HARDCODING ETHICS:
THE TAO OF DAO FOR ANY BUSINESS

by

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Abstract

Core concepts of Taoism – foremost among them "action without deliberation" – help conceptualize the trend of automation in corporate governance, especially in the context of a business entity that engrains 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).

Conventional businesses are already beginning to use the technologies underlying a DAO – blockchain and smart contracts – to limit human discretion by effectively hardcoding rules with ethical aspects. To the best knowledge of the author, this is the first use of the phrase "hardcoding ethics" to specifically describe the deliberate and proactive use of these technologies to further ethical conduct in business. This paper also appears to be the first to actually explain how Taoism relates to, and may assist in conceptualizing, the implications of automation represented by DAOs and their component systems: blockchain and smart contracts.

Hardcoding ethics creates an opportunity for business leaders to think deeply about the impacts of their organizations along their chosen path. The practice opens lines of further scholarly and policy debate, including whether and how, through the deliberate encoding of ethical rules, leaders and regulators could flip the perceived hierarchy of duties that individuals act upon in practice. In other words, rather than treating ethical issues as secondary to the bedrock obligation to harvest profits even if laws are (profitably) broken and life is (profitably) destroyed, hardcoding ethics presents an opportunity to discuss whether "first, be lawful" or even "first, do no (net) harm" could, in at least some contexts, be encoded as first principles.

Following a brief overview of relevant Taoist tenets and the concept of a DAO and its underlying technologies, this paper will explore the desirability of hardcoding ethics from three broadly defined viewpoints: the business, legal, and ethical perspectives. In doing so, this paper may stimulate a dialogue about encoding ethics that could prove valuable for both scholars and those in the world of practice, including managers, investors, entrepreneurs, legal counsel, regulators, policy makers, and those involved in dispute resolution.

Somewhat ironically, in exploring the Taoist notion of hardcoded ethical "action without deliberation" in the business context, we will provoke a potential conversation about necessity for taking a more proactive and thoughtful approach to law and voluntarily assumed commitments that entails a deeper, wider and more conscious and deliberate consideration of externalities.

I. 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 functioning – 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 benevolent founding aspiration whose eventual daily operations illustrated the compromise unintentionally implied by Archie Carroll in his pyramid of corporate social responsibility (CSR).[4] In reality, managers' perceived bedrock obligation to make profits can make following the law, curbing harms, and generating net benefits to stakeholder a disposable secondary or tertiary optional afterthought. Gaps between an organization's explicit benevolent founding aspirations and its members' deliberately deadly actions is a phenomenon 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 a civilizational existential crisis.[5]

But what if core ethical values were hardwired – or, more accurately, hardcoded[6] – into the DNA of a business?[7] What if, instead of negotiable (and often disposable) principles, whose

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[1] GOOGLE CODE OF CONDUCT, Conclusion (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 (Adopted Oct. 2, 2015, amended Sept. 21, 2017), https://abc.xyz/investor/other/code-of-conduct/. 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. (Oct. 2, 2015), 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. 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. Issie Lapowsky, *How Cambridge Analytica Sparked the Great Privacy Awakening*, WIRED (Mar. 17, 2019), https://www.wired.com/story/cambridge-analytica-facebook-privacy-awakening/. Google has faced criticism as well 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] *See infra*, Section IV. and accompanying notes.

[5] *See infra*, Section VIII. and accompanying notes.

[6] 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?* TECHNOPEDIA, https://www.techopedia.com/definition/16934/hardcode. It is typically reserved for unchanging constant values, such as the speed of light. *Id.*

[7] 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

obeyance 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.[8] As will be explained in greater detail below, conventional management structures are beginning to be replaced by these technologies, in which computer code that is difficult to alter replaces human discretionary decisions.[9] This paper builds upon 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 the tropes of Taoism to frame two implications of hardcoding ethical rules of an organization. The first is the central Taoist theme of action without deliberation, and the second being action that is consistent with natural laws.

This paper also investigates the benefits and drawbacks of hardcoding ethical rules from a business, legal, and ethical perspective. 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 becomes 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 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

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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. Yaniv Erlich & Dina Zielinski, *DNA Fountain enables a robust and efficient storage architecture*, 355 SCIENCE, 950-54 (Mar. 3, 2017).

[8] For an introduction to these technologies and implications for law and policy, s*ee* Adam J. Sulkowski, *Industry 4. 0-Era Technology: Next Steps for Legal Research and Action on AI, Big Data, Blockchain, and DAO*, KAN. J.L. & PUB. POL'Y ONLINE, (forthcoming, 2019).

[9] *See infra,* Section III. and accompanying notes.

[10] *Id.*

[11] *See infra,* Section VI.-VIII. 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* (Sept. 11, 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3247155.

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 in business processes and examining the feasibility and desirability of assuring legal compliance and adherence to ethical commitments.[14]

II. Tenets of Taoism

Taoism is a Chinese wisdom tradition 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 prehistorical origins between 3,000 and 700 BCE likely grew from shamanic traditions purporting to, among other things, 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. Taoism has interacted with Confucianism and Buddhism and has 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 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]

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[13] Brett Scott, *Hardcoding Ethics Into Fintech*, FINANCE & BIEN COMMUN / COMMON GOOD 44/45, 80 (Jan. 2018), http://www.ethicsinfinance.org/wp-content/uploads/2018/01/Brett-Scott-Hard-coding-ethics-into-fintech.pdf

[14] The hardcoding 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 (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." *Id.* at 318.

[15] For a concise introduction to Taoism from an expansive historical perspective, *see* Alan Watts, THE WAY OF ZEN (Random House, 1999), 10-28.

[16] Linda Woodhead *et al.*, RELIGIONS IN THE MODERN WORLD (Routledge, 2016), 146. Taoism has sometimes been transliterated as Daoism and both pronunciations are in common usage in the English language, yet Taoism with a "t" is more faithful to the original Mandarin Chinese pronunciation. *Id.* For our present purposes, Taoism with a "t" additionally helps differentiate Tao from DAO.

[17] Eva Wong, TAOISM: AN ESSENTIAL GUIDE (Shambhala, 2011), 11-18.

[18] For an example of Taoist themes in popular culture, *see* Benjamin Hoff, THE TAO OF POOH (Dutton Books, 1982). *See also* Oliver Benjamin, THE TAO OF THE DUDE (Dudeism, 2016).

[19] Robert E. Van Voorst, ANTHOLOGY OF WORLD SCRIPTURES (Thomson Wadsworth, 2005), 170.

[20] *Id.*

This begs the question of what – more precisely – 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 unnamable source, pattern, and substance that underlies everything in the universe. Hence, to be on the correct path is to act in a way that is consistent with nature. As one might expect given its Naturalist origins, Taoism asserts that one must place their will in harmony with laws of the natural universe.[21]

Taoism shares Confucianism's core value of harmony, but lacks its emphasis on rituals and social structure.[22] Besides the core themes of wu-wei and aligning action in harmony with nature and the laws of the universe, other generally shared values of Taoism include self-organization,[23] simplicity,[24] and humility (or not placing oneself either at the center, or above, the order of the universe).[25]

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 narrowly and ultimately self-damaging anthropocentric) relationship with the world.[26]

III. The Tao of DAO, and underlying technologies of blockchain and smart contracts

The essential idea of a DAO is to automate all of the agreements needed 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.[27] Some have cautioned that not all decentralized structures are truly autonomous unless control is ceded to code, as opposed to human control.[28] However, there is general consensus that the core component technologies described below – self-executing agreements and automated record-keeping – can allow an

[21] Darrell Fasching & Dell deChant, COMPARATIVE RELIGIOUS ETHICS: A NARRATIVE APPROACH (Wiley, 2001), 35.
[22] Elizabeth Pollard *et al.*, WORLDS TOGETHER, WORLDS APART (Norton, 2011), 164.
[23] *See* J. Zai, TAOISM AND SCIENCE: COSMOLOGY, EVOLUTION, MORALITY, HEALTH AND MORE (Ultravisum, 2015).
[24] Norman J. Girardot, MYTH AND MEANING IN EARLY TAOISM: THE THEMES OF CHAOS (HUN-TUN), (University of California Press, 1988), 56.
[25] This last virtue stands in stark contrast to the American legal system's explicit anthropocentrism [remainder of footnote redacted to maintain author anonymity].
[26] 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. 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 CEO of Unilever, he reportedly told students in 2016 "I always say I represent one of the biggest NGOs." *Id.*
[27] 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/.
[28] Laila Metjahic, *Deconstructing the DAO: The Need for Legal Recognition and the Application of Securities Laws to Decentralized Organizations*, 39 CARDOZO L. REV. 1533, 1541-1544 (2018).

organization to function in the absence of human managerial discretion, deliberation, and control.[29]

While the history of DAOs is limited,[30] conventional business have begun to adopt some of the underlying technologies: namely, blockchain and smart contracts.[31] This development promises to deliver the benefit of removing potentially flawed human discretion, fraud, theft, by automating processes.[32]

Blockchain is essentially a form of record-keeping,[33] in which information is digitally stored, constantly available, and can be updated at multiple nodes across a network – for this reason it also known as distributed ledger technology or DLT.[34] Data on public blockchains is visible to anyone, with no single central authority controlling or owning the records.[35] In contrast, most businesses prefer to adopt private blockchain records, otherwise known as permissioned ledgers, because they can control access.[36]

Smart contracts are a series of if-then triggers that allow for the pre-programmed, automated execution of agreements.[37] Hence they are often described as self-executing agreements.[38] A DAO makes use of a set of smart contracts to coordinate the activity of people in the way that a conventional business does – replacing the business entity with a nexus of contacts.[39]

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[29] *Id.*
[30] For a description of developments related to three DAO platforms, *see* Usha R. Rodrigues, *Law and the Blockchain*, 104 IOWA L. REV. 679, 717-720 (2019).
[31] Heather Clancy, *The blockchain's emerging role in sustainability*, GREENBIZ (Feb. 6, 2017), https://www.greenbiz.com/article/blockchains-emerging-rolesustainability. For an alternative perspective, *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).
[32] Adam Sulkowski, *Blockchain, Business Supply Chains, Sustainability, and Law: The Future of Governance, Legal Frameworks, and Lawyers?* 43 DEL. J. CORP. L. 303 (2019).
[33] Marco Iansiti & Karim R. Lakhani, *The Truth About Blockchain*, 95 HARV. BUS. REV. (Jan.-Feb. 2017).
[34] Carla L. Reyes, *If Rockefeller Were A Coder*, 87 GEO. WASH. L. REV. 373 (2019)
[35] Michèle Finck, *Blockchains: Regulating the Unknown*, 19 GERMAN L. J. 665, 670 (2018).
[36] Todd Benzies, *Tech and Banking Giants Ditch Bitcoin for Their Own Blockchain*, WIRED (Dec. 17, 2015), https://www.hyperledger.org/news/2015/12/17/wired-tech-and-banking-giants-ditch-bitcoin-for-their-own-blockchain. Due to the business retaining control and access, private blockchain applications arguably are 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. *Id.*
[37] Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 308 (2017).
[38] Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L. J., 313, 316-19 (2017).
[39] For a review and critique of the conceptualization of a firm as a nexus of contacts, *see* William W. Bratton, Jr., *The "Nexus of Contracts" Corporation: A Critical Appraisal*, 74 CORNELL L. REV. 407 (1989).

A conventional business organization, in contrast, is not decentralized nor autonomous – a hierarchy of individuals in centralized system of authority ultimately exerts command-and-control authority, and decisions at various levels require human discretion. Short of abandoning completely 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.[40] This has begun to happen in supply chains and financial record keeping. McKinsey & Company recently predicted a material impact on commerce between 2020 and 2022, identified several dozen nascent use cases, and concluded that most of blockchain's initial $80-110 billion impact would be related to record-keeping in both the finance and insurance industries.[41]

Before we begin a discussion of how selective 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.[42] Decentralization of record-keeping allows for distributed access to information.[43] Trust that the information has not been altered is enhanced when access to the network either fully public or else shared with some regulatory agency or stakeholders outside of the company that keeps its records on a blockchain.[44] Besides limiting the potential for fraud in financial information tracking, this also enhances trust in the context of supply chains.[45] Finally, automation of contracts allows for the self-execution of promises – commitments to act or comply with a standard trigger consequences without the potentially flawed discretion of human intermediary.[46]

Put simply, any information that can be quantified or reduced to a yes/no statement can be stored on a blockchain-enabled application.[47] Based on this data, any decision triggers that can be reduced to if-then statements can be automated by a smart contract.[48] Some, 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*,

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[40] *See* Laura Shin, *How The Blockchain Will Transform Everything From Banking To Government To Our Identities*, FORBES (May 26, 2016), https://www.forbes.com/sites/laurashin/2016/05/26/how-the-blockchain-will-transform-everything-from-banking-to-government-to-our-identities/#17ed4cfc558e.
[41] McKinsey & Co., BLOCKCHAIN TECHNOLOGY IN THE INSURANCE SECTOR: QUARTERLY MEETING OF THE FED. ADVISORY COMMITTEE ON INS. (FACI), (Jan. 5, 2017), https://www.treasury.gov/initiatives/fio/Documents/McKinsey_FACI_Blockchain_in_Insurance.pdf, 6-9.
[42] 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, 338-39 (2017).
[43] *Id.*
[44] *Id.*
[45] Phil Taylor, *EY partners with EZLab on blockchain wine security project*, SECURING INDUSTRY (Apr. 18, 2017), https://www.securingindustry.com/food-and-beverage/ey-partners-with-ezlab-on-blockchain-wine-security-project/s104/a4014/#.WvenBogvw2w.
[46] *See* Werbach & Cornell, *supra* note 38 at 316-19.
[47] Reid Hoffman, *Why the Blockchain matters*, WIRED UK (May 15, 2015), https://www.wired.co.uk/article/bitcoin-reid-hoffman.
[48] Konstantinos Christidis & Michael Devetsikiotis, *Blockchains and Smart Contracts for the Internet of Things*, IEEE ACCESS J. 2292, 2292 (June 3, 2016), http://ieeexplore.ieee.org/document/7467408/.

a modern day analog to *Lex Mercatoria* created by merchants in earlier eras.[49] Others, such as Kevin Werbach, have argued that the body of rules enabled by blockchain and smart contracts will still, at times, need the conventional apparati of dispute resolution and enforcement provided by the existing legal system.[50] Regardless, the overall forseeable 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 toward greater automation. First, by eliminating human discretion over a daily operating decision, businesses will manifest "action without deliberation" – 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 the series of if-then conditions of 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 could be hardcoded and the desirability of automating processes such as to eliminate the risks of recurring human deliberation.

IV. Hardcoding ethics: could any business automate doing the right thing?

This section will proceed as follows. First, we outline how hardcoding ethics could work, starting with basic principles. While this is not a technical paper, we 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, we 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, there is mandating obligatory actions – the equivalent of "thou shalt." Second, there is barring unacceptable actions – or "thou shalt not." Third, there is requiring offsets, whereby causing a harm triggers an action that causes a benefit, such that the amount of net harm totals zero.

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[49] *See* Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia* 1, 4 (Mar. 12, 2015), https://ssrn.com/abstract=2580664.

[50] *See* Kevin D. Werbach, *Trust, But Verify: Why the Blockchain Needs the Law*, 33 BERKELEY TECH. L.J. 487, (2018).

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.[51] Flashtrading takes this idea to an extreme.[52]

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 for a myriad of supply chain contexts, ranging from proof-of-provenance to the use of organic practices, to the adoption of fair labor practices.[53]

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. For example, companies including General Motors, Delta Airlines, Lyft, and Expedia voluntarily buy carbon offsets as a part of their carbon emissions reduction strategies.[54] 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. 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 revive the idea of sustainability reporting – the practice of measuring and publishing impacts on society and the environment. Even one of sustainability reporting's own original evangelists has "recalled" the idea in a Harvard Business Review article, explaining that the idea had failed to adequately disrupt business as usual.[55] Rather than 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. What businesses can take steps 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 – and may want – to pursue this practice. The key reason that one could question the credibility of blockchain-enabled applications adopted by conventional corporations is that access and control is still centralized – the organization's

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[51] Silvia Amaro, *Sell-offs could be down to machines that control 80% of the US stock market, fund manager says*, CNBC (Dec. 5 2018), https://www.cnbc.com/2018/12/05/sell-offs-could-be-down-to-machines-that-control-80percent-of-us-stocks-fund-manager-says.html.
[52] *See* Michael Lewis, FLASH BOYS (Penguin Books, 2015).
[53] Tilde Herrera, *Navigating the Wilderness of Green Business Certifications*, GREENBIZ (July 13, 2008), https://www.greenbiz.com/news/2008/07/13/navigating-wilderness-green-business-certifications.
[54] Katie Fehrenbacher, *Lyft is buying carbon offsets to cover all of its rides*, GREENBIZ (Apr. 19, 2018), https://www.greenbiz.com/article/lyft-buying-carbon-offsets-cover-all-its-rides.
[55] 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.

leadership ultimately can change the code, alter records, and control access.[56] 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.[57] Examples of this in practice include the Securities Exchange in Sydney and the Depository Trust Clearing Corp.[58] Hyperledger and R3CEV represent similar improvements over conventional permissioned ledgers.[59]

Once we acknowledge that the automated mechanisms that make blockchain records, smart contracts, and the DAO trustworthy can be adapted to any organization – moreover that, indeed, they have already been adapted in reality[60] – we have essentially answered the question posed in this section's subheading. Any organization – including but not limited to conventional business corporations – could use blockchain-enabled smart contracts to hardcode their ethical values. Blockchain technology has reportedly functioned well, for instance, in the context of authentication of inventory in the timber industry, in which illegal sales are estimated to total $51-152 billion annually.[61]

We can now move on to consider why this is significant. We will consider how it may help us overcome the existential crisis of business and civilization in the early 21st Century, and then consider whether, from the business, legal, and ethical perspectives, this is desirable.

V. Flipping the hierarchy implied by Carroll's Pyramid of CSR

Now that we have used Taoism to frame implication of automating business operations using blockchain and established that its adoption is a nascent trend, it is useful to acknowledge the current realities in business ethics before we weigh the desirability of hardcoding ethics. Archie Carroll's Pyramid of 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.[62]

It should be highlighted immediately that our 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, based on a plain reading, Carroll's CSR pyramid does not represent what one would guess is an appropriate hierarchy of duties based on a plain reading of U.S. laws, as also

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[56] *See* Sulkowski, *supra* note 32.
[57] R3, *R3 Unlocks Regulatory Reporting on Corda with Financial Conduct Authority and Two Global Banks* (Sept. 12, 2017), https://www.r3.com/news/r3-unlocks-regulatory-reporting-on-corda-with-financial-conduct-authority-and-two-global-banks/.
[58] David Yermack, *Corporate Governance and Blockchains*, 21 REV. FIN. 7 (2017) at 12.
[59] *Id.* at 16.
[60] *See* Jochem Verberne, *How can blockchain serve society?,* WORLD ECON. FORUM (Feb. 1, 2018), https://www.weforum.org/agenda/2018/02/blockchain-ocean-fishing-sustainable-risk-environment/.
[61] Boris Dudder & Omri Ross, *Timber Tracking: Reducing Complexity of Due Diligence by Using Blockchain Technology* 1, 3 (Univ. of Copenhagen Dept. of Computer Sciences Working Paper, Aug. 8, 2017), https://ssrn.com/abstract=3015219.
[62] Archie B. Carroll, *The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders*, 34 BUS. HORIZONS 39, 41 (1991).

elaborated upon below.[63] 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 framework[64] succeeds, for our purposes, in explaining reasons for recurring managerial scandals.

Carroll's model seems to imply a clear hierarchy of duties, represented by a pyramid.[65] The foundational duty is to "Be profitable. The foundation upon which all others rest [sic] (economic responsibilities)"[66] – and above that follows the duty to act lawfully (legal responsibilities). Only then do we arrive at the aspiration to be fair and avoid harm (ethical responsibilities). At the last level we find the consideration of how the community can benefit stakeholders (philanthropic responsibilities).

Carroll attempts to clarify that "[t]hough the components have been treated as separate concepts for discussion purposes, they are not mutually exclusive"[67] 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."[68]

However, a few observations based on a plain reading of Carroll's diagram and text are worth noting,[69] deserving of a quick critique, and ultimately explain why the model helps us understand decades of corporate CSR failings and scandals – more than Carroll perhaps intended.

First, the image of the pyramid connotes a hierarchy, and 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 Colombia still stipulate that corporations are only allowed to engage in lawful activities,[70] and articles of incorporation typically include a commitment to obey the law.[71] 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 conduct[72] – a power confirmed by

[63] Others have critiqued the implication of Carroll's model. Gerlinde Berger-Walliser and Inara Scott, Redefining *Corporate Social Responsibility in an Era of Globalization and Regulatory Hardening*, 55 AM. BUS. L.J. 167, at 213-214 (2018).
[64] According to Google Scholar, Carroll's 1991 Business Horizons article featuring his pyramid model had been cited 9733 times as of May, 11, 2019.
[65] Carroll, *supra* note 62 at 42.
[66] *Id.*
[67] *Id.*
[68] *Id.* at 43.
[69] Here we will not quibble with the clearly erroneous word choice of this seminal text when the author wrote that his diagram was "not intended to juxtapose [sic] a firm's economic responsibilities with its other responsibilities." *Id.* at 42. More likely Carroll intended to use the word "prioritize" rather than "juxtapose."
[70] *See* Sulkowski, *supra* note 32.
[71] *Id.*
[72] *Id.*

the California attorney general.[73] Therefore, one could argue that obeying the law should actually be 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 decision tree of managers in reality. To take the Volkswagen emissions scandal as one vivid example: the duty to be profitable trumped any perceived responsibilities to be lawful, avoid harm, or benefit stakeholders. 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 profitably 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?

VI. 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 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.[74] 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 side effects.[75] In at least one instance in the U.S. involving Nike, the failure to fulfill a voluntary, publicly declared ethical commitment – elimination of sweat shop labor – was grounds for a

[73] *Id.*
[74] *See* Pub. Law No. 107-204, 116 Stat. 745 (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.), at § 302(a).
[75] Adam Sulkowski and Sandra Waddock, *Beyond Sustainability Reporting: Integrated Reporting is Practiced, Required and More Would be Better,* 10 U. ST. THOMAS L. J. 1060, 1061 (2013).

viable complaint against the company for false advertising and unfair competition.[76] Regardless of whether government sanction is 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 a 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 constitute ethical practices 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.[77] In other words, why would any reasonable business leader hardcode a standard of conduct, when the standard of what is acceptable could change – would not the hardcoding lock-in a practice that seems enlightened now, but later appears egregious? Closely related to this objection 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 business models, supply chains, and entire industries and markets change. Once again, why would anyone commit to a 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 an ethical performance target may be considered desirable if it allows the organization to continue operating, such as to deliver value (and continue operating ethically) in the future. This is analogous to a corporation's 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 being tolerated, such as 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.

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[76] *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* 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)

[77] The International Labor Organization recently estimated there are 40 million people are victims of modern slavery. 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.

For each of the objections above there is, given current knowledge, a rejoinder. With regard to the first two – 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. This is closely related conceptually 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 objections – who bears the fault for flawed code – there is an extant literature.[78] 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.[79] Harms arising from errors in hardcoded ethical standards could conceivably include faulty information being reported, or possibly the lost profits stemming from the code's refusal to contract with a supplier based on erroneously concluding that it fails 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.[80] 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 since it was not conceived as being amenable to the framework of a conventional business with legal personhood.[81] 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.[82] A solution has

[78] For a review that traces the evolution of tort law along the timeline of technological change, *see* Donald G. Gifford, *Technological Triggers to Tort Revolutions: Steam Locomotives, Autonomous Vehicles, and Accident Compensation,* 11 J. TORT L. 71 (2018)
[79] *See* Kevin Werbach, *The Song Remains the Same: What Cyberlaw Might Teach the Next Internet Economy*, 69 FLA. L. REV. 887 (2017).
[80] *Id.*
[81] Metjahic, *supra* note 28 at 1547-1548.
[82] Don Kramer, *Members of Unincorporated Association May Be Liable for Association's Debt*, NONPROFIT ISSUES, (Sept. 16 - Oct. 15, 2012).

been suggested by Shawn Bayern, whereby a DAO could be created as a memberless LLC.[83] In such a scenario, the DAO acquires legal personhood for purposes of contracting and liability disputes.[84]

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.[85] Attorneys will likely not all need to be adept at coding.[86] 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.[87] This will put a greater premium on an attorney's ability to help their business client fully contemplate all of their evident and less-evident assumptions and expectations and contingencies that could materialize given a commitment to a given rule or standard.[88]

Despite the foreseeable objections and qualifications above, hardcoding ethics is a viable tool for use in "soft law" purposes of self-regulation. It is even conceivable that, once a critical mass of companies in an industry have 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.[89] 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.

VII. The regulatory perspective: would hardcoding ethics be desirable 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.[90] A more expansive review of government regulations

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[83] *See* Shawn Bayern, *Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC*, 108 NW. U. L. REV. 1485 (2014).
[84] *See* Shawn Bayern, *The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems*, 19 STANFORD TECH. L. REV. 93 (2016).
[85] *See* Sulkowski, *supra* note 32.
[86] *Id.*
[87] Nick Szabo, *Wet Code and Dry*, UNENUMERATED (Aug. 24, 2008), http://unenumerated.blogspot.com/2006/11/wet-code-and-dry.html.
[88] *See* Sulkowski, *supra* note 32.
[89] *See* Dalia Tsuk Mitchell, *The Import of History to Corporate Law*, 59 ST. LOUIS U. L.J. 683 (2015)
[90] 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 (2017).

relevant to corporate governance that could be facilitated by blockchain is available;[91] our goal here will be to review several examples such as to facilitate a discussion of the desirability of this option.

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, stemming from its essential function as a distributed ledger. 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.[92] The Dodd-Frank Act similarly enhances reporting expectations[93] and includes requirements for the reporting of minerals sourced from conflict zones.[94] 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 constitutional rights – could, at least in theory, be reduced to code on a blockchain.[95]

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 Pigovian taxes that effectively raise the price of permitted activities that have harmful side effects,[96] governments have established cap-and-trade regimes.[97] Examples include the U.S. Clean Air Act's trading scheme for emissions from stationary sources.[98] 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.[99] 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 – data tracking, a

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[91] *See* Joan MacLeod Heminway and Adam J. Sulkowski, *Blockchains, Corporate Governance, and the Lawyer's Role*, 65 WAYNE L. REV. 17 (2019).
[92] Pub. Law No. 107-204, 116 Stat. 745 at § 404(a). For a more in-depth discussion of duties created by the SOX, *see* Larry Catá 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 (2003).
[93] Pub. L. No. 111–203, 124 Stat. 1376 (2010). For an overview and discussion of the law, see David M. Lynn, *The Dodd-Frank Act's Specialized Corporate Disclosure: Using the Securities Laws 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, 544 (2013).
[94] *Id.*, § 1502, 124 Stat. at 2213–18
[95] Young, *supra* note 90, at 68.
[96] *See* Erin Adele Scharff, *Green Fees: The Challenge of Pricing Externalities Under State Law*, 97 NEB. L. REV. 168 (2018).
[97] *See* Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293 (2008).
[98] 42 U.S.C. §§ 7401-7671q.
[99] Stavins, *supra* note 97 at 298.

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 ledger[100] – 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. While, in some contexts, some amount of discretion is allowed tolerated, the standards mentioned above were not intended to be optional guidelines. 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 Securities and Exchange Commission (SEC) has issued similar clarifications in the past, as to the acceptability of disclosing information online.[101] This is especially evident, for example, in the arena of informational regulation, specifically in the context of mandatory reporting and data privacy standards. Next, 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 offers the benefits of preventing illegalities before they occur.[102] Third, given that some principles are deliberately flexible and are 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 set sunset provisions, whereby a timeline and process is set for the possible alteration of hardcoded standards. None of these implications are conceptually revolutionary. Now that we have examined the feasibility and desirability of hardcoding ethics

[100] *See* Sulkowski, *supra* note 32.
[101] According to SEC interpretative guidance, relevant investor protection law provides "considerable flexibility" and is intended to permit the use of technologies such as the Internet. *See* 65 Fed. Reg. 51,716, 51,723-24 (Aug. 24, 2000) (codified at 17 C.F.R. pt. 243).
[102] *See* Young, *supra* note 90, at 57.

from the business and regulatory perspectives, it remains to consider these questions from a more abstracted ethical perspective.

VIII. The ethical perspective: weighing the implications of wu-wei for business and the categorical imperative of aligning one's path in business with natural laws

This section will attempt to discuss hardcoding ethics from a perspective that is removed from the more narrow 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.[103] This is consistent with the approach taken by philosophers ranging from the Ancient Greeks to Taoist hermits: those striving for sagacious insights often remove themselves from society to gain and later share wisdom.[104]

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.[105] Deontology is a duty-based approach to moral dilemmas.[106] 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.[107] 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.[108] This line of reasoning can lead to disturbing but some would argue ultimately defensible actions in wartime. These include committing one's own young people to lose their lives storming beaches, or even the U.S. creation of firestorms over civilian populations – nuclear and otherwise – if one accepts that in the longer run these were decisions that spared a greater number of lives by expediting the end of a catastrophic conflict.

Based on this overview of two broad categories of ethical reasoning, hardcoding non-negotiable standards seems very consistent with a deontological approach. In fact, 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 corporate or personal gain.

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[103] *See* John Rawls, A THEORY OF JUSTICE (Harvard University Press, 2009).
[104] *See* Peter France, HERMITS: THE INSIGHTS OF SOLITUDE (Random House, 2014).
[105] 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* Aristotle, THE NICOMACHEAN ETHICS (Lesley Brown, ed., David Ross, trans., Oxford World's Classics, 2009), Book I Chapters 3, 4, 6, 7. It therefore does not really offer a calculus of moral reasoning for an individual to make a decision at a certain point in time.
[106] *See* Stephen Darwell, DEONTOLOGY (Wiley Blackwell, 2008).
[107] *See* Immanuel Kant, THE CRITIQUE OF PURE REASON (Kshetra Books, 2016).
[108] *See* Martin Peterson, THE DIMENSIONS OF CONSEQUENTIALISM: ETHICS, EQUALITY, AND RISK (Cambridge University Press, 2013).

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, is it 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, so long as they are offset in a way as to neutralize the disastrous eventual consequences. It is conceivable to hardcode a rule that permits an act, yet attaches a penalty or requirement to offset a harm. As explained above, we already have this system 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, that development brings a net improvement in a greater number of people's living conditions by eliminating the 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, that 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 global society: the fundamentals of natural sciences are unchanging.[109] The laws of physics, chemistry, and biology are inviolable in the context of understanding and planning human activity on earth.

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

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: that we have – and continue to accelerate – a death spiral of the destruction of planetary life support systems.[110] 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.[111] 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: action without deliberation and alignment of that action with nature and natural laws.

To clarify: this section has explored deontological and consequentialist reasoning, and has 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 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.

IX. Conclusions

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

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[110] William J. Ripple, Christopher Wolf, Thomas M. Newsome, Mauro Galetti, Mohammed Alamgir, Eileen Crist, Mahmoud I. Mahmoud, William F. Laurance, and 15,364 scientist signatories from 184 countries, *World Scientists' Warning to Humanity: A Second Notice*, 67 BIOSCIENCE 12, 1026-1028 (2017).

[111] *See* Ray C. Anderson & Robin White, BUSINESS LESSONS FROM A RADICAL INDUSTRIALIST: HOW A CEO DOUBLED EARNINGS , INSPIRED EMPLOYEES AND CREATED INNOVATION FROM ONE SIMPLE IDEA (St. Martin's Griffin, 2011).

We concluded that that hardcoding ethics is not just an option for DAOs – given the right adaptation, the underling technologies of blockchain-enabled records and smart contracting can and are being credibly adopted by conventional businesses.

Having pointed out that this existing practice can be used to further automate ethics – by requiring, barring, or offsetting certain actions and attendant consequences – we 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, we 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 fulfill an ethical duty to align the path of their enterprises with the laws of nature.