022). Those Ukrainian SOF forces are now fighting for their survival and in dire need of support. If the war bogs down into a siege or occupation, those forces will likely be leaders in resistance networks not unlike the French resistors in WWII. In December of 2021, President Biden made it clear that U.S. troops would not unilaterally engage Russians on Ukrainian soil but pledged that the U.S. would stand behind Ukraine with other forms of support (Egan, 2021).

With the invasion unfolding and a protracted Russian military occupation of Ukraine likely, SOCEUR, SOCOM and NATO militaries are wrestling with the question of *how* to enable their partners from afar; partners whose existential struggle to defend their homeland could hinge on the timely delivery of financial aid or intelligence. The playbook from WWII for delivering such aid is obsolete. Establishing human networks takes time and Russia's air defense capabilities take air drops effectively off the table.

Cryptocurrency represents a novel yet optimal solution and Ukraine, as it so happens, is already fertile ground for the experiment.

In 2021, the Ukrainian parliament passed a law legalizing and regulating Bitcoin and other cryptocurrencies and by doing so, established a framework that recognizes and protects the rights of digital asset owners (Segal & Nechepurenko, 2021). In February of 2022, CNBC reported that Bitcoin and other cryptocurrencies are pouring into Ukraine from private donors alarmed by the Russian threat. The funds are being used by activist groups and Ukrainian Non-Governmental Organizations (NGOs) to buy equipment, including drones and medical supplies, for the Ukrainian military (Sigalos, 2022). The Ukrainian infrastructure necessary to receive, convert and disseminate cryptocurrency payments for military use appears to be fully functional.

Yes, adopting cryptocurrency and blockchain utility can help move money around the battlefield faster. With the right permission or regulatory framework, this could be achieved by any number applications or technology already in commercial use today. But beyond the obvious utility, it can also perform a secondary, maybe more important, function of intelligence gathering and delivery. This chapter outlines some of these possibilities.

A. A BETTER WAY TO FUND RESISTANCE NETWORKS

UW is one SOCOMs 12 core activities. SOCOM defines UW as “Actions to enable a resistance movement or insurgency to coerce, disrupt, or overthrow a government or occupying power” (SOCOM, n.d.). While traditionally a mission of Army Special Forces, familiarity of how to effectively conduct UW and its close relations, asymmetric and irregular warfare, is a requirement of all SOF in the fractured melting pot of missions in today’s deployed reality. Whether deployed to support the Global War on Terror (GWOT) or a Great Power Competition (GPC) with peer adversaries such as Russian and China, the one consistent element is an inconsistent battlefield, one where mission success requires front line operators armed with autonomy, flexibility and the latest tools.

In the business of developing, supplying and maintaining resistance networks behind enemy lines, cryptocurrencies represent a novel way to accomplish a task that right now requires physical transfers of cash or traceable bank transactions. Transfers can be completed from anywhere at any time and, with the right tradecraft, users on either end can preserve anonymity. Nations in which the United States has a keen interest in developing resistance networks have already shown a proclivity toward such tactics. Ukrainians are among the most avid cryptocurrency users in the world and in 2021, its parliament passed a law legalizing and regulating its use (Segal & Nechepurenko, 2021). The Baltic states—another geographic sector under Russian territorial threat—have become fertile ground for cryptocurrency users (Zviadadze, 2018). Evidence of this statement can be found in the amount of full Bitcoin nodes in the area combined with a Memorandum of Understanding developed by all three countries in 2017 encouraging blockchain innovation (Šerstobitovs, 2019).

B. OUR ENEMIES USE IT

In 2015, the FBI shut down an ISIS-linked dark web account being used for fundraising. The man behind the account was soliciting Bitcoin for jihad and was successful in obtaining five Bitcoins before the account was closed (Goldman et al., 2017). Russia has long chafed at the market-driven reality of having to denominate and sell their oil in USD (Browne, 2021). The Russian government is exploring options to develop their own cryptocurrency backed by and pegged to domestically sourced oil (Georgiev, 2019). If successful, this initiative will allow them to trade oil, which makes up 15% GDP, without the currency conversion costs and, more importantly, the negative strategic implications of having to buy and sell USD. Another U.S. enemy, Iran, has instigated bold, state-sponsored forays into the cryptocurrency space as a way to beat U.S. sanctions. In 2018, President Hassan Rouhani's administration announced their intent to build a national cryptocurrency (Ratna, 2020). Cryptocurrency transactions appear to be popular with the Iranian public and Bitcoin mining operations have relocated there as a result of low electricity costs (Ratna, 2020). In a bold move giving them primacy in the state-sponsored cryptocurrency space, Venezuela launched their own coin in 2018—the Petro—which they initially claimed to be backed by the countries oil

reserves. In public statements, Venezuelan president Maduro, made it clear that the effort was specifically designed to free his country from the burden of U.S. sanctions and avoid trade denominated in USD (McBride & Gold, 2019). North Korea, as well, has used cryptocurrencies to evade sanctions, launder money, and accept payment for ransomware attacks (Orcut, 2020).

Economic diplomacy, be it through sanctions or loans or foreign direct investment, has long been the United States' preferred lever for international persuasion. The evidence presented here suggests there is consensus among hostile nation states that the effectiveness of that lever can be undermined by digital alternatives. These alternatives exist almost entirely outside the current global banking system and are not subject to the rules—the same rules that give teeth to that lever (Ditamore, 2018). Nevertheless, there seems to be little understanding of the problem or any effort to stem the erosion of power. It is likely that funding for future attacks by hostile nation states and terrorist organizations against the United States will flow through cryptocurrencies. Understanding how to isolate, disrupt, ambush, penetrate, bypass, block, counterattack and screen these financial attack vectors will be the future fight; their corresponding graphics of lines and arrows lifted from the sand table and arrayed across the blockchain to the same tactical endstate and military objective (Frebowitz, 2018). As vanguard for the DOD, SOCOM must lean into this space proactively. A common justification for government inaction has been uncertainty amidst a regulatory scrum between policy makers and cryptocurrency stakeholders. But SOF was purpose-built for uncertainty and if it can secure the digital beachhead, the conventional might will follow.

C. CHINA HATES IT: DECENTRALIZED FINANCE IS A THREAT TO CENTRALIZED POWER

In the mid-1800s, China's social culture and military clashed with The West in what became known as the Opium Wars. The basic premise is as follows: Britain and other western nations craved Chinese goods such as silk, porcelain and tea. The Chinese, believing western goods inferior to their own, demanded silver as payment. Struggling to find enough silver to satisfy domestic demand, the East India Company imported opium from Indian territories, traded the opium to Chinese smugglers for silver, and then used

the same silver to procure the goods it later sold in Western markets. The eventual pushback from the governing Qing dynasty to combat the flight of silver, addiction and corresponding moral decay caused Great Britain to send warships to China to force “free trade” upon the empire (Hanes & Sanello, 2002).

The 100+ years following the Opium Wars is referred to in China as the Century of Humiliation. This period was marked by domination and intervention of the Qing dynasty by Western powers and Japan (Kaufman, 2010). It continues to be a source of great embarrassment and resentment by Chinese historians and is often cited as a contributing factor in the rise of the Chinese Communist Party and Xi Jinping’s realistic goal of dominating the global power structure (Allison, 2017).

Today, China appears to be taking steps toward retribution. In 2019, illegal fentanyl, a synthetic opioid, was responsible for the deaths of 36,000 Americans (CDC, 2021). Almost all fentanyl consumed in the U.S originates in China. It is sold directly through online websites, or indirectly as precursor chemicals to Mexican cartels who synthesize and import the finished product (Shelley, 2020).

Beyond narcotics, the Chinese have found more pervasive ways to effect control over American culture and attention. In 2021, Tik Tok became the world’s most popular social media application. Its success is driven by an opaque algorithm that leverages psychological incentives to drive user behavior which mimic many signs of addiction (CNBCTV, 2021). The algorithm is so successful that it is heavily regulated within China. Douyin, Tik Tok’s Chinese face, limits users under 14 to 40 minutes a day and blocks all use between the hours of 10 pm and 6 am (Z. Huang, 2021). Access in the U.S. is, of course, unrestricted.

The intent behind this introduction on China is not to debate the merits of social media or decry a synthetic opioid crisis. The intent is to prime the reader’s mind to how the nature of China’s long-term memory has contributed to its rise and current status as challenger of the current world order. To guard against such a challenge, the DOD needs every available tool and cryptocurrency is uniquely threatening to China’s centralized power structure.

1. China Bans Cryptocurrency but Embraces Blockchain

On September 24, 2021, after years of signaling their intent, the Chinese Communist Party (CCP) issued a blanket ban on all cryptocurrency transactions including mining (John et al., 2021). Chinese officials cited familiar concerns over energy consumption, volatility and money laundering but the core reason for the ban appeared to be power. The nature of crypto's value proposition—decentralization, transparency, lack of third party control—represent a threat to the CCP's ability to wield the top-down totalitarian control they have come to expect (Kaiser et al., 2018). Paradoxically though, the CCP has embraced blockchain and has been testing its own digital currency, an electronic version of the Chinese yuan. Broad adoption of an electronic yuan, by choice or mandate, will give the CCP sweeping access to the economic activity of its citizens (Qin & Livni, 2021), further invading privacy and curtailing personal freedom. By telegraphing the notion that Bitcoin is a threat, China has flagged a weakness and provided its enemies with a tool for unconventional intervention. To fund and support resistance networks of the future, the U.S. must develop the capability to leverage payment methods that exist outside the purview of Chinese electronic surveillance.

In the event of a war with China, SOCOM needs the capability to contact, train, but more importantly fund resistance networks within mainland China. In a totalitarian state with the capability and incentive to financially surveil their citizens, cryptocurrencies represent a potential backdoor or future attack vector.

2. Web 3.0: Why China Wants to be First

The internet has developed in cycles. The first version—Web 1.0, a product of the late 1990s—was defined by limited access from desktop browsers and dedicated infrastructure. The birth of Web 2.0 was driven by three core innovations: mobile access to the internet, social networks and cloud computing (Mersch & Muirhead, 2021). The defining architecture of the first two versions, intentional or not, was sketched by U.S. based companies and favors the values and core economic tenants of western society: freedom of information and free markets (Adams, 2019). Web 3.0 stands to once again

revolutionize the internet as we know it and will be based on three new sources of innovation: edge computing, decentralized data networks (blockchain), and artificial intelligence (AI) (Mersch & Muirhead, 2021). Like Bitcoin and the blockchain technology on which it is built, Web 3.0 is advertised to be open, decentralized and trustless (as in no third party necessary). But to a highly centralized state like China, this is a threat. There is evidence that China fully understands the implications of Web 3.0 and is racing to innovate and set the ground rules. In October of 2019, Chinese President Xi Jinping told a Politburo Committee:

We must take blockchain as an important breakthrough for independent innovation of core technologies, clarify the main directions, increase investment, focus on a number of key technologies, and accelerate the development of blockchain and industrial innovation. (Martin, 2019)

Since 2019, Chinese-based companies have filed for over half of all global blockchain-related patents (Philipp, 2021). When considered alongside China's One Belt One Road (OBOR) initiative which leveraged predatory lending practices to link 70 countries and over 40% of world GDP into a single trading system (Aoyama, 2016), it is not unreasonable to imagine a scenario where the Chinese can force adoption of their own, state-surveillance friendly, backdoor-enabled Web 3.0 protocol predicated on a benign campaign of common good for global markets. Chinese Smart Contracts (necessary programs stored on blockchain that determine how transactions are executed) could be written in a way that gives the Chinese government access to sensitive information and also conceal the source of cyberattacks (Adams, 2019).

In short, China's vision for a blockchain-enabled Web 3.0 stands in direct opposition to Nakamoto's. That said, Bitcoin, the anonymous creators' invention, exists, for now at least, outside any firewalls or government-designed protocol. As stated before, the CCP considers bitcoin as a threat to their power. It's basic value proposition: that it is outside the control of any one person or government is exactly why SOCOM should invest.

D. CONVENIENCE: INSTANT TRANSACTIONS AND AN AUTOMATIC LEDGER

Moving cash to units well beyond the reach of military disbursing offices is cumbersome, risky and subject to tactical and logistical access restrictions. Theft, loss and inadvertent destruction are also risks inherent in cash payments. With cryptocurrency, any amount could be available to any user with a smartphone and internet connection.

Recordkeeping often becomes overlooked within units conducting kinetic operations. It tends to be viewed with disdain, as a task for a higher echelon in the rear and can be ignored entirely. With the use of an e-wallet, Bitcoin or other cryptocurrencies, recordkeeping is an automatic function of the blockchain and can be audited remotely. This removes not only the burden of recordkeeping for the front-line unit out of reach of the local disbursing office, but also weeks of pre-deployment man-hours spent training operators to a minimum financial team of Field Ordering Officer (FOOs) and Paying Agent (PA). Issues of accountability and theft, lost receipts and lagging paperwork times can be alleviated.

E. INTELLIGENCE: STEGANOGRAPHY AND HUMINT

Cryptology, upon which current methods of encryption are based, enables secret messaging but it has a flaw: while adversaries are unable to decipher the message, they are usually aware of its existence. That knowledge, in some circumstances, may be enough to foil the purpose of encoded messages. Conversely, steganography (not to be confused with stenography), is the practice of hiding messages in plain sight (Tiemann et al., 2021). Steganographic methods enable messages to exist entirely in the white noise of a digital society, one step below the radar of a sophisticated enemy. Financial transactions on blockchain protocols hold many unique places to hide messages in plain sight. With the beforehand exchange of a nonce or key, steganographic messages encoded into the Bitcoin protocol can be exchanged between two parties initiating transactions to an innocuous third party such as a charity or major coin exchange (Tiemann et al., 2021). Such method layered into routine OPFUND financial transactions

could be the basic architecture of SOF communications in a future communications-denied environment such as a Chinese “smart city.”

The traditional model for military human intelligence (HUMINT) operations require face-to-face meetings or physical exchanges of product and payment. Today, this model is completely obsolete. The 2018 National Defense Strategy (NDS) presents a clear mandate to modernize key capabilities including command, control, communications, computers, and intelligence, surveillance and reconnaissance (C4ISR). It also includes language directing the DOD to invest in “autonomy, artificial intelligence, and machine learning, including rapid application of commercial breakthroughs, to gain competitive military advantages” (NDS, 2018). It is now entirely possible to conduct HUMINT operations from afar—to task sources, receive information and exchange payment or incentives in a completely virtual, disaggregate environment. Cryptocurrencies are the ideal method to fund these operations for several reasons: they still exist in a “grey” area—outside conventional financial channels, they are instant, hard to trace, and, with the right amount of operational security, nearly anonymous.

Imagine a scenario where a U.S. SOF team is attempting to rescue hostages held in an urban building. Even the best satellite imagery will leave they assault team with critical information gaps: what is the front door made out of? Are there bars over the windows? Will dogs bark when we pass by? There is no time to physically find, vet, task and pay a new source to casually stroll by the target building with a camera rolling but there might be time to anonymously task a local taxi driver to drive past the entrance with his smartphone recording. This open source intelligence model is already being used by the U.S. military which pays for access to data collected by third party businesses who leverage gig workers in the developing world to complete small tasks (Tau, 2021). The model, though effective, stands to be improved by the ability to focus collection efforts through anonymous tasking with cryptocurrency incentives. With cryptocurrency-funded virtual HUMINT, payment can be made in any desired coin and the longevity and usefulness of the source is extended due to the enhanced operational security.

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V. ANALYSIS AND CONCLUSION

A. BITCOIN'S DURABILITY COMPARED TO OTHER ASSETS

In its lifespan of just over 12 years, Bitcoin's market cap has gone from zero to over \$1 Trillion (CoinMarketCap, 2021). This has inspired sensational headlines such as "Best Investment in History" or stories of untold wealth if one had only invested \$100 during the early years. But headlines rarely tell the whole story and this is especially true with Bitcoin. Bitcoin was born during the recovery from the Great Recession of 2008 and from inception until 2019, it existed alongside a bull market in stocks and real estate. That changed during Spring of 2020 when widespread panic about COVID 19 lockdowns created a global bear market. During March and February of 2020, the S&P 500 declined 37.6%. Bitcoin's decline during the same time period was more severe at 51.6% (D. Phillips, 2021). In the years since, as Bitcoin increases both in market cap and adoption by institutional investors, the correlation between Bitcoin and major markets has trended higher (Kuznetsov, 2021). Since the trough of 2020, the price of all assets has drastically increased. Stocks dramatically rebounded from their COVID-induced lows and the median home price in the U.S. increased by over 37% (U.S. Department of Housing and Urban Development, 2021). The percentage gained by Bitcoin however over this same period was several multiples greater.

Lower lows and higher highs—this behavior is consistent with historically risky and speculative assets. Asset price increases since the 2020 crash where due in large part to low interest rates, loose monetary policy by the Fed to shore up domestic markets and the issuance of stimulus checks which have been blamed for increasing speculation (M. Phillips, 2021). In summary, the evidence here suggests the price of Bitcoin is now correlated to the price of other assets.

B. DEATH SPIRAL SCENARIO

The economic incentive to Bitcoin miners is largely predicated on the belief that scarcity and increased interest by new users will maintain or increase token value. As established before, miners provide the processing power critical to the operation and

integrity of the network and, for this service, are rewarded with new tokens and transaction fees. But what happens if this is no longer the case, if Bitcoin's value decreases below the point where the cost to mine exceeds the token price? Understanding the answer to this question is critical to gauging future risk with investments in Bitcoin—not only in a wealth generation/preservation capacity but also in a potential knowledge and manpower investment by SOCOM or the DOD.

The scenario where a tokens value dips and stays below the marginal cost to produce it is known in Bitcoin circles as a “death spiral” (Peng & Heninger, 2013). Bitcoin enthusiasts tend to view the death spiral as a myth, that Nakamoto foresaw the possibility and built a mechanism to prevent it known as the difficulty adjustment. According to Nakamoto:

To compensate for increasing hardware speed and varying interest in running nodes over time, the proof-of-work difficulty is determined by a moving average targeting an average number of blocks per hour. If they're generated too fast, the difficulty increases. (Nakamoto, 2008).

Stated differently, Nakamoto protected the regular release of all 21 million Bitcoins with the difficulty adjustment algorithm—if more processing power joins the network and coins are mined faster than planned, the difficulty increases. If processing power drops, the adjustment decreases (Nakamoto, 2008).

In theory, this adjustment would result in standard behavior patterns of Bitcoin miners (producers). As value increases, marginal cost of production decreases and miners pile in. When value dips, only those with the lowest production costs remain. These inversions have happened in the past. In 2011, Bitcoin's price went from \$33 to under \$2 (Arthur, 2011), forcing miners from the industry but not destroying the coin or network. Enthusiasts point to this as a sign of resilience and in 2020, Bitcoin expert PlanB declared on Twitter that “mining death spiral risk is effectively zero” (PlanB, 2020).

But these predictions are theoretical and largely ignore or discount serious macroeconomic trends that could cripple Bitcoin or undermine its value proposition. If a spike in energy prices, regulation, market manipulation or a combination of these factors cause a sustained dip in Bitcoin prices and forces miners from the industry, consolidation

of the remaining operations will result in reduced decentralization. Centralization of Bitcoin—a few large miners in possession of a majority of the processing power—will increase the likelihood of both a 51% attack and also give the large stakeholders access to modifying the code (Kaiser et al., 2018). The evidence suggests that while a death spiral might not necessarily kill Bitcoin or other cryptocurrencies, it could very well erode enough value and faith from its user base to keep its price consistently depressed.

C. BITCOIN AND ENERGY CONSUMPTION

In the ongoing public debate over Bitcoin’s utility to the world, excess energy consumption is often cited as an argument against its widespread use. During the week of May 12, 2021, Tesla CEO Elon Musk posted a series of tweets criticizing Bitcoin’s negative impact to the environment and announcing that Tesla would no longer accept the cryptocurrency as payment for their vehicles (Thorbecke, 2021). By the end of that month, Bitcoin’s price had fallen from a monthly high of nearly \$60,000 on May 8th to less than \$35,000 on the 29th (Coindesk, 2021). Bitcoin, as an enterprise, requires 0.69% of the world’s total energy consumption according to researchers at the University of Cambridge Center for Alternative Finance (CCAF, 2021). In a world increasingly focused on reducing emissions, the energy required by the Bitcoin network has become a lightning rod for criticism and prevented further growth and adoption by the mainstream financial sector. In a 2021 interview, investor Kevin O’Leary claimed that institutional investors (banks, pension funds, insurance companies), are interested in cryptocurrency investments but are barred from entering the market due to energy consumption issues triggering stringent Environmental Social and Governance (ESG) criteria regulating the industry (McCormack, 2021).

While the amount of energy required to mine Bitcoin is large by comparison and growing as the difficulty adjustment inherent to the protocol increases the computing power necessary to mine each coin, those involved in the mining process will quickly point out that what is commonly framed as an energy “problem” could instead be a net benefit to the planet (Pysh, 2021). Their argument is rooted in the incentive proposition to miners: essentially, only those with the absolute lowest cost of energy can operate at a

profit. Thus, miners are forced to creatively seek ever more economic sources of energy which, by immediately monetizing previously wasted or inaccessible sources, makes the whole system more efficient (McCormack, 2021). By way of mining equipment (computers) stored and operated out of hardened portable storage containers, Bitcoin mining can happen almost anywhere—including areas that are cost prohibitive to grid-connecting infrastructure. For example, Bitcoin mining company Great American Miners has co-located Bitcoin mining rigs with natural gas wells to harness the methane byproduct of natural gas mining that is normally “flared” and wasted due to the high cost of capturing and storing it (Pysh, 2021). Other examples are hydroelectric or geothermal sources that are too remote for traditional grid infrastructure to reach. Although evidence of follow-through is forthcoming, Salvadorian president Nayib Bukele cited volcanoes inside his country as future power sources for a planned Bitcoin mining industry (Arauz, 2021).

By immediately monetizing and capturing the value in cheap, wasted or previously unused energy sources in a way that can be traded or exchanged for real productivity, Bitcoin essentially performs a global arbitrage function. If Bitcoin maintains its current trajectory of tapping unused or marginal pockets of energy, its force for global good may far outweigh the side effects of increased carbon generation.

If Bitcoin is embraced by the DOD as a tool to counter a rising China, the energy required to run its nodes and mining operations could potentially come from pre-existing and under-utilized power sources within its existing infrastructure footprint. At a strategic level, this could mean funneling unused capacity from nuclear reactors onboard aircraft carriers. At a tactical level, it could be as simple as using diesel generators deployed with expeditionary basing packages during off-peak hours.

D. CONCLUSION

When contrasting the primordial soup of ideas and values that Bitcoin emerged from over 12 years ago to the common parlance and culture surrounding the phenomenon today, one can see a divergence, where the founding principles of self-reliance, decentralization and personal autonomy have faded in prominence, becoming

overshadowed by the predictable inertia of hype, greed, skepticism and ignorance. These obfuscating forces are naturally inherent in the narrative of any asset class with such a meteoric rise. The question this research paper sought to answer is, once all the rhetorical noise of speculation, hype and disbelief is stripped away, do the founding principles hold true? Does the initial value proposition that gave Bitcoin gills and legs and momentum to crawl then run then vault from its humble pond of obscurity provide enough backbone to the creature to make it a durable and enduring thing? Using the essential characters of money as a metric, the answer appears to be, yes. Bitcoin is **durable**: it survived formal banishment from China, repeated attempts to modify its basic code and it has become the bedrock asset underwriting a multi-trillion-dollar industry of alt-coins and decentralized finance. It is the most **portable** form of money yet, **divisible** into 100 million parts (satoshis) per token, and **uniform** in such a way that has never existed. In likely its most valuable attribute, its **supply is limited** to 21 million tokens. **Acceptability** remains its only debatable characteristic although its elevation by El Salvador to national currency and the U.S. Treasury's moves to tax it as a formal asset class suggest that this is changing in its favor.

1. **Bitcoin's Utility Stands Apart From its Trading Price**

As a speculative asset class, Bitcoin's price will remain volatile for the near future and could face a severe reckoning in the event of a global recession. But this in no way changes Bitcoin's utility to DOD and SOCOM as a potential GPC tool any more than a change in the price of jet fuel affects a fighter squadron's readiness. Steps can be taken to mitigate volatility including holding any balances—OPFUND or otherwise—in dollar-pegged stablecoins.

2. **SOCOM is Uniquely Poised to be a First Mover**

The Special Operations community is accustomed to being at the tip of the spear, behind enemy lines and ahead of conventional forces. For this reason, SOCOM is purpose-built to be the first organization within DOD seize the initiative and take formal steps to adopt cryptocurrency as an important battlefield tool. Due to the speed at which cryptocurrency and decentralized finance is developing, SOCOM must be prepared to

invest in this work in advance of any doctrine or formal codification of operating parameters. The difficult first step will be establishment of infrastructure needed to leverage such a tool, namely the selection and training of cyber teams enabled to do the work required. But hairbrained ideas and experimental units are part of SOCOM's value proposition. Now is the time to invest, before our adversaries can develop a coherent strategy of their own and write the rules to the game.

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