

The Tao of DAO: Hardcoding Business Ethics on Blockchain

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ABSTRACT

The Taoist concept of “action without deliberation” helps frame the implications of automation in corporate governance, especially in the context of business entities that engrain operating rules into self-executing computer code. Taken to an extreme, it is possible to encode all operating rules of a group of individuals, creating a so-called decentralized autonomous organization (DAO). Businesses are using the technologies underlying a DAO – blockchain and smart contracts – to limit human discretion by “hardcoding ethics.” This article is the first to use this phrase, to explain how Taoism may assist in understanding DAOs and their components: blockchain and smart contracts, and to explore why the nascent trend of hardcoding ethics is significant to any organization and its managers and stakeholders.

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INTRODUCTION

“[D]on’t be evil[.]”¹ Originally the first words of the preface of Google’s code of conduct,² this phrase seems like a simple and straightforward founding ethos, yet the company’s core daily function (providing free services in exchange for selling insights on users), is the fundamental business model that underlies modern privacy scandals.³

This is but one clear and recent example of a company having a pithy, easy-to-grasp, and harmless (though not actively benevolent),⁴ founding aspiration whose eventual daily operations illustrated the compromise unintentionally implied by Archie Carroll in his pyramid of

¹ ALPHABET, GOOGLE CODE OF CONDUCT (July 31, 2018), <https://abc.xyz/investor/other/google-code-of-conduct/>.

² Alphabet, the holding company of which Google is now a subsidiary, did not retain this phrase in its code of conduct. See ALPHABET, CODE OF CONDUCT, <https://abc.xyz/investor/other/code-of-conduct/> (last updated Sept. 21, 2017). Some authors have suggested that the slogan was entirely dropped. See David Mayer, *Why Google Was Smart To Drop Its “Don’t Be Evil” Motto*, FAST CO. (Feb. 9, 2016), <https://www.fastcompany.com/3056389/why-google-was-smart-to-drop-its-dont-be-evil-motto> (citing Alistair Barr, *Google’s ‘Don’t Be Evil’ Becomes Alphabet’s ‘Do the Right Thing’*, WALL ST. J. BLOG (Oct. 2, 2015, 7:59 PM)), <https://blogs.wsj.com/digits/2015/10/02/as-google-becomes-alphabet-dont-be-evil-vanishes/>). Others have expressed the opinion that Google’s code of conduct has understandably evolved in the wake of controversies. See Roger Montti, *Google’s “Don’t Be Evil” No Longer Prefaces Code of Conduct*, SEARCH ENGINE J. (May 20, 2018), <https://www.searchenginejournal.com/google-dont-be-evil/254019/>.

³ Data privacy scandals were epitomized by Facebook’s sharing of user data with Cambridge Analytica, which used the information to attempt to influence the 2016 American presidential election. See Issie Lapowsky, *How Cambridge Analytica Sparked the Great Privacy Awakening*, WIRED (Mar. 17, 2019, 7:00 AM), <https://www.wired.com/story/cambridge-analytica-facebook-privacy-awakening/>. Google also faced criticism for its approach to user data. See Ian Bogost, *What Is ‘Evil’ to Google? Speculations on the Company’s Contribution to Moral Philosophy*, THE ATLANTIC (Oct. 15, 2013), <https://www.theatlantic.com/technology/archive/2013/10/what-is-evil-to-google/280573/>.

⁴ Strictly speaking, “don’t be evil” is not benevolent, as it is not actively positive. Rather, it merely tries to prevent harm. For effective corporate responsibility, we need to go beyond “do no harm.” See Florian Wettstein, *For Better or For Worse: Corporate Responsibility Beyond “Do No Harm”*, 20 BUS. ETHICS Q. 275, 275, 278 (2010).

corporate social responsibility (“CSR”).⁵ In reality, managers’ perceived obligations to make profits can relegate following laws, curbing harms, and generating net benefits to stakeholders to the status of disposable secondary or tertiary afterthoughts. Gaps between an organization’s explicit benevolent founding aspirations and its members’ deliberately deadly actions are phenomena as old as humanity. However, the collective scale, efficiency, and power of modern business organizations to impact people and natural ecosystems elevates the gap between ethical aspirations and actions in our present time to the scale of an existential crisis in our civilization.⁶

But what if core ethical values were hardwired, or, more accurately, hardcoded,⁷ into the DNA of a business?⁸ What if, instead of negotiable (and often voluntary and disposable) principles, whose obedience are subject to the whims of fallible and corruptible people, founding ethical aspirations were instead programmed as inviolable duties?

Enter the era of Digital Autonomous Organizations (“DAO”) and its component technologies of blockchain and smart contracts. As will be explained in greater detail below, these technologies are beginning to replace conventional management structures, so that human discretionary decisions are replaced by computer code that is difficult to alter.⁹ This paper builds upon the extant scholarship of this new reality.¹⁰ It specifically contributes to the conversation concerning ethical parameters that could be among the self-executing rules, barring or requiring some actions and triggering consequences in the event certain harms are caused.

This paper uses concepts from Taoist philosophy to frame two implications of hardcoding ethical rules of an organization. The first is the central theme in philosophical Taoism of action without deliberation (*wu wei* 無為), and the second is that actions should be aligned with the natural order, as will be elaborated upon below. It should be acknowledged that adopting terms outside the context of their culture has limitations and poses a risk of accusations of misappropriation. However, on balance, this paper will suggest that these core ideas of Taoism provide a conceptual lens to help identify and discuss novel aspects of business ethics in the present era of automation.

⁵ See *infra*, Section IV and accompanying notes.

⁶ See *infra*, Section VII and accompanying notes.

⁷ A hardcode is the part of a computer program which cannot be altered while the program is running, even if the software is otherwise adapted. *Definition - What does Hardcode mean?*, TECHOPEDIA, <https://www.techopedia.com/definition/16934/hardcode> (last visited Feb. 9, 2020). It is typically reserved for unchanging constant values, such as the speed of light. *Id.*

⁸ While the initialism of deoxyribonucleic acid (“DNA”) is intended here as a metaphor for the collected policies of a corporation, figurative corporate DNA may in the future be stored on actual synthesized DNA; data scientists are experimenting with encoding and storing data on human-engineered DNA structures because its double helix structure is a robust and efficient system for storing information. See Yaniv Erlich & Dina Zielinski, *DNA Fountain enables a robust and efficient storage architecture*, 355 *SCI.* 950, 950 (2017).

⁹ See *infra*, Section II and accompanying notes.

¹⁰ *Id.*

This paper also investigates the benefits and drawbacks of hardcoding ethical rules from a business, legal, and ethical perspective in sections V-VII. More specifically, two broad models of ethical reasoning are employed: deontological and consequential; and certain limitations and necessities based in the natural sciences are acknowledged.¹¹ This paper concludes that, while there are a variety of foreseeable objections, hardcoding ethics is a viable tool for use in the public law arena as well as for “soft law” purposes of self-regulation. As is the case in other contexts, the failure to adopt a viable tool to prevent or mitigate the occurrence of illegalities and harms may eventually represent a deliberate failure to exercise reasonable care. It is a foreseeable possibility that, whether through government mandate or a mix of stakeholder demands, proactively hardcoding ethical action-without-deliberation will become a reasonable standard of care for business managers.

It bears mention that others have, independently of this author, used the word, Tao, and acronym, DAO, in article titles, but they have not actually explained the connection between Taoist themes and the operation of DAOs; in fact, both extant essays are devoid of any explanation of Taoism.¹² Similarly, “hardcoding ethics” is terminology that has appeared at least once before in a publication title, but the essay proposed a research agenda related to automating existing practices in the financial technology space,¹³ rather than proposing how ethical standards could be deliberately automated to improve outcomes in any industry.

Therefore, this essay, to the best knowledge of the author, applies a novel means of framing the potential of blockchain-based automation of business processes and examining the feasibility and desirability of assuring legal compliance and adherence to ethical commitments.¹⁴

¹¹ See *infra*, Section VII and accompanying notes.

¹² See Qayyum Rajan, *Ethereum & the Tao of the Dao*, HACKER NOON (Jan. 13, 2018), <https://hackernoon.com/ethereum-the-tao-of-the-dao-fa561b2f6b54>; see also David J. Shakow, *The Tao of The DAO: Taxing an Entity That Lives on a Blockchain* (Univ. of Pa. Law Sch. Inst. for Law & Econ., Research Paper No. 18-23, 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3247155.

¹³ Brett Scott, *Hardcoding Ethics Into Fintech*, FIN. & THE COMMON GOOD/BIEN COMMUN 44 80 (Jan. 2018), <http://www.ethicsinfinance.org/wp-content/uploads/2018/01/Brett-Scott-Hard-coding-ethics-into-fintech.pdf>

¹⁴ The hardcoding of business ethics presents a context where scholarship of law and moral philosophy can both help inform the arena of practice and is therefore the type of research focus that has long been advocated by law faculty in business schools. See Thomas W. Dunfee, *On the Synergistic, Interdependent Relationship of Business Ethics and Law*, 34 AM. BUS. L.J. 317, 318 (1996) (“In the tactical academic field of commercial law, seemingly far removed from the strategic battles of Olympian philosophers and jurisprudential scholars debating the relationship between morality and law, the potential for a synergistic interaction between applied ethical concepts and doctrinal research is evident.”).

I. TENETS OF TAOISM

Taoism is a Chinese philosophy that values living in harmony with the Tao,¹⁵ literally “the way” or “the path,” and also “the One, which is natural, spontaneous, eternal, nameless, and indescribable” (traditional and simplified Chinese: 道, pinyin: Dào).¹⁶ Taoism’s prehistoric origins between 3,000 and 700 BCE likely grew from shamanic traditions purporting to, among other things, heal, foretell the future, and affect natural phenomena like the weather.¹⁷ Over centuries, the typical trappings of organized religion, such as priestly classes, liturgical ceremonies, deities, and splintered sects, have waxed and waned, but certain central themes have remained constant and distinct in the Taoist philosophical tradition. Taoism has interacted with Confucianism and Buddhism and exerted an influence on Chinese culture, and to some extent well outside of China, into the present day.¹⁸

The central tenet of Taoism, *wu-wei* (traditional Chinese: 無爲, simplified: 无为, pinyin: wú wéi), has been translated to “action performed without deliberation.”¹⁹ *Wei* connotes intention or deliberation and *wu* conveys the meaning of “lacking” or “without,” resulting in the alternative translations “non-action,” “effortless action,” or “action without intent.”²⁰

This begs the question of what is the correct path that one should follow in acting without deliberation. It bears re-emphasizing both Tao’s meaning as “the way” and the fact that it denotes the unnamable²¹ source, pattern, and substance that underlies everything in the universe.²² Hence, to be on the correct path is to act in a way that is consistent with nature. As one

¹⁵ For a concise introduction to Taoism from an expansive historical perspective, see ALAN WATTS, *THE WAY OF ZEN* 23–24 (1999).

¹⁶ Min Young Jin, *Contributions of Bible Translation for Ecumenism in Asia*, in *ASIAN HANDBOOK FOR THEOLOGICAL EDUCATION AND ECUMENISM* 153 (Ruth Padilla DeBorst ed., 2013). Taoism has sometimes been transliterated as Daoism and both pronunciations are in common usage in the English language, yet Daoism with a “d” is more faithful to the original Mandarin Chinese pronunciation. LEONIE MCKEON, *TAME THE TIGER: NEGOTIATING FROM A POSITION OF POWER* 8 (2017). For our present purposes, Taoism with a “t” helps differentiate Tao from DAO.

¹⁷ EVA WONG, *TAOISM: AN ESSENTIAL GUIDE* 10-16 (2011).

¹⁸ Emily Mark, *Taoism*, *ANCIENT HISTORY ENCYCLOPEDIA* (Feb. 22, 2016), <https://www.ancient.eu/Taoism/>. For an example of Taoist themes in popular culture, see BENJAMIN HOFF, *THE TAO OF POOH* (1982). See also OLIVER BENJAMIN, *THE TAO OF THE DUDE* (2015).

¹⁹ Li-Jun Ji & Emily Chan, *Chinese Thinking Styles and Religion*, in *RELIGIOUS COGNITION IN CHINA: “HOMO RELIGIOSUS” AND THE DRAGON* 47 (Ryan G. Hornbeck et al. eds., 2017).

²⁰ ROBERT E. VAN VOORST, *ANTHOLOGY OF WORLD SCRIPTURES* 172 (7th ed. 2011).

²¹ Alan Watts prefers not to even try to offer a translation, calling it a “nonsense syllable.” ALAN WATTS, *WHAT IS TAO?* 38 (2000).

²² HERRLEE G. CREEL, *WHAT IS TAOISM? AND OTHER STUDIES IN CHINESE CULTURAL HISTORY* 2–3 (1970).

might expect given its Naturalist origins, Taoism asserts that one must place their will in harmony with the natural order.²³

Taoism somewhat shares Confucianism's core value of harmony, although Taoism emphasizes harmony with the natural order while Confucianism involves social harmony, and Taoism lacks Confucian dedication to rituals and rigid approach to social structure.²⁴ Besides the core themes of wu-wei and aligning action in harmony with nature, other generally shared values of Taoism with Confucianism include spontaneous self-organization,²⁵ simplicity,²⁶ and humility, modesty, and curbed desires (or not placing oneself either at the center, or above, the order of the universe or others).²⁷

As we will see, we can find echoes of these themes in the adoption of new automation technologies, as well as the professed commitments of some companies to simple, uncontroversial first principles that could place their businesses in a more harmonious (and less narrow and self-damagingly anthropocentric) relationship with the world.²⁸

II. THE TAO OF DAO, AND THE UNDERLYING TECHNOLOGIES OF BLOCKCHAIN AND SMART CONTRACTS

The essential idea of a DAO is to automate all of the agreements necessary to coordinate a group of individuals to accomplish the work of an organization – in other words, to replace the centralized overhead of a conventional business with code.²⁹ Some have cautioned that not all decentralized structures are truly autonomous unless control is ceded to code, as opposed to human control.³⁰ However, there is general consensus that the

²³ DARRELL J. FASCHING & DELL DECHANT, *COMPARATIVE RELIGIOUS ETHICS: A NARRATIVE APPROACH* 35 (2001).

²⁴ ELIZABETH POLLARD ET AL., *WORLDS TOGETHER, WORLDS APART* 168 (2011).

²⁵ See J. ZAI, *TAOISM AND SCIENCE: COSMOLOGY, EVOLUTION, MORALITY, HEALTH AND MORE* 127 (2015).

²⁶ See N. J. GIRARDOT, *MYTH AND MEANING IN EARLY DAOISM: THE THEMES OF CHAOS (HUNDUN)* 56 (1988).

²⁷ This last virtue stands in stark contrast to the American legal system's explicit anthropocentrism. See Adam J. Sulkowski, *Ultra Vires Statutes: Alive, Kicking, and a Means of Circumventing the Scalia Standing Gauntlet in Environmental Litigation*, 24 J. ENVTL. L. & LITIG. 75, 116–17 (2009) [hereinafter Sulkowski, *Ultra Vires*].

²⁸ For example, Paul Polman is commonly identified as an example of a business leader authentically committed to innovation and generating societal benefits while eliminating environmental harms. See Leila Abboud, *High-flying Dutchman Polman divided opinion but leaves positive legacy*, FIN. TIMES (Nov. 29, 2018), <https://www.ft.com/content/565399e4-f3f9-11e8-9623-d7f9881e729f>. As the CEO of Unilever, he reportedly told students in 2016, “I always say I represent one of the biggest NGOs.” *Id.*

²⁹ Vitalik Buterin, *DAOs, DACs, DAs and More: An Incomplete Terminology Guide*, ETHEREUM BLOG (May 6, 2014), <https://blog.ethereum.org/2014/05/06/daos-dacs-das-andmore-an-incomplete-terminology-guide/>.

³⁰ Laila Metjahic, *Deconstructing the DAO: The Need for Legal Recognition and the Application of Securities Laws to Decentralized Organizations*, 39 CARDOZO L. REV. 1533, 1543–44 (2018).

core component technologies described below – self-executing agreements and automated record-keeping – can allow an organization to function with minimal human managerial discretion, deliberation, and control.³¹

While the history of DAOs is limited,³² conventional businesses have begun to adopt some of the underlying technologies: namely, blockchain and smart contracts.³³ This development promises to eliminate fraud, theft, and imperfect human discretion by automating processes.³⁴

Blockchain is essentially a form of record-keeping,³⁵ in which information is digitally stored, constantly available, and can be updated at multiple nodes across a network. For this reason, it is also known as a distributed ledger technology (“DLT”).³⁶ Data on public blockchains is visible to anyone, with no single central authority controlling or owning the records.³⁷ In contrast, most businesses prefer to adopt private blockchain records, otherwise known as permissioned ledgers, because they can control access.³⁸

Building upon this automated record-keeping, smart contracts are a series of if-then triggers that allow for the pre-programmed, automated execution of agreements.³⁹ Hence they are often described as self-executing agreements.⁴⁰ A DAO makes use of a set of smart contracts to coordinate the

³¹ *Id.* at 1544.

³² For a description of developments related to three DAO platforms, see Usha R. Rodrigues, *Law and the Blockchain*, 104 IOWA L. REV. 679, 717–20 (2019).

³³ Heather Clancy, *The Blockchain's Emerging Role in Sustainability*, GREENBIZ (Feb. 6, 2017), <https://www.greenbiz.com/article/blockchains-emerging-role-sustainability>; *but see* Steve Banker, *Blockchain in the Supply Chain: Too Much Hype*, FORBES (Sept. 1, 2017), <https://www.forbes.com/sites/stevebanker/2017/09/01/blockchain-in-the-supply-chain-too-much-hype/#4e4510f9198c> (suggesting that while this technology has the potential to prevent thefts and combat cybersecurity issues, it is still relatively new and likely to experience several challenges while maturing).

³⁴ See Adam Sulkowski, *Blockchain, Business Supply Chains, Sustainability, and Law: The Future of Governance, Legal Frameworks, and Lawyers?*, 43 DEL. J. CORP. L. 303, 305 (2019) [hereinafter Sulkowski, *Blockchain*].

³⁵ See Marco Iansiti & Karim R. Lakhani, *The Truth About Blockchain*, 95 HARV. BUS. REV. 119, 120 (Jan. – Feb. 2017).

³⁶ See Carla L. Reyes, *If Rockefeller Were a Coder*, 87 GEO. WASH. L. REV. 373, 379–80 (2019).

³⁷ Michèle Finck, *Blockchains: Regulating the Unknown*, 19 GER. L.J. 665, 670 (2018).

³⁸ See *id.* Due to the business retaining control and access, private blockchain applications are arguably not as credible to outside observers as public blockchain records, but for internal purposes still offer advantages over conventional data tracking systems. As will be further explained below, this perceived credibility gap has been corrected by allowing independent third parties such as regulatory agencies access to private blockchains. Examples of applications include Hyperledger from Linux Foundation and Corda from the R3 financial services consortium. See generally Todd Benzies, *Tech and Banking Giants Ditch Bitcoin for Their Own Blockchain*, WIRED (Dec. 17, 2015, 12:01 AM), <https://www.hyperledger.org/news/2015/12/17/wired-tech-and-banking-giants-ditch-bitcoin-for-their-own-blockchain>.

³⁹ See Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 306 (2017).

⁴⁰ See Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J., 313, 319–20 (2017).

activity of people in the way that a conventional business does, replacing the business entity with a nexus of contacts.⁴¹

A conventional business organization, in contrast, is neither decentralized nor autonomous. In contrast, a hierarchy of individuals in a centralized system ultimately exerts command-and-control authority, and decisions at various levels require human discretion. Short of completely abandoning a centralized structure of human authority, a conventional business may nonetheless adopt aspects of the ethos, technology, and resulting benefits of some decentralization and automation of select processes.⁴² This began to happen in supply chains and financial record keeping.⁴³ McKinsey & Company released a report in early 2017 that: (1) predicted that blockchain will have a material impact on commerce between 2020 and 2022; (2) identified several dozen nascent use cases; and (3) concluded that most of its initial \$80-110 billion impact would be related to record-keeping in both the finance and insurance industries.⁴⁴

Before we begin a discussion of how decentralization and automation of business processes could relate to business ethics, it is important to clarify the benefits that these trends could potentially deliver. The first is transparency.⁴⁵ Decentralization of record-keeping allows for distributed access to information.⁴⁶ Trust that the information has not been altered is enhanced when access to the network is either fully public or shared with some regulatory agency or stakeholders outside of the company that keeps its records on a blockchain.⁴⁷ Besides limiting the potential for fraud in financial information tracking, this also enhances trust in the context of supply chains.⁴⁸ Finally, automation of contracts allows for the self-execution of promises – commitments to act or comply with a standard

⁴¹ For a review and critique of the conceptualization of a firm as a nexus of contracts, see generally William W. Bratton, Jr., *The "Nexus of Contracts" Corporation: A Critical Appraisal*, 74 CORNELL L. REV. 407 (1989).

⁴² See Laura Shin, *How The Blockchain Will Transform Everything From Banking To Government To Our Identities*, FORBES (May 26, 2016, 8:00 AM), <https://www.forbes.com/sites/laurashin/2016/05/26/how-the-blockchain-will-transform-everything-from-banking-to-government-to-our-identities/#17ed4cfc558e>.

⁴³ See Sulkowski, *Blockchain*, *supra* note 34, at 305–06.

⁴⁴ MCKINSEY & CO., FED. ADVISORY COMM. ON INS., *BLOCKCHAIN TECHNOLOGY IN THE INSURANCE SECTOR 2*, 6, 9 (Jan. 5, 2017), https://www.treasury.gov/initiatives/fio/Documents/McKinsey_FACI_Blockchain_in_Insurance.pdf.

⁴⁵ See Scott J. Shackelford & Steve Myers, *Block-by-Block: Leveraging the Power of Blockchain Technology to Build Trust and Promote Cyber Peace*, 19 YALE J.L. & TECH. 334, 340, 375 (2017).

⁴⁶ See *id.* at 355.

⁴⁷ See *id.* at 339–40, 355, 360, 364–65.

⁴⁸ See, e.g., Phil Taylor, *EY Partners with EZLab on Blockchain Wine Security Project*, SECURING INDUSTRY (Apr. 18, 2017), <https://www.securindustry.com/food-and-beverage/ey-partners-with-ezlab-on-blockchain-wine-security-project/s104/a4014/#.WvenBogvw2w>.

trigger consequences without the potentially flawed discretion of a human intermediary.⁴⁹

Put simply, any information that can be quantified or reduced to a yes/no statement can be stored on a blockchain-enabled application.⁵⁰ Based on this data, any decision triggers that can be reduced to if-then statements can be automated by a smart contract.⁵¹ Some scholars, such as Aaron Wright and Primavera de Filippi, have argued that the array of self-enforcing commitments and rules could create a new body of law that they have named *Lex Cryptographia*, a modern day analog to *Lex Mercatoria* created by merchants in earlier eras.⁵² Others, such as Kevin Werbach, have argued that the body of rules enabled by blockchain and smart contracts will still need the conventional mechanisms of dispute resolution and enforcement provided by the existing legal system.⁵³ Regardless, the overall foreseeable trend in business operations will be toward automation, including those that until now have necessitated recurring human interventions.

Whether it is in the context of a pure DAO or the more limited scope of a conventional corporation employing blockchain-based applications, Taoist themes are useful for framing and understanding the implications of this movement towards greater automation. First, by eliminating human discretion over a daily operating decision, businesses will manifest “action without deliberation,” meaning regular and repeated human decision-making will be replaced by pre-set triggers in programmed code. Second, inasmuch as an individual or group of individuals decide upon values and the expression of those values in a series of if-then conditions in code, they are setting their organization on a path. All paths, including those in the business world, carry with them ethical questions and impacts, be they intended or unintended consequences, core to the business activity or a side effect, or a benefit or a harm to someone or something.

Conventionally, business leaders have published codes of ethics to guide individuals in their organizations when making decisions. We are now entering an era when these values, if they can be expressed in the language of conditions and decision triggers, can be hardcoded into programs. The automation of ethically loaded sequences of pre-programmed decisions should therefore be a cause for contemplation of the values with which a chosen path is aligned. The balance of this paper will now discuss how ethics

⁴⁹ See Werbach & Cornell, *supra* note 40, at 316 n.10, 317–19.

⁵⁰ See *The Great Chain of Being Sure About Things*, *THE ECONOMIST* (Oct. 31, 2015), <https://www.economist.com/news/briefing/21677228-technology-behind-bitcoin-lets-people-who-do-not-know-or-trust-each-other-build-dependable>.

⁵¹ See Konstantinos Christidis & Michael Devetsikiotis, *Blockchains and Smart Contracts for the Internet of Things*, 4 *IEEE ACCESS* 2292, 2296–97 (2016), <http://ieeexplore.ieee.org/document/7467408/>.

⁵² See Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia*, *SSRN ELEC.* 4, 44, 48 (Mar. 12, 2015), <https://ssrn.com/abstract=2580664>.

⁵³ See Kevin Werbach, *Trust, But Verify: Why the Blockchain Needs the Law*, 33 *BERKELEY TECH. L.J.* 487, 489, 495–96, 543 (2018).

could be hardcoded and the desirability of automating processes such as to eliminate the risks of recurring human deliberation.

III. HARDCODING ETHICS: COULD ANY BUSINESS AUTOMATE DOING THE RIGHT THING?

This section will proceed as follows. First, this article will outline how hardcoding ethics could work, starting with basic principles. While this is not a technical paper, this article will probe the concept deeply enough to understand better how it would be deployed, such as to have a more informed discussion of its merits and limitations from business, legal, and ethical perspectives. Second, this article will explore how broadly this concept could be applied, building upon how existing conventional corporations are embracing aspects of automation.

A. *How to Hardcode Ethics*

There are at least three ways, broadly speaking, that ethics could be automated. First, mandating obligatory actions, the equivalent of “thou shalt.” Second, barring unacceptable actions, or “thou shalt not.” Third, requiring offsets, whereby causing a harm triggers an action that causes a benefit, such that the amount of net harm totals zero, or whereby benefits exceed harms.

It is easy enough to imagine the first two rules being encoded. They already have been. In the world of investing, automated buy, sell, or hold decisions are already a widespread fact-of-life.⁵⁴ Flash trading takes this idea to an extreme.⁵⁵

Triggering sell-or-hold-or-buy decisions based on previously determined price points is a close analog to, for example, programming a blockchain-based smart contract to purchase, or refuse to purchase, a diamond or quantity of Coltan based on whether the material has been certified as having been extracted without the use of coerced or child labor. Certification schemes already exist in a myriad of supply chain contexts, ranging from proof-of-provenance to the use of organic practices, to the adoption of fair labor practices.⁵⁶

Slightly less intuitive, but already an existing practice, is the phenomenon of offsetting or cap-and-trade mechanisms, both of which aim to effectively neutralize a side effect such as pollution.⁵⁷ For example,

⁵⁴ See Silvia Amaro, *Sell-Offs Could be Down to Machines that Control 80% of the US Stock Market, Fund Manager Says*, CNBC (Dec. 5, 2018, 6:23 AM), <https://www.cnbc.com/2018/12/05/sell-offs-could-be-down-to-machines-that-control-80percent-of-us-stocks-fund-manager-says.html>.

⁵⁵ See MICHAEL LEWIS, *FLASH BOYS: A WALL STREET REVOLT* 270 (2014).

⁵⁶ See Tilde Herrera, *Navigating the Wilderness of Green Business Certifications*, GREENBIZ (July 13, 2008, 5:00 PM), <https://www.greenbiz.com/news/2008/07/13/navigating-wilderness-green-business-certifications>.

⁵⁷ See *Cap and Trade FAQs*, NICHOLAS INST. FOR ENVTL. POLICY SOLS., DUKE U., <https://nicholasinstitute.duke.edu/focal-areas/cap-and-trade/cap-and-trade-faqs>.

companies including General Motors, Delta Airlines, Lyft, and Expedia voluntarily buy carbon offsets as a part of their carbon emissions reduction strategies.⁵⁸ A variation of this has been adopted by airlines; some offer passengers the option of purchasing offsets for the share of GHG resulting from their travel.⁵⁹ As will be described, governments have supported cap-and-trade emission trading schemes that accomplish the same goal of allowing pollution so long as it is offset.

There is no reason, in theory, that a business entity could not hardcode their offset commitments. The idea of automating offsets could help imbue fresh power and relevance into the idea of sustainability reporting, which is the practice of measuring and publishing impacts on society and the environment. Even one of sustainability reporting's early evangelists has "recalled" the idea in a Harvard Business Review article, explaining that the idea had failed to adequately disrupt business as usual.⁶⁰ Rather than sometimes functioning as a meaningless dashboard, or worse a misleading greenwashing public relations exercise, companies could program a set of "if-then" triggers to automate purchasing offsets for specific harms.

B. Steps Businesses Can Take to Hardcode Ethics

This leads us to a brief technical tangent to discuss more precisely how to hardcode ethics before we discuss what entities could adopt this practice. The key reason that one could question the credibility of blockchain-enabled applications deployed by conventional corporations is that access and control is still centralized – the organization's leadership ultimately can change the code, alter records, and control access.⁶¹ The solution to this is fairly simple. Access – even one node – can be shared with an independent and credible third-party observer such as a government regulatory agency, so that attempts to illegitimately alter records would be detectable.⁶² Examples of this in practice include the Securities Exchange in Sydney and the Depository Trust Clearing Corp.⁶³ Hyperledger and R3CEV represent similar improvements over conventional permissioned ledgers.⁶⁴

⁵⁸ See, e.g., Katie Fehrenbacher, *Lyft is Buying Carbon Offsets to Cover All of its Rides*, GREENBIZ (Apr. 19, 2018, 6:01 AM), <https://www.greenbiz.com/article/lyft-buying-carbon-offsets-cover-all-its-rides>.

⁵⁹ See *IATA Carbon Offset Program*, INT'L AIR TRANSP. ASS'N, <https://www.iata.org/en/programs/environment/carbon-offset/>.

⁶⁰ See John Elkington, *25 Years Ago I Coined the Phrase "Triple Bottom Line." Here's Why It's Time to Rethink It*, HARV. BUS. REV. (June 25, 2018), <https://hbr.org/2018/06/25-years-ago-i-coined-the-phrase-triple-bottom-line-heres-why-im-giving-up-on-it>.

⁶¹ See Sulkowski, *Blockchain*, *supra* note 34, at 306–07.

⁶² See *R3 Unlocks Regulatory Reporting on Corda with Financial Conduct Authority and Two Global Banks*, R3 (Sept. 12, 2017), <https://www.r3.com/news/r3-unlocks-regulatory-reporting-on-corda-with-financial-conduct-authority-and-two-global-banks/>.

⁶³ See, e.g., David Yermack, *Corporate Governance and Blockchains*, 21 REV. FIN. 7, 12 (2017).

⁶⁴ *Id.* at 16.

Therefore, the question posed in this section's subheading is partially answered by these examples: automation is being adopted in reality.⁶⁵ There is nothing about the technologies described above that prevents them from being used by any organization – including but not limited to conventional business corporations – to hardcode ethical values. To offer one more example, blockchain technology has reportedly functioned well in the context of inventory authentication in the timber industry, in which illegal sales are estimated to total \$51-152 billion annually.⁶⁶

This article will now move on to consider why this is significant. It will consider how the phenomena above may help overcome the existential crisis of business and civilization in the early 21st Century, and then consider whether this is desirable from the business, legal, and ethical perspectives.

IV. FLIPPING THE HIERARCHY IMPLIED BY CARROLL'S PYRAMID OF CSR

It is useful to acknowledge the current realities in business before we weigh the desirability of hardcoding ethics. Archie Carroll's Pyramid of Corporate Social Responsibility ("CSR") provides a classic, simple, and useful model for understanding the realities of ethical compromises in the business world that together constitute the defining existential crisis of our time.⁶⁷

It should be highlighted immediately that my use of Carroll's model differs slightly from what he originally attempted to communicate, as elaborated upon below. It is also important to note that a plain reading of Carroll's CSR pyramid does not reflect the hierarchy of duties described in state laws that create the ability to establish corporations, as also discussed below.⁶⁸ Nor, as will become obvious in a moment, does it represent what one would want in a neighbor or any entity in society. Rather, this frequently cited framework⁶⁹ succeeds, for our purposes, in explaining reasons for recurring managerial scandals, and helps provide context for discussing the implications of hardcoding ethics.

Carroll's model seems to imply a clear hierarchy of duties,

⁶⁵ See Jochem Verberne, *How Can Blockchain Serve Society?*, WORLD ECON. F. (Feb. 1, 2018), <https://www.weforum.org/agenda/2018/02/blockchain-ocean-fishing-sustainable-risk-environment/>.

⁶⁶ Boris Dudder & Omri Ross, *Timber Tracking: Reducing Complexity of Due Diligence by Using Blockchain Technology*, SSRN ELEC. 1, 3 (Aug. 8, 2017), <https://ssrn.com/abstract=3015219>.

⁶⁷ Archie B. Carroll, *The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders*, 34 BUS. HORIZONS 39, 42 (1991).

⁶⁸ Others have critiqued the implication of Carroll's model. See Gerlinde Berger-Walliser & Inara Scott, *Redefining Corporate Social Responsibility in an Era of Globalization and Regulatory Hardening*, 55 AM. BUS. L.J. 167, 213-214 (2018).

⁶⁹ According to Google Scholar, Carroll's 1991 Business Horizons article featuring his pyramid model has been cited 11,114 times as of February 8, 2020. See Carroll, *supra* note 67.

represented by a pyramid.⁷⁰ The foundational duty is “[b]e profitable. The foundation upon which all others rest [sic] (economic responsibilities).”⁷¹ Above that, follows the duty to act lawfully (legal responsibilities).⁷² Only then do we arrive at the aspiration to be fair and avoid harm (ethical responsibilities).⁷³ At the top level, there is the consideration of how the firm can benefit stakeholders (philanthropic responsibilities).⁷⁴

Carroll attempts to clarify that “[t]hrough the components have been treated as separate concepts for discussion purposes, they are not mutually exclusive”⁷⁵ and that “[i]n summary, the total corporate social responsibility of business entails the simultaneous fulfillment of the firm’s economic, legal, ethical, and philanthropic responsibilities.”⁷⁶

However, a few observations based on a plain reading of Carroll’s diagram and text are worth noting,⁷⁷ deserve a rebuke, and ultimately explain why the model helps clarify decades of corporate CSR failings and scandals – more than Carroll perhaps intended.

First, the image of the pyramid connotes a hierarchy, as well as the verbatim text in the foundational level – again: “Be profitable. The foundation upon which all others rest [sic]” – captures the reality faced by business leaders – that being profitable is perceived as a bedrock duty. However, as a legal matter, the incorporation statutes of 46 states (including Delaware) and the District of Columbia still stipulate that corporations are only allowed to engage in lawful activities,⁷⁸ and articles of incorporation typically include a commitment to obey the law.⁷⁹ While rarely tested, state attorneys general or shareholders in 49 states have the power, at least in theory, to move for dissolution of a corporation for unlawful conduct⁸⁰ – a power confirmed by the California attorney general.⁸¹ Therefore, one could argue that obeying the law is actually the foundational duty of a business.

Ultimately, regardless of whether we embrace or critique Carroll’s pyramid of CSR, the hierarchy that it implies does reflect the realities of the decision tree of managers. To take the Volkswagen emissions scandal as one vivid example: the perceived duty to be profitable trumped any perceived

⁷⁰ *Id.* at 42.

⁷¹ *Id.*

⁷² *See id.*

⁷³ *See id.*

⁷⁴ *See id.*

⁷⁵ *Id.*

⁷⁶ *Id.* at 43.

⁷⁷ Here, we will not quibble with the clearly erroneous word choice of this seminal text when Carroll wrote that his diagram was “not intended to juxtapose a firm’s economic responsibilities with its other responsibilities.” *Id.* at 42. More likely, Carroll intended to use the word “prioritize,” rather than “juxtapose.”

⁷⁸ *See* Sulkowski, *Ultra Vires*, *supra* note 27, at 101.

⁷⁹ *Id.*

⁸⁰ *Id.* at 102.

⁸¹ *See id.* at 106-07.

responsibilities to be lawful, avoid harm, or benefit stakeholders.⁸² Periodically the business press and general public take note of such scandals when they are truly massive or egregious. Public debate and legislative and regulatory action may even ensue, as described below, intended to reduce the risk of a scandal's recurrence. However, all of these acute governance failures happen against a backdrop of ongoing societal ills and the collapse of ecosystems. Carroll's pyramid of CSR helps us understand why this is so: each decision maker sees the pursuit of short term profitability as a more fundamental obligation than remaining lawful, benefiting stakeholders, or doing no harm – to the extent that we have been presently bearing witness, to an accelerating (although still comparatively slow motion) suicidal sprint to destroy our own planetary life support systems, manifested in phenomena such as climate change.

We now move on to the question: now that we can hardcode what we sometimes collectively ponder after an epochal scandal like the worldwide financial collapse of 2008 – that “first, do no harm” perhaps ought to be the bedrock first principle of business – should we pursue such ideas in reality?

V. THE BUSINESS PERSPECTIVE: IS HARDCODING ETHICS DESIRABLE AS A VOLUNTARY SELF-GOVERNANCE OR "SOFT LAW" MECHANISM?

The advantage of automating ethics from a business perspective is mitigating the risk of liabilities associated with illegal or otherwise scandalous practices that are undetected or at times deliberately tolerated by managers. An easily imagined context in which a rational, self-interested business leader would want a misdeed to be made impossible or immediately detectable would be intentional fraud or unintended misrepresentation in financial reporting. For example, in the U.S. context, as will be discussed further below, the Sarbanes-Oxley Act (“SOX”) has extended liability to corporate leaders whose firms misrepresent financial information.⁸³ Any tool, including blockchain-enabled applications, that mitigates this risk would therefore be desirable to deploy, even for executives that are primarily self-interested.

Beyond complying with legal requirements, corporate leaders have committed voluntarily to various initiatives related to fair trade, ethical sourcing, and emissions reduction targets. Partially to demonstrate progress toward achieving such ethical aspirations, over 90% of the world's largest companies publish regular disclosures on their societal and environmental

⁸² See Roger Parloff, *How VW Paid \$25 Billion for 'Dieselgate' — and Got Off Easy*, FORTUNE (Feb. 6, 2018, 5:01 AM), <https://fortune.com/2018/02/06/volkswagen-vw-emissions-scandal-penalties/>.

⁸³ See Sarbanes-Oxley Act, Pub. L. No. 107-204, 116 Stat. 745, 777 (2002) (codified as amended at 15 U.S.C. §§ 7201-7266 (2002) and in scattered sections of 18 U.S.C., 28 U.S.C., & 29 U.S.C.).

side effects.⁸⁴ In at least one instance in the U.S. involving Nike, the failure to fulfill a voluntary, publicly declared ethical commitment – which is the elimination of sweatshop labor – was grounds for a viable complaint against the company for false advertising and unfair competition.⁸⁵ Regardless of whether government sanctions are triggered, at least some executives that commit to certain verifiable ethical standards in sprawling global operations would want an assurance that their corporate code of ethics is actually hardcoded. Motives, aside from any sense of personal integrity, could include avoiding backlash from investors, customers, business partners, or other stakeholders.

Yet there are three obvious objections from the point of view of the reasonable businessperson, even one with a commitment to ethics in their organization. First, standards of what constitutes an ethical practice in an industry and society (and in the investment and activist communities) change. For example, less than two centuries ago, in some contexts, it may have been considered a comparatively humane practice to commit to not whipping slaves on a plantation. Today, the act of owning a human being is, in terms of mainstream global cultural norms and laws, generally unacceptable and officially illegal.⁸⁶ In other words, why would any reasonable business leader hardcode a standard of conduct, when the standard of what is acceptable could change? Would the hardcoding not lock-in a practice that seems enlightened now, but later appears egregious? Closely related to this objection, which is based on the fact that social norms are continually evolving, is the observation that change occurs in terms of new facts coming to light, new technologies developing, and the fact that business models, supply chains, and entire industries and markets change. Once again, why would anyone commit to the best available technology now, when it may be obsolete in a decade, either in terms of consumer expectations or economic viability? To illustrate: would it be desirable to hardcode a fuel economy standard that seemed ambitious in 1990, when accessible emission-free transportation is possible in 2020? Could not a business, investors, consumers, other stakeholders, and the environment all be harmed by locking-in a status quo paradigm?

Second, a temporary compromise or failure to deliver on some ethical performance targets may be considered necessary if it allows the organization to continue operating. This is analogous to a corporation's

⁸⁴ See Adam Sulkowski & Sandra Waddock, *Beyond Sustainability Reporting: Integrated Reporting is Practiced, Required and More Would be Better*, 10 U. ST. THOMAS L.J. 1060, 1061 (2013).

⁸⁵ *Kasky v. Nike, Inc.*, 45 P.3d 243, 259 (Cal. 2002). For a discussion on the delineation of the boundary between protected political speech and commercial speech, see generally James Weinstein, *Speech Categorization and the Limits of First Amendment Formalism: Lessons from Nike v. Kasky*, 54 CASE W. RES. L. REV. 1091, 1142 (2004).

⁸⁶ However, the International Labor Organization recently estimated that 40 million people were victims of modern slavery in 2016. See Mark Tutton, *40 Million Slaves in the World, Finds New Report*, CNN (Sept. 20, 2017), <https://edition.cnn.com/2017/09/19/world/global-slavery-estimates-ilo/index.html>.

leadership asking for understanding and confidence over the long term, despite more than once having to report a massive quarterly loss. Why would any reasonable businessperson eliminate the option of a short-term disappointment, to better deliver on a long-term duty or expectation?

Finally, there is the question of who bears responsibility for errors in coding. A reasonable businessperson may be wary of the adoption of automation that in principle promises to deliver value, but malfunctions and results in harm.

For each of the objections above, there is, given current knowledge, a rejoinder. With regard to the first two objections – that hardcoding current best practices, or a standard could hamper viability of an entity or innovation in the longer term – there are two responses. First, not every standard should be hardcoded. Just as failure to deliver a quarterly profit does not on its own constitute a breach of a duty to investors, a commitment to firm-wide climate neutrality in every quarter would probably be an imprudent goal to attempt to hardcode. On the other hand, a commitment to purchase an offset of each unit of carbon emitted from a specific planned operation like a shipping route could be hardcoded. In other words, hardcoding a commitment can be narrowly tailored. Or, less threatening, a commitment to transparency could be hardcoded, just as financial performance must be reported to investors without actually creating automatic consequences for temporary disappointments.

Second, as will be discussed again in the context of the regulatory perspective, a concept already exists in contract law and public law: the idea of proactively contemplating and stipulating when and how a rule can be changed.⁸⁷ This is closely and conceptually related to the solution above: narrow and careful tailoring of a commitment in terms of timespan, with conditions for either ending the commitment or deliberately resetting it.

With regard to the final objection (who bears the fault for flawed code), there is extant literature.⁸⁸ The potential for automation – despite its promise to eliminate vast harms caused by human errors and malfeasance in many contexts, – has provoked an arguably disproportionate amount of concern for who should bear the blame when code is the cause of the harm, either when it functions as intended or due to negligent coding.⁸⁹ Harms arising from errors in hardcoded ethical standards could conceivably include faulty information being reported, or possibly lost profits (stemming from the code's refusal to contract with a supplier based on an erroneous

⁸⁷ In the context of public lawmaking, this idea is known as a sunset clause. See David A. Fahrenthold, *In Congress, Sunset Clauses are Commonly Passed but Rarely Followed Through*, THE WASH. POST (Dec. 15, 2012), https://www.washingtonpost.com/politics/in-congress-sunset-clauses-are-commonly-passed-but-rarely-followed-through/2012/12/15/9d8e3ee0-43b5-11e2-8e70-e1993528222d_story.html.

⁸⁸ See, e.g., Donald G. Gifford, *Technological Triggers to Tort Revolutions: Steam Locomotives, Autonomous Vehicles, and Accident Compensation*, 11 J. TORT L. 71 (2018) (tracing the evolution of tort law along the timeline of technological change).

⁸⁹ See Kevin Werbach, *The Song Remains the Same: What Cyberlaw Might Teach the Next Internet Economy*, 69 FLA. L. REV. 887, 889 (2017).

conclusion that it failed to meet a standard). On the other hand, for a conventional business corporation adopting blockchain-based applications, current liability frameworks would likely apply, as they already do for existing online operations management systems.⁹⁰ In other words, the risk of harm and who bears the blame depends on many non-exotic details, including whether a company outsourced the coding, what kind of harm the code caused, and factors like indemnity clauses in contracts.

A less settled and more intriguing question arises in the case of establishing liability in the context of a true DAO, especially because it was not conceived as being amenable to the framework of a conventional business with legal personhood.⁹¹ Some persuasively argue that those associated with the DAO would be treated as general partners with unlimited personal liability, or else as an unincorporated association with the same implications.⁹² A solution has been suggested by Shawn Bayern, whereby a DAO could be created as a member-less limited liability company (“LLC”).⁹³ In such a scenario, the DAO acquires legal personhood for purposes of contracting and liability disputes.⁹⁴

Returning to the perspective of the businessperson in a conventional corporate setting: all of the steps mentioned above for addressing the objections to hardcoding ethics points to the evolving role of lawyers in automating business operations.⁹⁵ As commented elsewhere, attorneys will likely not all need to be adept at coding.⁹⁶ However, a new role is evolving, whereby legal counsel will need to help translate, as Nick Szabo put it, the wet code of human norms into the dry code of software.⁹⁷ This will put a greater premium on an attorney’s ability to help their business clients fully contemplate all of their evident and less-evident assumptions, expectations, and the contingencies that could materialize given a commitment to a given rule or standard.⁹⁸

Despite the foreseeable objections and qualifications above, hardcoding ethics is a viable tool for use in “soft law” approaches to self-

⁹⁰ *Id.* at 935-44.

⁹¹ Metjahic, *supra* note 30, at 1547-48.

⁹² Don Kramer, *Members of Unincorporated Association May Be Liable for Association’s Debt*, NONPROFIT ISSUES, (Sept. 16 - Oct. 15, 2012), <https://www.nonprofitissues.com/article/members-unincorporated-association-may-be-liable-association%E2%80%99s-debt>.

⁹³ See Shawn Bayern, *Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC*, 108 NW. U. L. REV. 1485, 1495-98 (2014).

⁹⁴ See Shawn Bayern, *The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems*, 19 STAN. TECH. L. REV. 93, 104 (2016).

⁹⁵ See Sulkowski, *Blockchain*, *supra* note 34, at 327-28; see also Joan M. Heminway & Adam J. Sulkowski, *Blockchains, Corporate Governance, and the Lawyer’s Role*, 65 WAYNE L. REV. 17, 53 (2019).

⁹⁶ See Heminway & Sulkowski, *supra* note 95, at 50.

⁹⁷ See Sulkowski, *Blockchain*, *supra* note 34, at 328; see generally Nick Szabo, *Wet Code and Dry*, UNENUMERATED (Aug. 24, 2008), <http://unenumerated.blogspot.com/2006/11/wet-code-and-dry.html> (explaining wet and dry codes).

⁹⁸ See Sulkowski, *Blockchain*, *supra* note 34, at 341.

regulation. It is conceivable that, once a critical mass of companies in an industry has adopted blockchain-based applications to assure compliance with regulatory and ethical standards, it becomes risky and indefensible not to do so. As is the case in other contexts, the failure to adopt a viable tool to prevent or mitigate the occurrence of illegalities and harms may eventually represent a deliberate failure to exercise reasonable care. The standard for exercising reasonable care, part of the greater fiduciary duties of managers, is constantly evolving and has at times been determined by norms in an industry.⁹⁹ It is a foreseeable possibility that, even in the absence of government encouragement or stakeholder demands, enough businesses adopt blockchain-based applications with ethically-related screening and conditions that proactively hardcoding ethics becomes a reasonable standard of care for business managers.

VI. THE REGULATORY PERSPECTIVE: WOULD HARDCODING ETHICS BE AS A MECHANISM OF GOVERNMENT REGULATION OF BUSINESS?

The goal of this section is to explore whether regulatory requirements, prohibitions, and other frameworks could be advanced by hardcoding business ethics. From a regulatory perspective, governments already set non-negotiable “thou shalt” and “thou shalt not” minimum standards for businesses, regulate information disclosure, and, through cap-and-trade frameworks, promote offsetting of harms.¹⁰⁰ A more expansive review of government regulations relevant to corporate governance that could be facilitated by blockchain is available;¹⁰¹ our goal here will be to review several examples such as to facilitate a discussion of the desirability of this option.

Stemming from blockchain’s essential function as a distributed ledger, the government mandates and prohibitions that could be most amenable to blockchain-based ethical hardcoding are those related to data transparency, fraud detection, and auditing. As previously mentioned, SOX establishes personal liability for executives, and stipulates that they are to personally promise that regularly-checked oversight systems are in place to detect financial fraud.¹⁰² The Dodd-Frank Act similarly enhances reporting expectations¹⁰³ and includes requirements for the reporting of minerals

⁹⁹ See Dalia T. Mitchell, *The Import of History to Corporate Law*, 59 ST. LOUIS U. L.J. 683, 683 (2015).

¹⁰⁰ For a discussion of basing social contract, laws, and constitutional rights on blockchain, see Steven Young, *Enforcing Constitutional Rights Through Computer Code*, 26 CATH. U. J.L. & TECH. 52, 53 (2017).

¹⁰¹ See Heminway & Sulkowski, *supra* note 95, at 22.

¹⁰² See Sarbanes-Oxley Act of 2002, *supra* note 83, at 116 Stat. 789. For a more in-depth discussion of duties created by the SOX, see Larry C. Backer, *The Duty to Monitor: Emerging Obligations of Outside Lawyers and Auditors to Detect and Report Corporate Wrongdoing Beyond the Federal Securities Laws*, 77 ST. JOHN’S L. REV. 919, 962 (2003).

¹⁰³ See Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111–203, 124 Stat. 1376 (2010). For an overview and discussion of the law, see generally David M. Lynn, *The Dodd-Frank Act’s Specialized Corporate Disclosure: Using the Securities Laws*

sourced from conflict zones.¹⁰⁴ Blockchain-based applications could help achieve the ultimate purpose of such laws: fraud elimination and transparency. These are just the most intuitive and obvious regulatory contexts. Some argue that any governmental mandate or prohibition – including encroachments on constitutional rights – could, at least in theory, be reduced to code on a blockchain.¹⁰⁵

For purposes of this paper it is important to further flesh-out how blockchain-based applications, beyond assuring reporting credibility and enforcing mandates and prohibitions, could also further government-backed initiatives to use market mechanisms to limit harms. In addition to Pigouvian taxes that effectively raise the price of permitted activities that have harmful side effects,¹⁰⁶ governments have established cap-and-trade regimes.¹⁰⁷ Examples include the U.S. Clean Air Act's trading scheme for emissions from stationary sources.¹⁰⁸ Such cap-and-trade schemes set a declining limit on aggregate emissions in a region and allow late adopters of less-polluting technologies to purchase credits from businesses that adopt such technologies sooner.¹⁰⁹ To function, these offset markets require three elements: credible tracking of emissions data, a prohibition on exceeding the stipulated aggregate maximum, and a marketplace where a price can be settled upon between those who pollute less than their apportioned share, and those who pollute more and therefore need to purchase credits. Each of these functions, such as data tracking, a prohibition, and a set of if-then conditions that comprise the credit purchase agreement, are clearly possible to automate. Further, the tracking of emissions and trading of credits could be made more transparent and efficient if automated. Moreover, if blockchain-based applications are employed, then aggregate limits, compliance with the rules, and reliability of the underlying data would all be enhanced. Aside from working out technical details such as how, when, and where emissions are detected – in other words, how a fact in the real world becomes a recorded datum in the digital ledger¹¹⁰ – blockchain-based applications appear to be ideally suited to use in government-backed cap-and-trade mechanisms.

In short, governments have already clearly expressed the intent of codifying minimum ethical standards for business laws. While, in some contexts, some amount of discretion is tolerated, the standards mentioned

to Address Public Policy Issues, 6 J. BUS. & TECH. L. 327 (2011); see also Emily Veale, *Is There Blood On Your Hands-Free Device?: Examining Legislative Approaches to the Conflict Minerals Problem in the Democratic Republic of Congo*, 21 CARDOZO J. INT'L & COMP. L. 503, 520-25 (2013).

¹⁰⁴ See Dodd-Frank Wall Street Reform and Consumer Protection Act, *supra* note 103, at 124 Stat. 2213–18.

¹⁰⁵ Young, *supra* note 100, at 68.

¹⁰⁶ See generally Erin Adele Scharff, *Green Fees: The Challenge of Pricing Externalities Under State Law*, 97 NEB. L. REV. 168 (2018).

¹⁰⁷ See Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293, 296-97 (2008).

¹⁰⁸ Clean Air Act, 42 U.S.C. §§ 7401-7671q (2015).

¹⁰⁹ Stavins, *supra* note 107, at 298.

¹¹⁰ See Sulkowski, *Blockchain*, *supra* note 34, at 308.

above were not intended to be optional. The gap between legal expectations and reality has arguably existed partially because the technology did not yet exist to hardcode a standard. Moving forward, if legislators and regulators are serious in setting non-negotiable minimum standards and effective market mechanisms, they now have a tool to reduce illegality that could be vastly more efficient and effective than conventional schemes relying on deterrence (through penalties) and costly, time-consuming, and unpredictable investigation, enforcement, and litigation.

There are four implications for legislators and regulators based on the discussion in this section. First, at a minimum, clarification should be issued as to whether and how blockchain-enabled applications satisfy existing regulatory frameworks. The U.S. Securities and Exchange Commission (“SEC”) has issued similar clarifications in the past, as to the acceptability of disclosing information online.¹¹¹ This is especially evident, for example, in the arena of informational regulation, specifically in the context of mandatory reporting and data privacy standards.¹¹² Second, perhaps legislators and regulators would want to go further and require such applications, including the triggering of offset requirements or credit purchases and consequences such as penalties in certain contexts. To require a more efficient and effective approach to existing practices is not a massive leap forward in terms of conceptual approach, but rather an upgrade analogous to recognizing that online communications ought to replace paper-based communication for some purposes. Moreover, it can offer the benefit of preventing illegalities before they occur.¹¹³ Third, given that some principles are deliberately flexible and based partially on reasonable person standards, there should be greater deliberation and clarity regarding which standards are discretionary rather than bright line obligations. Finally, with regard to the primary objection noted herein, that societal norms will evolve, and changes will be demanded, we have noted the normal protection against calcification of a rule that may later seem objectionable: sunset provisions. Therefore, the fourth implication for regulators will be a need to contemplate and include sunset provisions whereby a timeline and process is set for the possible alteration of hardcoded standards. None of these implications are conceptually revolutionary. After examining the feasibility and desirability of hardcoding ethics from the business and regulatory perspectives, it remains to consider these questions from a more abstracted ethical perspective.

¹¹¹ According to SEC interpretive guidance, relevant investor protection law provides “considerable flexibility” and is intended to permit the use of technologies such as the Internet. See Selective Disclosure and Insider Trading, 65 Fed. Reg. 51,716, 51,723-24 (Aug. 24, 2000) (codified at 17 C.F.R. pt. 243).

¹¹² See Heminway & Sulkowski, *supra* note 95, at 41.

¹¹³ See Young, *supra* note 100, at 57.

VII. THE ETHICAL PERSPECTIVE: WEIGHING THE IMPLICATION OF WU-WEI FOR BUSINESS AND THE DUTY OF ALIGNING ONE'S PATH IN BUSINESS WITH THE NATURAL ORDER

This section will attempt to discuss hardcoding ethics from a perspective that is removed from the narrower perspectives of market participants or regulators. This is based on an acceptance of the theory that we may divine valuable perspectives by attempting to remove ourselves from the biases attendant to a specific position or role.¹¹⁴ This is consistent with the approach taken by philosophers ranging from the Ancient Greeks to hermits of various traditions: those striving for sagacious insights often remove themselves from society to gain and later share wisdom.¹¹⁵

As many, if not most, textbooks for survey courses on law in business schools summarize, there are ultimately two overarching calculi for ethical reasoning: deontology and consequentialism, or utilitarianism.¹¹⁶ Deontology is a duty-centered approach to ethics.¹¹⁷ As captured in Emmanuel Kant's notion of the categorical imperative, this school of thought holds that one ought to evaluate what the world would be like if everyone undertook the action that one is contemplating.¹¹⁸ If the result is an unacceptable world, then one has a hard duty not to take this action, regardless of the consequences. Taken to an extreme, this school of thought leads one to conclude that "thou shalt not kill" is truly a non-negotiable obligation, and results in a commitment to pacifism. Consequentialism, on the other hand, holds that one ought to weigh benefits and harms of an action, and choose options that create the greatest benefits for the most people.¹¹⁹ This line of reasoning can lead to disturbing, but some would argue, ultimately defensible actions in wartime. These include committing one's own youth to lose their lives storming beaches, or even the creation of firestorms over civilian populations through the use of nuclear or conventional bombing – if one accepts that in the longer run these were decisions that spared a greater number of lives by expediting the end of catastrophic conflicts.

Based on this overview of the two broad categories of ethical reasoning, hardcoding non-negotiable standards seems consistent with a

¹¹⁴ See JOHN RAWLS, A THEORY OF JUSTICE 1, 81-86 (Harvard Univ. Press rev. ed. 1999).

¹¹⁵ See PETER FRANCE, HERMITS: THE INSIGHTS OF SOLITUDE 43, 121 (Vintage Digital 2014).

¹¹⁶ Some may argue that this reduction of ethical reasoning frameworks to two broad categories leaves out approaches such as virtue ethics. Virtue ethics, however, involves the building-up of appropriate sentiments and habits over time. See generally ARISTOTLE, NICOMACHEAN ETHICS BOOK I (Martin Ostwald trans., Bobbs-Merrill Educ. Pub. 1962). It therefore does not really offer a calculus of moral reasoning for an individual to make a decision at a certain point in time.

¹¹⁷ See STEPHEN DARWALL, *Introduction*, in BLACKWELL READINGS IN PHILOSOPHY: DEONTOLOGY 3, 4-6 (Stephen Darwall ed., 2003).

¹¹⁸ See IMMANUEL KANT, THE CRITIQUE OF PRACTICAL REASON 39-42, 64 (Thomas Kingsmill Abbott trans., The Floating Press 2009) (1788) (ebook).

¹¹⁹ See generally MARTIN PETERSON, THE DIMENSIONS OF CONSEQUENTIALISM: ETHICS, EQUALITY, AND RISK (2013).

deontological approach. Since hardcoding a “thou shalt” or “thou shalt not” command ought to prevent a certain act from taking place, it would eliminate the possibility of an efficient breach – the phenomenon of choosing an illegal or harmful act if the cost of fines, lawsuits, settlements, and other costs are outweighed by the potential for perceived gains.

It is less obvious whether hardcoding ethics can be seen as consistent with a consequentialist approach. If a consequentialist’s answer to even the most extreme ethical question – for example, whether it is morally correct to deliberately kill an innocent person – is “it depends,” then perhaps a consequentialist would conclude that no rule should be hardcoded? On the other hand, not every harm is so obviously egregious as outright murder, especially if it can be effectively neutralized. Once again, the example of carbon emission offsets or credit trading provides us with an accessible scenario to contemplate. Emitting carbon is not in itself deadly, inherently anathema to a core ethical value, or unnatural – it is literally as natural as breathing. The problem is the aggregate net release of carbon from human activities that destabilizes climate systems with deadly consequences. In such a scenario, a consequentialist would suggest that the emissions should be tolerated as long as they are offset; in other words, so long as disastrous eventual consequences are neutralized. It is conceivable to hardcode a rule that permits an act yet attaches a penalty or requirement to offset a harm. As explained above, this system is already in place in various industries and regions, both through government-arranged cap-and-trade and credit purchase schemes.

Therefore, hardcoding ethics can be made consistent with both a deontological approach and a consequentialist approach. This section will conclude now with a discussion of what many have come to believe is the defining existential crisis of global civilization in the early 21st Century: that our human-created systems are destroying ecosystems to the extent that we are threatening – without exaggeration or hyperbole – our natural life support systems. This context allows us to see how both a deontological and consequentialist approach, using a Taoist framing, can inform a timely conversation on hardcoding ethics.

We presently hear echoes of both deontological and consequentialist reasoning expressed in debates about business ethics in the context of sustainable development. For example, the consequentialist school of thought finds expression in at least two common arguments involving rapid and polluting development or the destruction of natural ecosystems. First, that despite the destruction of life, including loss of human life as a result of pollution, development brings a net improvement in a greater number of people’s living conditions by eliminating diseases and other problems associated with extreme poverty. Second, that despite the annihilation of ecosystems and sometimes exploitation of human populations in the developing world, global capitalism creates massive amounts of wealth, a portion of which individuals and governments could redirect to humanitarian and environmental causes, or reinvest in developing the next generation of

socially and environmentally benign or even beneficial technologies and business models.

Regardless of our receptivity to the general lines of reasoning and specific arguments above, and accepting that societal values and human-made laws change, along with the state-of-the-art in technologies, there is a simple but irrefutable fact that is finally getting traction in mainstream global awareness: the fundamentals of natural sciences are unchanging.¹²⁰ The laws of physics, chemistry, and biology are inviolable in the context of understanding and planning human activity on earth.

In lieu of an exhaustive review of scientific literature, it should suffice to cite a representative example of a minimum agreed upon consensus of hundreds of specialists who unambiguously have been warning for decades: we have, and continue to accelerate, a death spiral of the destruction of planetary life support systems.¹²¹ Among other potentially reasonable responses, one could argue that achieving net zero environmental harm is an unassailable and non-negotiable duty – a categorical imperative for our time. There are examples of industrial companies who have demonstrated that the pursuit of this goal can actually boost profitability and economically valuable innovation, so it is not anathema to capitalist principles to consider this goal.¹²² If a tool exists to help automate this ethical duty to achieve net zero environmental harm, one might reasonably state that the burden rests with naysayers who oppose the hardcoding of this obligation. While deontological reasoning helps us arrive at this duty (i.e. each entity must achieve climate neutrality because, if everyone pollutes without limit, the outcome of mass death and suffering is unacceptable), the most evident hardcoding approach (automatic offsets) is arguably a consequentialist approach. Coming full circle, hardcoding- at least a duty to achieve net zero climate harm- would manifest two core Taoists tenets for daily business operations: (1) action without deliberation; and (2) alignment of that action with nature and natural laws.

To clarify, this section explored deontological and consequentialist reasoning and found that hardcoding ethics – depending on details – can be deployed in a way that is consistent with both approaches. This is regardless of whether it is imposed or encouraged by either government mandate or incentives, or is adopted voluntarily by a business entity, or whether we are considering the context of fraud detection or environmental collapse. We have deliberately closed this section, however, with a specific context in which hardcoding ethics would resonate with themes from deontology and

¹²⁰ See generally Bill McKibben, *Physics Doesn't Negotiate*, MEDIUM (Aug. 30, 2015), <https://medium.com/climate-desk/why-the-earth-is-heating-so-fast-267072ab2b49>.

¹²¹ See generally William J. Ripple et al., *World Scientists' Warning to Humanity: A Second Notice*, 67 BIOSCIENCE, 1026 (2017) (in addition to William J. Ripple, Christopher Wolf, Thomas M. Newsome, Mauro Galetti, Mohammed Alamgir, Eileen Crist, Mahmoud I. Mahmoud, and William F. Laurance, 15,364 scientists from 184 countries were signatories to this document).

¹²² See generally RAY C. ANDERSON & ROBIN WHITE, BUSINESS LESSONS FROM A RADICAL INDUSTRIALIST (McClelland & Stewart 2011).

consequentialism and Taoism, and hope that others will build upon this provocation to consider whether there is really a viable option to hardcoding “first, do not (net) harm” into the operations of business in our time.

CONCLUSIONS

This paper has explored a frontier issue in business. We are in the relatively early throes of automating operations with ethical implications in conventional business organizations, and at the dawn of deploying DAOs. This raises the possibility of more deliberately hardcoding ethics into businesses. I have reviewed the basics of Taoism as a framing device to understand implications of this option: among them being daily actions occurring without deliberation.

This study has concluded that hardcoding ethics is not just an option for DAOs; given the right adaptation, the underlying technologies of blockchain-enabled records and smart contracting can and are being credibly adopted by conventional business entities.

Having pointed out that this existing practice can be used to further automate ethics by requiring, barring, or offsetting certain actions and attendant consequences, this study then evaluated the desirability of this prospect from the business, regulatory, and ethical perspectives. Reasonable individuals may, at present, disagree on the desirability of eliminating human discretion over certain decisions with business, legal, and ethical dimensions. This paper outlined some foreseeable lines of argumentation for others to build upon in future debates, scholarly and otherwise, about whether automated ethics should be voluntarily adopted or required in regulatory frameworks.

Most confidently, one can imagine that eventually hardcoding rules that eliminate fraud and mitigate the risk of liability could become part of the reasonable standard of care that managers owe as part of their fiduciary duties. Another context is the possibility of hardcoding to help businesses achieve net environmental neutrality. This paper concluded with a deliberate provocation, coming full circle to draw upon Taoist tradition in suggesting that hardcoding the principle of achieving net zero environmental harm gives business leaders a tool to comply with the urgent necessity of aligning the path of their enterprises with the laws of nature.