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CORPORATE FIDUCIARY DUTY IN THE AGE OF ALGORITHMS

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The Age of Algorithms will soon have a seismic impact on fiduciary law and thus, on the fiduciary duty of directors and officers. On one hand, corporate fiduciaries will have access to Artificial Intelligence-based tools which may make their jobs more efficient, more accurate, and more effective. As a result, fulfilling fiduciary duties will be easier, and the use of these tools may significantly lower the exposure of corporate fiduciaries to claims of breaching fiduciary duties. However, artificial intelligence (AI) may be a double-edged sword because those attractive tools will create new standards corporate fiduciaries must meet to fulfill their fiduciary duties. At the same time, the risks and limitations of algorithm-based products will mean that fiduciaries who delegate their decision-making to AI tools will face new claims of fiduciary breaches. Corporate fiduciaries might resign from those roles rather than face these new AI-based legal hazards, and AI-tool developers could decide to withdraw from this market rather than face an avalanche of breach of fiduciary duty claims. To mitigate these risks, the jurisprudence of corporate fiduciary law must be modernized and clarified to establish new but understandable fiduciary obligations and protections for corporate fiduciaries.[*]

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I. A Brief Explanation of Algorithms and Artificial Intelligence for the Corporate Community

To anyone that is not intimately involved in the design and sales of AI-based products—which means virtually every corporate officer, director, and legal counsel—"algorithms", "artificial intelligence (or "AI")", "robotics," and similar technical terms seem immediately incomprehensible. Yet, for the legal analysis, these terms can be considered interchangeable and definable.[1] According to Merriam Webster Dictionary, an algorithm is "a step-by-step procedure for solving a problem or accomplishing some end."[2] A decision or action that is the result of one or more algorithms constitutes the use of artificial intelligence or "AI."[3] "Robotics" simply refers to "embodied material objects that interact with their environment."[4] In other words, a device or machine powered by AI, such as a robot, a self-driving vehicle, or, perhaps in the worst-case scenario, an assassin drone. Perhaps the easiest way to remember the interaction of algorithms, AI, and robotics is that algorithms are the individual software programs that comprise what is collectively called artificial intelligence. Robotics are the hardware that is run by artificial intelligence. Since algorithms make up the artificial intelligence which controls robotic devices, the fiduciary ramifications from the use of algorithms, AI, and robotics in corporate decision-making are so interwoven that they can simply be referred to as "artificial intelligence" or "AI" or "AI tools" for purposes of discussing those ramifications.

Though the definitions may be simple, the ramifications of AI on corporate fiduciary decision-making will likely become substantive and pervasive. Algorithms and AI are valuable tools anytime a decision requires, or the decision is improved by, large datasets to make multi-layered or otherwise complicated correlations and conclusions. A fiduciary can use those correlations and conclusions to make decisions and determinations about a wide range of corporate operational and strategic decisions. However, most managers, directors, and corporate consultants do not understand the full potential of these AI tools, let alone the pitfalls and limitations of using them.

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[1] Jack L. Balkin, *2016 Sidley Austin Distinguished Lecture on Big Data and Policy: The Three Laws of Robotics in the Age of Big Data*, 78 OHIO ST. L.J. 1217, 1221 (July 2017). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2890965#.

[2] *Algorithm*, Merriam Webster Dictionary, https://www.merriam-webster.com/dictionary/algorithm (last visited Feb. 7, 2023) [https://perma.cc/L69F-N6C2].

[3] Kaya Ismail, *AI vs. Algorithms: What's the Difference?,* CMSWIRE, (Oct. 26, 2018) https://www.cmswire.com/information-management/ai-vs-algorithms-whats-the-difference/ [https://perma.cc/9MDW-QC2S].

[4] Balkin, *supra* note 1, at 1219.

One reason that corporate managers have limited practical knowledge about the AI tools available to them is that AI tools have, until recently, been developed predominantly for use in sectors outside of the corporate board room. Those sectors include healthcare, energy, public safety and policing, communications and social media, and government intelligence and security.[5] Nonetheless, AI tools for corporate managers are already being marketed to meet a wide range of operational, marketing, and production needs. One need only do a website search for "how corporations can use artificial intelligence" to see the AI products and AI consultants promising to improve the decision-making of corporate senior managers regarding product pricing, supply chain management, brand management and marketing, hiring and other HR determinations.[6] Corporate directors can find their own AI tools to advise them on a wide range of corporate governance issues, such as strategic planning, financial assessments, market predictions, risk management, and corporate governance.[7] As such, regardless of whether corporate fiduciaries are aware of the inevitable impact of AI on their fiduciary duties, AI will fundamentally change the roles and functions of corporate fiduciaries.

II. How AI Works—The Devil is in the Details

Given the inevitable pervasiveness of AI tools for corporate fiduciaries, those who fail to educate themselves about the existence of these tools and how to use them properly may soon find that such failures constitute a breach of their fiduciary duties. On the other hand, those corporate fiduciaries who rely too heavily or too passively on AI and algorithms to make corporate decisions could find such reliance to also be a breach of their fiduciary duties. To better understand those values and risks, corporate fiduciaries must have a basic understanding of how algorithms are created and incorporated into AI products, and how AI renders the conclusions upon which corporate managers will make their own decisions and conclusions.

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[5] Rock Content Writer, *Artificial Intelligence Algorithm: Everything You Need to Know About It*, ROCKCONTENT (June 28, 2021), https://rockcontent.com/blog/artificial-intelligence-algorithm/#:~:text=Essentially%2C%20an%20AI%20algorithm%20is,and%20run%20tasks%20more%20efficiently [https://perma.cc/F9AH-VS8P].

[6] *See* e.g. Thomas Davenport & Rajeev Ronanki, *Artificial Intelligence for the Real World*, HARVARD BUSINESS REVIEW (last accessed May 8, 2023), https://hbr.org/2018/01/artificial-intelligence-for-the-real-world [https://perma.cc/4ZPG-QH8Q].

[7] Jo Ellis, *Can artificial intelligence help boards govern effectively?*, CORPORATE GOVERNANCE INSTITUTE (May 27, 2022), https://www.thecorporategovernanceinstitute.com/insights/guides/can-artificial-intelligence-help-boards-govern-effectively/#:~:text=Executives%2C%20board%20members%2C%20and%20directors,running%20as%20efficiently%20as%20possible [https://perma.cc/FZG6-KTAN].

As the more detailed explanations below show, at least for the foreseeable future, artificial intelligence has inherent limitations. Thus, humans, whose natural tendency is to be in awe of the power of artificial intelligence, should lower their expectations and exercise careful reticence when turning to artificial intelligence. Studies have repeatedly shown that humans exhibit "automation bias" in favor of AI, which means humans tend to accept an algorithmic outcome, even if they intuitively suspect there is something wrong with the outcome.[8] Even experts, who should have enough knowledge and experience to know when an algorithmic answer is wrong, tend to reject their own self-doubt in favor of the erroneous algorithmic-based results.[9] Thus, corporate fiduciaries are must always be on guard against assuming the AI products which provide guidance are infallible, and must rely on their own expertise and experience to question and reject any guidance that they reasonably believe is wrong.

a. Step One: The Design Process

Like any other software, or any other product for that matter, algorithms and AI tools begin with a design process initiated by and undertaken by humans.[10] Those human designers can create deficient algorithms that produce bad results.[11] Designers may be experts at crafting algorithms from software code, but they are not ever going to be the combination of lawyers, CPAs, business administrators, logistics experts, and HR managers needed to make a good algorithm for use by corporations. Without proper expert consultation at the design phase, including input from clients about their specific goals and needs, a good designer is doomed to make a bad AI tool. The risk also exists that a designer might be "too smart" and include correlations that seem perfectly rational to the designer, but include factors and considerations that a board may not want to consider or, as discussed below, may not be legally permitted to consider.[12] The end result in either situation will be algorithms created by highly competent designers that are nonetheless defective products for corporate fiduciaries to use to their peril.[13]

Even well-intentioned designers might succumb to market pressures that would result in an underperforming AI product. Due to cost and marketing

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[8] Danielle Keats Citron, *Technological Due Process,* 85 WASH. U. L. REV. 1249, 1271–72 (2008).
[9] JASON BORENSTEIN ET AL, PEDIATRIC ROBOTS AND ETHICS, ROBOT ETHICS 2.0 (Patrick Lin et al., eds) 127 (OXFORD UNIV. PRESS, NEW YORK, NY 2017).
[10] Ed Burns, *What is artificial intelligence (AI)?*, TECH TARGET (last updated Jan. 2023) https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence [https://perma.cc/9P6B-J4WJ].
[11] William Terdoslavich, *Recognizing (and Solving) Bad Algorithms*, DICE, https://www.dice.com/career-advice/recognizing-solving-bad-algorithms [https://perma.cc/2L86-UE28].
[12] Julian Velasco, *Fiduciary Principles in Corporate Law, in* THE OXFORD HANDBOOK OF FIDUCIARY LAW 72 (Evan J. Criddle et al., eds., 2018).
[13] Citron, *supra* note 8, at 1261.

considerations, designers would be forced to create AI products that do not live up to the promises of their manufacturer bosses.[14] In order to gain market share, AI tool manufacturers may try to market their products to a wider range of customers than the product is actually designed to address.[15] Furthermore, the more complicated an algorithm is, the more time is needed to perfect it, so designers might be pressured to cut corners during the design phase.[16] Additionally, the computer systems running those algorithms will require astounding amounts of energy to run. For example, the AI used to run bitcoin businesses can use more energy than entire nations.[17] Thus, a designer who wants to create an algorithm that is a viable product in terms of pricing and operation will face limitations on the sophistication of the final AI-driven product, which in turn means a higher risk of error in the end result. The dual consumer warnings of "you get what you pay for" and "if it sounds too good to be true, it might very well be" will apply to corporate AI tools.[18]

The design stage of AI products can also be affected by a more sinister problem: the bias and interests of the designers, as well as the bias and interests of customers placing the orders, to want a biased AI product.[19] It is commonly assumed that algorithms are better than humans at decision-making because they carry none of the human prejudices and preferences that can lead to biased outcomes. However, those assumptions forget that humans are designing the AI products, and that humans are paying for the design of those products. Thus, designers have a strong incentive to create algorithms that will complement the desired result of their customers. In a worst-case scenario, if the customer wants a discriminatory result, the designer can deliver an algorithm that will produce such a result while seemingly making non-human, unbiased analyses.[20]

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[14] *See, e.g.*, *Stories of AI Failure and How to Avoid Similar AI Fails*, LEXALYTICS, https://www.lexalytics.com/blog/stories-ai-failure-avoid-ai-fails-2020/ (last visited Feb. 17, 2023) [https://perma.cc/2GJD-S77Q].
[15] Citron, *supra* note 8, at 1261.
[16] *Id*. at 1255.
[17] Abigail Beale, *Bitcoin Mining Uses More Energy than Ecuador—But There's a Fix,* NEWSCIENTIST (Oct. 30, 2017), https://www.newscientist.com/article/2151823-bitcoin-mining-uses-more-energy-than-ecuador-but-theres-a-fix/ [https://perma.cc/557R-AJ2C].
[18] For other examples of where lack of knowledge or resources can affect and has detrimentally affected AI performance, see Alfred R. Cowger, Jr., THE THREATS OF ALGORITHMS AND AI TO CIVIL RIGHTS, LEGAL REMEDIES, AND AMERICAN JURISPRUDENCE 36–46 (2020).
[19] Zoe Larkin, *AI Bias -What Is It and How to Avoid It*?, LEVITY (Nov. 16, 2022) https://levity.ai/blog/ai-bias-how-to-avoid#:~:text=Machine%20Learning%20bias%2C%20also%20known,of%20the%20Machine%20Learning%20process.%202/15 [https://perma.cc/T8K9-ALDE].
[20] ZURICH, *White Paper: Artificial Intelligence and Algorithmic Liability* (July 29, 2021), https://www.zurich.com/en/knowledge/topics/digital-data-and-cyber/artificial-intelligence-gives-rise-to-algorithmic-liability [https://perma.cc/H2MZ-YCZU].

An additional factor affecting the design stage of algorithms is the level of accuracy that the AI tool is expected to meet. The accuracy of an algorithmic output will be dependent in large part on the level of accuracy built into the algorithm, taking into account the amount of computer hardware available to undertake the algorithmic process.[21] In fact, at some point, complicated questions could become "intractable," meaning the accuracy of any algorithmic answer to that question could be limited or even become questionable because the cost to get an accurate answer is simply too great.[22] Thus, no algorithm will be perfect and AI tools for corporate fiduciaries will always be wrong at some point.

The challenge for corporate fiduciaries is to select an AI product that will be "accurate enough" to meet their fiduciary duty. The question, in other words, is how low of an accuracy rate can an AI product have and still meet the legal standards of a fiduciary duty? For purposes of determining other legal rights, namely those involving criminals' due process rights, a failure rate of between 29% and 38% was deemed acceptable.[23] At least one state supreme court[24] found that a sentencing algorithm was sufficiently accurate to survive a due process challenge, even though its accuracy at predicting recidivism was determined to be about 65%.[25] So, will corporate fiduciaries be fulfilling their obligations if the AI product they use is accurate only two-thirds of the time?

b. Step Two: The Hidden Minefields in Data Selection and Use

The second integral part of an AI system is the data set used by the algorithms that make up the AI system.[26] Data sets are the raw materials that algorithms use to undertake their analysis, and as will be shown below, even to train themselves via "machine learning" to alter their own analytical processes in

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[21] Peter Wayner, *What is AI hardware? How GPUs and TPUs Give Artificial Intelligence Algorithms a Boost*, VENTURE BEAT (Sep. 22, 2022), https://venturebeat.com/ai/what-is-ai-hardware-how-gpus-and-tpus-give-artificial-intelligence-algorithms-a-boost/ [https://perma.cc/RNT6-V7RV].

[22] Moritz Hardt, Conference Paper, *Occupy Algorithms: Will Algorithms Serve the 99%?*, Discussion Paper for Governing Algorithms Conference at NYU (May 16-17, 2013), https://governingalgorithms.org/wp-content/uploads/2013/05/2-response-hardt.pdf [https://perma.cc/46RR-EEBA].

[23] Robert Brauneis & Ellen P. Goodman, *Algorithmic Transparency for the Smart City,* 20 YALE J. L. & TECH 103, 120 (2018).

[24] State v. Loomis, 881 NW 2d 749, 753 (2016).

[25] Ed Yong, *A Popular Algorithm Is No Better at Predicting Crimes than Random People*, THE ATLANTIC (Jan. 17, 2018), https://www.theatlantic.com/technology/archive/2018/01/equivant-compas-algorithm/550646.

[26] Darrell M. West & John R. Allen, *How Artificial Intelligence Is Changing the World*, THE BROOKINGS INSTITUTION (Apr. 24, 2018), https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world.

order to be more efficient and accurate.[27] Any flaws or shortcomings of databases used by algorithms can lead to erroneous or illegal analytical outcomes, even for a tech-savvy corporation as described below. A sophisticated algorithm capable of machine learning could be permanently damaged by inaccurate or inappropriate data that corrupts the machine-learning process and thus permanently damages the algorithm's analytical process results.[28] Even a well-designed algorithm can generate bad analyses if the data provided to it is deficient. Corporate fiduciaries must understand how those data set deficiencies can result in specific errors in decision-making, systemic corruption (literally or figuratively), or even outright violations of law, which in turn will cause corporate fiduciaries reliant on those outcomes to breach their fiduciary duties.

The selection of what datasets will be made available to algorithms can immediately introduce errors into the algorithmic process. A dataset that is too small, such as in the case of a company that is too small or too new to have generated adequate data for the algorithm to use, will lack data "with a degree of richness and completeness needed for in-depth analysis" by an algorithm.[29] That quote is from a 2018 study by the White House Big Data Study Group commenting on the dearth of historical criminal justice data, affirming that there is a high likelihood that AI tools used by criminal justice authorities will give suspect results.[30] When compared to the data collected by criminal justice agencies, any corporation dataset is going to be considerably smaller, with even less "richness and completeness." Thus, AI tools for business analysis are likely to be hamstrung by the lack of sufficient data, which in turn means a corporate fiduciary must understand how those data insufficiencies will limit the quality of the algorithmic outcomes on which the fiduciary is relying.

To overcome the lack of data from a client, an algorithm might have to rely generic corporate data which could result in even more problematic outcomes. Publicly available corporate databases are rare, and those public databases that are available are outdated and represent archaic business practices and communication methods.[31] In an attempt to improve database resources,

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[27] Nicole Turner Lee et al., *Algorithmic Bias Detection and Mitigation: Best Practices and Policies to Reduce Consumer Harms*, THE BROOKINGS INSTITUTION, (May 22, 2019) https://www.brookings.edu/research/algorithmic-bias-detection-and-mitigation-best-practices-and-policies-to-reduce-consumer-harms.

[28] Frank Pasquale, *Data-Informed Duties in AI Development*, 119 COLUM. L. REV. 1917, 1919 (2019); Zurich Ins. Gr. & Microsoft, *supra* note 20, at 8.

[29] EXEC. OFF. OF THE PRESIDENT, BIG DATA: A REPORT ON ALGORITHMIC SYSTEMS, OPPORTUNITY, AND CIVIL RIGHTS, 21 (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/2016_0504_data_discrimination.pdf.

[30] *Id*. at 21–22.

[31] John Armour & Horst Eidenmüller, *Self-Driving Corporations?*, 10 HARV. BUS. L. REV. 87, 97–98 (2020).

many marketers of corporate AI tools develop their own databases generated by their own corporate clients.[32] However, even with these databases there is no guarantee that the data collected will be relevant or applicable to a particular corporation, and correlations derived from those datasets might be too generic to generate good results for a specific company. Additionally, machine-learning algorithms might derive correlations that are incorrect or irrelevant for a specific company, so any conclusions provided to a human fiduciary might be useless, misleading, or simply wrong.[33] Thus, even an excellent algorithm might give a corporate fiduciary bad advice because of the database used.

Worse, unknown or unidentified third parties can create data sets filled with errors that could potentially lead to embarrassing or even illegal results. An infamous example of how such reliance on a third-party database can lead to errors in an allegedly state of the art algorithm was an AI tool sold as a means to track a computer user to a particular residential address.[34] Individuals found themselves being served with court summons, opening their doors to find armed police, and even being threatened by private revenge-seekers, because Internet Protocol (IP) addresses for computers used by wrong-doers had been erroneously assigned to their residential addresses by outdated and imprecise databases.[35] Even a good algorithm could give bad results due to the problematic database it is provided.

Even a dataset that is sufficiently populated with data relevant to a corporation can result in biased output. Both the supporters of AI[36] and its critics[37] have noted that algorithms have a bad tendency to re-enforce or re-introduce historic discrimination hidden in the databases used by algorithms. For example, tech-savvy Amazon created a biased AI program as part of Amazon's resume-screening process to identify candidates that would be successful in the Amazon work environment.[38] Amazon provided the algorithm its hiring and

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[32] *Id*. at 98.
[33] Shani R. Else & Francis G.X. Pilegg, *Corporate Directors Must Consider Impact of Artificial Intelligence for Effective Corporate Governance*, ABA (Feb. 2019), https://www.jstor.org/stable/27180364#metadata_info_tab_contents.
[34] Kashmir Hill, *How Cartographers for the U.S. Military Inadvertently Created a House of Horrors in South Africa*, GIZMODO (Jan. 9, 2019), https://gizmodo.com/how-cartographers-for-the-u-s-military-inadvertently-c-1830758394 [https://perma.cc/EG84-X3V2].
[35] *Id*.
[36] Zurich Ins. Gr. & Microsoft, *supra* note 20, at 7.
[37] Frank Pasquale, *Toward a Fourth Law of Robotics: Preserving Attribution, Responsibility, and Explainability in an Algorithmic Society*, 78:5 OHIO ST. L. J. 1243, 1247–48 (2017), https://digitalcommons.law.umaryland.edu/cgi/viewcontent.cgi?article=2608&context=fac_pubs.
[38] Jeffrey Dastin, *Amazon Scraps Secret AI Recruiting Tool that Showed Bias Against Women*, REUTERS (Oct. 10, 2018, 7:04 PM), https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G.

promotion database so the algorithm could identify what traits new hires that eventually moved up in the company historically possessed.[39] That algorithm "discovered" historically discriminatory promotion practices at Amazon that disfavored women, and concluded that men were most likely to be successful within the company. The algorithm proceeded to screen out any CV that identified an applicant as a woman, such as being captain of a girl's athletic team or going to an all-female college.[40] This tendency of an algorithm to discover and repeat historical biases found in databases is so prevalent that corporate fiduciaries must be vigilant against unquestionably accepting any algorithm conclusion, or risk committing a fiduciary breach by condoning similarly erroneous or even illegal decisions.

c. Step Three: Understanding (or Not) How Algorithmic Processes Works

Corporate fiduciaries will have to do more than simply shop for good AI products, since their fiduciary duty will not end with the purchase process for such products. Corporate fiduciaries will have to understand how algorithms work, if they are to be able say why their reliance on those AI products fulfills their fiduciary duties. In fact, as will be argued below, it should be assumed for fiduciary purposes that failing to understand how the products worked, and thus removing human involvement in the actual decision-making process will be a *per se* violation of fiduciary duty. Unfortunately, the non-transparent nature of algorithmic processes, together with machine learning, whereby an algorithm will fundamentally alter itself without any human oversight, means that fiduciaries may be foreclosed from understanding algorithmic processes to the degree necessary to meet their fiduciary duties.

i. How Algorithms Analyze Data and Draw Conclusions

Understanding how algorithmic processes work is crucial if a fiduciary is to justify their reliance on algorithms to meet their fiduciary duties. Granted, the actual workings of algorithms are becoming so technologically sophisticated that it is increasingly unlikely that someone who is not an AI engineer or algorithm software specialist can hope to keep up with AI innovations, let alone understand them enough to confidently rely on them in a fiduciary capacity. But the simplest explanation is that algorithms take large sets of data and determine correlations among those data points, which in turn can be used to predict outcomes, discover conclusions hidden within the data, and advise on the best course of action given

[39] *Id*.
[40] *Id.*

these correlations and similar data.[41] The ability of AI tools to undertake these analyses more efficiently and effectively than any management or operational team means they will become an integral part in any corporate fiduciary decision.

In the early days of the Age of Artificial Intelligence (about ten years ago),[42] algorithms worked solely on tasks defined by human designers using a specific set of data.[43] For example, an investment broker might receive a request from a client to buy shares in XYZ company at the best price available in the world. A simple investment algorithm would obtain all available share offerings for XYZ at that moment and determine, after factoring in currency conversions and trade costs, which offerings would result in the cheapest price of XYZ stock for the client. Then, the broker would make that purchase. As technology progressed, even the broker was removed from the process, and the AI program could initiate the preferred purchase, withdraw funds from the customer's account to settle the purchase, and then report back to the broker and customer that the purchase had been successful.[44]

The technological breakthrough that was so breathtaking that it led to the "Age of Algorithms," the development of "machine learning" in algorithmic processes.[45] The first machine learning processes involved "supervised learning".[46] A human would put together a set of data called "training dataset."[47] The human would then analyze the data, and either determine the classifications that existed within the dataset, or create a decision tree, which in turn would result in answers to questions or goals established by the designer or the customer.[48] Additionally, the human might use the algorithm to understand the relationship between two sets of variables.[49] The human would establish the existence of one set of variables in the dataset, and then determine outcomes that arise because of

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[41] Amy B. Caiazza & Rob H. Rosenblum, *The Use of Artificial Intelligence by Investment Advisers: Considerations Based on an Adviser's Fiduciary Duties,* WILSON SONSINI BLOG (May 28, 2020), https://www.wsgr.com/en/insights/the-use-of-artificial-intelligence-by-investment-advisers-considerations-based-on-an-advisers-fiduciary-duties.html.

[42] DELOITTE, The Age of Artificial Intelligence: A Brief History... (last visited May 11, 2023), https://www2.deloitte.com/mt/en/pages/rpa-and-ai/articles/mt-age-of-ai-1-a-brief-history.html [https://perma.cc/R6JQ-XZZ4].

[43] *Id*.

[44] *Id*. *See also* Armour & Eidenmüller, *supra* note 31, at 93–94.

[45] Lee Rainie & Janna Anderson, *Code-Dependent: Pros and Cons of the Algorithm Age*, PEW RESEARCH CENTER (Feb. 8, 2017), https://www.pewresearch.org/internet/2017/02/08/code-dependent-pros-and-cons-of-the-algorithm-age.

[46] Julianna Delua, *Supervised vs. Unsupervised Learning: What's the Difference?*, IBM BLOG (Mar. 12, 2021), https://www.ibm.com/cloud/blog/supervised-vs-unsupervised-learning [https://perma.cc/4S3V-XG3R].

[47] *Id*.

[48] *Id*.

[49] *Id*; Armour & Eidenmüller, *supra* note 31, at 95.

those established variables in the dataset.[50] Then, the algorithm would analyze that training data and determine the best way to proceed to get to the same answers or outcomes established by the designer or the customer. This way to proceed is called the "trained model".[51] The algorithm would then use the model it has "learned" to analyze a new set of data in order to determine both the best answer to the question posed, as well as if there is another answer to a "better question", i.e., one not defined by the human.[52]

Machine learning then advanced to the next stage of complexity. This generation of machine-learning algorithms did not need a human to establish training data or define the paths by which outcomes or relationships within that data were discovered. This was called "unsupervised training" due to the lack of pre-defined data and a human trainer.[53] The algorithm takes a data set on its own and discovers correlations and trends in data without being "guided" to that discovery by a human.[54] By eliminating the initial human interaction, the process becomes faster and cheaper. Furthermore, unsupervised learning means that an algorithm can discover unexpected correlations or differences that a human had never defined or even anticipated within the data.[55]

To use the original example of the stock trade, an unsupervised investment algorithm might be told to invest the client's $10,000 in the best mix of investments that will make the client happy over the next ten years. The algorithm would receive unlimited access to all the client's prior purchases from their banking and brokerage accounts, and a list of all possible investment purchases in the world. The client could end up with a combination of stocks, bonds, options, etc., not just the XYZ stock the client thought they wanted to buy. The algorithm might even discover within the data set a use for the money that would make the client even happier than just investing it for some undefined future goal, based on what the client bought in the past with discretionary funds.

However, unsupervised learning can also result in algorithms that are more prone to errors.[56] In particular, machine learning can be substantively affected by mis-weighted or unrepresentative data. When an algorithm, via its machine learning, tries to determine the most efficient way to find correlations and conclusions in that data, the wrongly weighted data will cause the algorithm

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[50] IBM, *What is Supervised Learning?*, IBM BLOG, https://www.ibm.com/topics/supervised-learning (last visited Jan. 18, 2023) [https://perma.cc/3UYN-WSKA].
[51] Armour & Eidenmüller, *supra* note 31, at 95.
[52] Delua, *supra* note 46.
[53] Armour & Eidenmüller, *supra* note 31, at 95. *See also* Delua, *supra* note 46.
[54] *Id.*
[55] IGUAZIO, What is Unsupervised Machine Learning? (last visited May 11, 2023), https://www.iguazio.com/glossary/unsupervised-ml/ [https://perma.cc/S2W6-HKS7].
[56] Pasquale, *supra* note 28, at 1925–26; Zurich Ins. & Microsoft, *supra* note 20, at 7.

to make correlations that are incorrect.[57] The erroneous analytical process resulting from bad machine learning will not be readily apparent to the user of that algorithm, and thus the user could be unknowingly misled by the defective algorithm resulting from bad machine learning.[58]

A jarring example of this misguided machine learning were the AI-based predictive policing tools purchased by jurisdictions eager to use their limited policing resources more effectively.[59] Those tools would direct the deployment of police resources to neighborhoods that algorithms determined were most in need of policing to prevent crimes.[60] Unfortunately, the algorithms used by predictive policing programs used data that over-weighted the number of crimes involving minorities and/or citizens on the lower economic rung. This overweighting was the result of historical decisions for allocating police resources, meaning police departments policed minority neighbors more intensely, regardless of crime patterns, and thus minorities were more likely to be subject to arrest.[61] The data was further skewed by historic prosecutorial decisions, whereby minorities and poor people were prosecuted at a higher rate than Whites and the middle or upper classes.[62] Predictive policing algorithms quickly "learned" from the historically weighted data to allocate resources based on the demographics of a neighborhood, not the actual resource needs of the city.[63]

Machine learning is what has made algorithms such powerful tools that one can say society has entered the Age of Algorithms. Machine learning allows algorithms to create their own analytical process, and thus discover their own correlations in the data and draw their conclusions from those self-taught correlations. Machine learning can make algorithms more efficient and thus faster, and will allow algorithms to provide answers to questions that humans would not even know to raise.[64] However, machine learning can also lead the algorithm astray, if the machine learning is the result of error-filled or biased

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[57] Pasquale, supra note 28, at 1925–26.
[58] Zurich Ins. & Microsoft, *supra* note 20, at 11.
[59] Lyria Bennett Moses & Janet Chan, *Algorithm Prediction in Policing: Assumptions, Evaluations and Accountability*, 28 POLICING & SOCIETY 806, at 3 (Nov. 8, 2016 published online—page numbers reference online publication), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3742541.
[60] *Id.* at 1.
[61] *Id.* at 4.
[62] *Id*.
[63] *Id. See also* Caroline Haskins, *Dozens of Cities Have Secretly Experimented With Predictive Policing Software,* MOTHERBOARD (Feb. 6, 2019), https://www.vice.com/en/article/d3m7jq/dozens-of-cities-have-secretly-experimented-with-predictive-policing-software [https://perma.cc/T9FK-4MRN]. For a detailed review of the problems of predictive policing, see Cowger, *supra* note 18, at pp. 65–69.
[64] Yash Raj Shrestha et. al., *Organizational Decision-Making Structures in the Age of Artificial Intelligence*, 61(4), CAL. MGMT. REV., 66, 70 (2019).

data.[65] This risk is compounded by the risk that defects in algorithmic process introduced by bad machine learning would be undetectable unless the results face stringent auditing and tracking.

ii. Beware AI "Black Box" Processing

One additional weakness in algorithmic processes that will lead to corporate fiduciary breaches is the non-transparent "Black Box" nature of AI process.[66] Professor Frank Pasquale was perhaps the first legal scholar to note that the non-transparent nature of algorithmic processes, i.e., the fact that algorithmic processes could not be observed or readily tracked, resulted in a "Black Box" for anyone trying to identify or track the processes that had occurred.[67] More recently, a White Paper by Zurich Insurance and Microsoft on the risks inherent in the use of AI tools, found that:

> the complex and often opaque nature of algorithms, specifically "black box" algorithms or deep learning applications, means that they lack transparency and can sometimes hardly be understood by experts (inherent challenge of explainable Al). Potential modifications through updates or self-learning during operation and limited predictability are additional factors adding to the complexity and opacity of Al systems. Also, hidden errors are likely to go undetected for a long time (often until it is too late) which again complicates the traceability of relevant failures.[68]

The non-transparency of AI tools is increased when multiple algorithms contribute to the outcome of an AI tool, and where multiple "hands" of secondary designers, product manufacturers, licensees, and end users have modified a designer's original algorithm.[69] If an AI tool leads to a legal claim, the Black Box nature of the entire algorithmic process would preclude knowing exactly how, when, and why the failure occurred, or if indeed a failure did occur, whether it would give rise to legal liability. The corporate fiduciary, who will be expected to provide a well-based and reasonable explanation for why they relied on an AI tool's conclusions to make their decision, will simply be unable to explain any of the algorithmic process that led to their corporate decision. Without that explanation, the fiduciary could readily be found to have violated their fiduciary duty. Unfortunately, this suggests that the Black Box nature of AI processes will

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[65] Pasquale, *supra* Note 28, at 1923–26.
[66] Zurich Ins. & Microsoft, *supra* note 20, at 11.
[67] *See generally,* FRANK PASQUALE, THE BLACK BOX SOCIETY (Harvard Univ. Press, Cambridge, MA 2015).
[68] Zurich Ins. Co. & Microsoft, *supra* note 20, at 11.
[69] *Id.*

result in liability even for those fiduciaries trying to use high technology to make "better" decisions.

III. A General Synopsis of the Current State of Corporate Fiduciary Duties

Turning to the requirements and parameters of corporate fiduciary duties, a corporate fiduciary ignorant of the limitations of artificial intelligence, or careless in their use of and reliance on AI, could breach both their duty of due care and their duty of loyalty.[70] Furthermore, the protections from the Business Judgment Rule and immunity-granting statutes might not save them from liability for these breaches.[71] The paradox is these duties might be breached if the fiduciary fails to use AI tools in decision-making *and* if the fiduciary uses such tools.

a. The Two Corporate Fiduciary Duties—Due Care and Loyalty

To set the stage for a more detailed discussion below, a summary of a corporate fiduciary's duties will be helpful.[72] The concept of corporate fiduciary duties dates back to at least the mid 1850's, with the case of *Gaskell v. Chambers,*[73] and is based on duties owed by trustees to a beneficiary established under common law.[74] By the early 20th century, corporate directors were

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[70] *Id.* at 17.
[71] *See* Lori McMillan, *The Business Judgment Rule as an Immunity Doctrine*, 4 WM. & MARY BUS. L. REV. 521, 521–523 (2013).
[72] "Corporate fiduciary" is used as a catch-all phrase in this article to mean a director or officer of a business organization. A corporate fiduciary is usually a director or officer of a corporation, but fiduciary duties can also arise in several business settings beyond corporations, such as limited liability companies and partnerships, and thus corporate fiduciaries can also be managers of LLC or general partners. Robert A. Kutcher, *Breach of Fiduciary Duties* 4–5, *in* BUSINESS TORTS LITIGATION (David A. Soley ed.) (2nd ed 2005) https://www.americanbar.org/content/dam/aba-cms-dotorg/products/inv/book/214873/5310344_chap1_abs.pdf. *See also* Velasco, *supra* note 12, at 61. In the case of closely held corporations, a controlling shareholder can also be a fiduciary to other shareholders. Jason R. Domark & Ashley Gomez-Rodon, *What Is, and What Triggers, a Fiduciary Duty?*, LITIGATING FIDUCIARY DUTY CLAIMS 8 (American Bar Ass'n Litigation Section, Chicago, IL 2022); Sinclair Oil Corp. v. Levien, 280 A.2d 717, 723 (Del. 1971); Crosby v. Beam, 548 N.E.2d 217 (Ohio 1989); Tillis v. United Parts, Inc., 395 So.2d 618 (Fla.App. 1981); Alaska Plastics, Inc. v. Coppock, 621 P.2d 270 (Alaska 1980); Horizon House-Microwave, Inc. v. Bazzy, 486 N.E.2d 70 (Mass. App. 1985); and Donahue v. Rodd Electrotype Co. of New England, Inc., 328 N.E.2d 505 (Mass. 1975).
[73] 26 Beav. 252, 254, 122 REV. REP. 138, 140, 53 E.R. 895, 897 (High Ct. of Chancery 1858), *discussed in* DAVID COWAN BAYNE, THE PHILOSOPHY of CORPORATE CONTROL: A TREATISE ON THE LAW OF FIDUCIARY DUTY 34 (Loyola University Press, Chicago 1986).
[74] *Id.* at 34.

unquestionably deemed to be fiduciaries of corporations on behalf of shareholders as beneficiaries.[75] The relationship between corporate officers and directors, on one hand, and shareholders, on the other hand, meet the common law elements of a fiduciary relationship: (1) the shareholder is a party which owns property, namely the shares of a corporation; (2) the shareholder puts their trust in a corporate manager, i.e., a director or officer of the corporation, to provide services to manage that property for the benefit of the shareholder; 3) the shareholder is relying on the corporate manager's skill and judgment, and thus is dependent or subservient to the corporate manager's decision making while providing those services; and 4) the corporate manager accepts that role and obligation.[76]

In their role as corporate fiduciaries, directors and officers have two major fiduciary obligations. The first obligation is a ***duty of care:*** the corporate fiduciary "must inform themselves prior to making a business decision of all material information reasonably available to them."[77] Thus, the duty of care focuses on the quality of the services and decisions rendered by a fiduciary on behalf of the corporation and shareholders.[78] A corporate fiduciary may not simply accept information made available to that fiduciary, but rather must use a "critical eye" to evaluate the correctness and applicability of that information.[79] The fiduciary must be fully informed of the issues being considered, review all relevant documents and other items, and obtain advice from competent and independent advisors.[80] The standard required to meet a duty of due care is an objective one, in that a fiduciary must "exercise the prudence that an ordinarily prudent person would have exercised under the circumstances."[81] The level of prudence takes into account the training, skills, and expertise normally possessed by a person occupying the same role as that fiduciary. However, if the fiduciary has a higher expertise than the average fiduciary, then the fiduciary must exercise that higher expertise.[82]

The second obligation is a ***duty of loyalty:*** the corporate fiduciary must place the interests of the shareholder above that of the fiduciary at all times, and

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[75] Max Pram, *Interlocking Directorates, the Problem and its Solution,* 26 HARV. L. REV. 467, 471 (1913) https://www.jstor.org/stable/pdf/1326913.pdf.
[76] Domark & Gomez-Rodon, *supra* note 72, at 194.
[77] Smith v. Van Gorkom, 488 A.2d 858, 872 (Del. 1985) (quoting Aronson v. Lewis, 473 A.2d 805 (Del. 1984)).
[78] Richard S. Whitt, *Old-School Goes Online: Exploring Fiduciary Obligations of Loyalty and Care in the Digital Platforms Era*, 36 SANTA CLARA HIGH TECH. L.J. 75, 92 (2020).
[79] William M. Lafferty et al., *A Brief Introduction to the Fiduciary Duties of Directors Under Delaware Law*, 116 PENN. ST. L. REV. 837, 842 (2012), citing *Van* Gorkom, 488 A.2d at 872.
[80] *Id.* at 843.
[81] John C.P. Goldberg, *The Fiduciary Duty of Care,* in OXFORD HANDBOOK OF FIDUCIARY DUTY, 1–2 (2018). *See also* Graham v. Allis-Chalmers Mfg. Co., 188 A.2d 125, 130 (Del. 1963).
[82] Domark & Gomez-Rodon, *supra* note 72, at 194.

not have any conflict of interest with the corporation or the shareholder.[83] That means that a corporate fiduciary may not: (1) cause the corporation to enter into a transaction that is not fair to the corporation; (2) profit from any information learned in the fiduciary's capacity; (3) take any action that secures a position or right for the fiduciary, or (4) place benefits for themselves or any other third party to which the fiduciary is beholden ahead of the benefits of the corporation.[84] It does not matter if the fiduciary gains a benefit which the corporation could not or would not want to pursue; a fiduciary is liable if the gain is not disclosed to the corporation.[85]

Specific "sub-duties" that fall under the duty of loyalty—and which will, as discussed herein—will be particularly problematic for corporate fiduciaries using AI tools. Those sub-duties include a duty of good faith, a duty to disclose relationships that could cause a conflict of interest, a duty to keep matters and information confidential,[86] and a duty to monitor the business organization for instances of illegality, unethical, or corrupt activities.[87] Although the duty of good faith for a brief time was considered a separate, third fiduciary duty, it has been relegated most recently to this "sub-duty" status.[88] Moreover, this duty of good faith does not require a "traditional" action of disloyalty or self-interest. Rather, a breach of the duty of good faith:

> may be shown, for instance, where the fiduciary intentionally acts with a purpose other than that of advancing the best interests of the corporation where the fiduciary acts with the intent to violate applicable positive law, or where the fiduciary intentionally fails to act in the face of a known duty to act, demonstrating a conscious disregard for his duties.[89]

One of these known duties to act, as held in the recent case of *Marchand v. Barnhill*,[90] is the duty of a corporate fiduciary to monitor against illegal or wrongful acts of the corporation. Thus, the failure to monitor, which was once considered a breach of duty of care, can now, in egregious instances, be considered a breach of good faith and loyalty.

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[83] *Id.*
[84] Lafferty et al., *supra* note 79, at 844–45.
[85] BAYNE, *supra* note 73, at 76.
[86] Daniel B. Kelly, *Fiduciary Principles in Fact-Based Fiduciary Relationships, in* OXFORD HANDBOOK OF FIDUCIARY DUTY, *supra* note 9, at Ch 1, p. 17.
[87] Stone *ex rel*. AmSouth Bancorp. v. Ritter, 911 A.2d 362, 370 (Del. 2006).
[88] Lafferty, et al., *supra* note 79, at 847, citing Stone v. Ritter, 911 A.2d at 369–70 (Del. 2006).
[89] In re Disney Co. Derivative Litigation, 906 A.2d 27, 67 (Del. 2006).
[90] Marchand v. Barnhill, 212 A.3d 805 (Del. 2019).

These obligations share some important requirements, but are not equally important in the relationship between corporate fiduciaries and shareholders. Both require scrupulous observance, meaning that these obligations are continually active and proscriptive, and thus require the fiduciary to both protect the shareholder and refrain from harming the shareholder at all times.[91] However, depending on state law, the duty of due care can only be breached by either negligence or gross negligence.[92] Furthermore, as explained below, the duty of due care is subject to the "Business Judgment Rule" as well as statutory immunities against fiduciary liability. The Business Judgment Rule does not apply to situations where a fiduciary is in a conflict of interest financially[93] or has usurped a corporate opportunity,[94] or even in the situation where the fiduciary's decision could be tainted because the fiduciary could lose their director position or job.[95] In other words, the Business Judgment Rule does not apply to any situation that would trigger a fiduciary breach of loyalty. As a result, the duty of loyalty has in many ways become the more important and predominant corporate fiduciary duty.[96]

b. The Business Judgment Rule

The Business Judgment Rule establishes a defense to claims that a corporate fiduciary has breached their duty of due care. As articulated in the common law, courts presume that a fiduciary has not breached their duty of due care,[97] or more broadly stated, courts presume that a fiduciary has acted with "sound business judgment."[98] The Business Judgment Rule has both procedural and substantive implications under the law of fiduciary duty.[99] The Rule creates a presumption that a corporate fiduciary has not violated a duty of due care, which

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[91] Velasco, *supra* note 12, at 61–62.
[92] For example, Delaware courts apply the gross negligence standard. *See Aronson*, 473 A.2d, at 805; *Van* Gorkom, 488 A.2d, at 873. The Model Business Corp Act ("MBCA") calls only for a "reasonableness" standard, which suggests simple negligence. ABA COMM. ON CORP. LAWS, MBCA, §8.30(b) (3d ed. 2002). New Jersey law only requires a showing of simple negligence. *See* Michael J. Lubben, *The Blame Game (Understanding Your Fiduciary Duties and Protecting Against Personal Liability Claims)*, GIBBONS CORP. & FIN. ALERT BLOG (Jun. 2, 2009).
[93] *Aronson*, 473 A.2d, at 812. Gries Football Ent. V. Cleveland Football Co., 496 N.E.2d 959, 962 (Ohio 1986).
[94] Kutcher, *supra* note 72, at 18.
[95] *See* Unocal Corp. v. Mesa Petroleum Co., 493 A.2d 946 (Del. 1985); Unitrin, Inc. v. Am. Gen. Corp., 651 A.2d 1361 (Del. 1995).
[96] Whitt, *supra* note 78, at 91.
[97] Domark & Gomez-Rodon, *supra n*ote 72, at 200. Delaware cases are often cited to articulate the Business Judgment Rule, but the Rule has basically been adopted in all fifty states. *See* Harhen v. Brown, 730 N.E.2d 859, 868 (Mass. 2000).
[98] Sinclair Oil Corp. v. Levien, 280 A.2d 717, 720 (Del. 1971).
[99] *See* Carter G. Bishop, *A Good Faith Revival of Duty of Care Liability in Business Organization Law*, 41 TULSA L. REV. 477, 484 (2006).

can only be overcome by evidence of fraud, bad faith, or self-dealing.[100] If a plaintiff cannot overcome this presumption, a claim of breach of due care cannot proceed, regardless of any harmful ramifications of the fiduciary's decision.[101] If a plaintiff does overcome this presumption, the burden then shifts to the fiduciary to prove that the decision was "entirely fair" to the corporation and stockholders.[102]

The substantive implications of the Business Judgment Rule are that a court will not find liability in a fiduciary's decision if it can be attributed to some rational purpose. [103] The purposes of the Business Judgment Rule are facially valid ones: to avoid the constant need for directors to obtain approval of their actions from shareholders,[104] and to preclude courts from imposing their own notions of what constitutes a sound business practice.[105] However, some commentators argue that the modern application of the Business Judgment Rule has resulted in a *de facto* negation of the duty of due care.[106]

c. Statutory Immunities

As a complement to the Business Judgment Rule, and in response to the exposure of corporate fiduciaries to personal liability as a result of the *Smith v. Van Gorkom* case,[107] many states have enacted immunity statutes limiting or entirely eliminating the personal liability of corporate fiduciaries for a duty of due care claim.[108] A commonly cited immunity statute is the one found in the Delaware General Corporation Law. Section 102(b)(7) allows corporations to insert provisions into their certificates of incorporation that grant their fiduciaries total immunity from monetary liability related to claims of a breach of due care:

> (7) A provision eliminating or limiting the personal liability of a director or officer to the corporation or its stockholders for monetary damages for

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[100] Adam Hayes, *What is the Business Judgment Rule? With Exemptions & Example*, INVESTOPEDIA (April 27, 2022), https://www.investopedia.com/terms/b/businessjudgmentrule.asp [https://perma.cc/9HA3-TXJD].
[101] *See* Bishop, *supra* note 99, at 484–485.
[102] *See* Lafferty et al., *supra* note 79, at 842.
[103] *See Sinclair Oil Corp.*, 280 A.2d at 720.
[104] *See* Alexander Styhre, *What We Talk About When We Talk About Fiduciary Duties: The Changing Role of a Legal Theory Concept in Corporate Governance Studies*, 13 MGMT. & ORGANIZATIONAL HIST. 113, 120 (2018).
[105] *See Sinclair Oil Corp.*, 280 A.2d at 720.
[106] *See* Bishop, *supra* note 99, at 483–484. *See also* William A. Gregory, *The Fiduciary Duty of Care: A Perversion of Words*, 38 AKRON L. REV. 181, 189–190 (2005).
[107] *See* Lafferty et al., *supra* note 79, at 844 n.29 (citing Smith v. Van Gorkom, 488 A.2d 858 (Del. 1985), in which the Delaware Supreme Court held directors liable for breaches of the duty of care).
[108] *See id*. *See also* Bishop, *supra* note 99, at 497.

> breach of fiduciary duty as a director or officer, provided that such provision shall not eliminate or limit the liability of:
>
> > (i) A director or officer for any breach of the director's or officer's duty of loyalty to the corporation or its stockholders;
> > (ii) A director or officer for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law;
> > (iii) A director under section 174 of this title;
> > (iv) A director or officer for any transaction from which the director or officer derived an improper personal benefit; or
> > (v) An officer in any action by or in the right of the corporation.[109]

In addition to this general immunity, section 141(e) of the Delaware General Corporation Law specifically protects directors who rely on information provided by other persons:

> (e) A member of the board of directors, or a member of any committee designated by the board of directors, shall, in the performance of such member's duties, be fully protected in relying in good faith upon the records of the corporation and upon such information, opinions, reports or statements presented to the corporation by any of the corporation's officers or employees, or committees of the board of directors, or by any other person as to matters the member reasonably believes are within such other person's professional or expert competence and who has been selected with reasonable care by or on behalf of the corporation.[110]

Like the Business Judgment Rule, state immunity statutes do not apply to a breach of loyalty claim.[111] They are also limited in that they do not apply to all corporate fiduciaries, but rather only directors and specified senior officers.[112] Furthermore, statutory immunity applies only to monetary damages, and as such, it neither negates the actual breach of the fiduciary duty of due care nor precludes a demand for equitable relief from that breach.[113] Finally, since the drafters of these statutes likely were not contemplating the possibility of decision-making by

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[109] DEL. CODE ANN. tit. 8, § 102(b)(7) (2022). *See also* Unif. Ltd. Liab. Co. Act § 105(d)(3) (2006) (amended 2013); Model Bus. Co. Act § 8.31 (2002).
[110] DEL. CODE ANN. tit. 8, § 141(e) (2022); *see also* MBCA § 8.30(c)-(e).
[111] *See* Lafferty et al., *supra* note 79, at 844. *See also* Nicholas v. Perricone, *Elimination of the Duty of Care in Delaware? Statutory Exculpation of Officers: Recent Amendment to Section 102(B)(7) of the Delaware General Corporation Law*, MINTZ (Sept. 21, 2022), https://www.mintz.com/insights-center/viewpoints/2871/2022-09-21-elimination-duty-care-delaware-statutory-exculpation [https://perma.cc/L99R-DUZB].
[112] *See* Perricone, *supra* note 111.
[113] *See id.*

non-human artificial intelligence, the immunity arises only from reliance on humans.

d. The Implications of Modern Corporate Fiduciary Jurisprudence When Applied to the Use of Artificial Intelligence

The current state of corporate fiduciary jurisprudence creates a quandary for corporate fiduciaries that use artificial intelligence. The fiduciary duty of due care would seem to require corporate fiduciaries to use the best available AI tools to analyze any major business decision. At the same time, if corporate fiduciaries intentionally use AI tools that are made opaque by Black Box processing, are oblivious as to how AI tools actually process the questions submitted to them, defer completely to algorithm-based decisions, or simply delegate their responsibilities as corporate fiduciaries to non-transparent, imperfect, and bias-prone AI tools, then it would seem evident that they have violated that same duty of due care.

Moreover, the "crossover" of a failure of a corporate fiduciary to monitor from being a breach of due care to being a breach of loyalty has serious implications for the corporate fiduciary in the Age of Algorithms. Again, the paradox will exist that a fiduciary is expected to use high technology to make decisions based on algorithms, since that is both the most efficient and most comprehensive way to make such decisions.[114] However, if a corporate fiduciary completely delegates their duties to an AI tool, whether by passively deferring to an algorithmic decision available today or, in the more distant future, using an AI tool to displace humans involved in the decision-making corporate ladder, that would be a breach of the fiduciary duty of good faith, and thus loyalty. This means that any protection against liability under the Business Judgment Rule or immunity-granting statutes will not protect a corporate fiduciary, since they do not apply to cases alleging a breach of loyalty. Therefore, the corporate fiduciary faces a legal minefield in making fiduciary decisions in the Age of Algorithms.

IV. A Deeper Analysis of the Duty of Due Care and the Use of AI

[114] *See* Akshaya Kamalnath, *The Perennial Quest for Board Independence: Artificial Intelligence to the Rescue?*, 83 ALBANY L. REV. 43, 50, 52 (2020) (citing Val Srinivas et al., *Bringing Digital to the Boardroom*, DELOITTE INSIGHTS (Jan. 31, 2019), https://www2.deloitte.com/us/en/insights/topics/digital-transformation/digital-transformation-financial-services-boards.html [https://perma.cc/8JV4-N9SP]).

a. How AI Can Help Meet the Duty of Due Care in the Age of Algorithms, and Thus, Might Become a Necessary Tool of All Corporate Fiduciaries

Although this article has tended to focus on the negative aspects of AI, one should not lose sight of the fact that AI will have a major positive effect on the world of corporate governance, just as it will have on the fields of medicine, consumer goods, and communications. However, the extent of this positive effect is currently incalculable. AI for corporate governance and operations is still in its infancy,[115] most corporate officers and directors are not skilled in or knowledgeable about the potential for AI in the corporate board room, and most corporations have no plan in place to educate its corporate fiduciaries about the existence or uses of AI tools.[116] Additionally, one may wonder how some corporate fiduciaries, particularly those in smaller companies, will have the resources to pay for these expensive AI tools, or even want to risk their limited resources on these untested AI tools. Put another way:

> But the big unknown is whether boards can keep up with the pace of technological change, or how quickly "software will eat the world" – a phrase coined by tech entrepreneur, Marc Andreessen. And whether machines will be needed in boardrooms to process an exponential increase in technology, find value in it, and supplement the skills of human directors.[117]

Thus, for now, the potential positive impact of AI tools on corporate planning and governance is almost the stuff of science fiction theorizing.

Yet, there is no question that AI tools will indeed make corporate fiduciaries' jobs more efficient and their decisions more reasoned and more correct. Keep in mind that, even in the halls and board rooms of corporate management, it is said:

> Above all, artificial intelligence helps to make decisions. Decision-making requires data, often in large amounts. The more complex a decision, the more data is needed to make the decision on an informed, rational basis [citation omitted]. Since computers, algorithms and artificial intelligence are particularly well-suited to process "big data", they are able to contribute to improve decision-making…. To be more

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[115] *See id* at 43–45.
[116] *See* Lisa Fontenot & Cassandra Gaedt-Sheckter, *Fiduciary Duty Considerations for Boards of Cos. Using AI*, LAW360 (Jan. 3, 2020), https://www.law360.com/articles/1229472/fiduciary-duty-considerations-for-boards-of-cos-using-ai [https://perma.cc/UED9-2AHJ].
[117] Tony Featherstone, *Governance in the New Machine Age*, AUSTL. INST. OF CO. DIRS. (March 24, 2017), https://www.aicd.com.au/innovative-technology/disruptive-innovation/examples/governance-in-the-new-machine-age.html [https://perma.cc/7C6R-Z56S].

> precise, artificial intelligence can reduce uncertainties of any kind (not just about the future) by making predictions, that is, by translating large amounts of data into small, manageable chunks.[118]

These AI-based benefits mean that AI tools used by corporate fiduciaries will allow them to meet their duty of due care more thoroughly than at any time in the history of corporate fiduciaries.

A more specific overview of the benefits that AI will bring to corporate fiduciaries illustrates even more clearly how corporate fiduciaries will be able to fulfill their duty of due care.

a. Corporate fiduciaries will be able to manage the volumes of data that board members receive in a far more timely and complete manner than most board members or C-level executives could devote to such an effort.[119] Once released from this tedious use of time and energy, corporate fiduciaries will be better able to focus on strategy and management development.[120]

b. Board members, particularly those who are independent and thus out of the day-to-day loop, will be empowered to act in a timely fashion on suddenly urgent matters because algorithms can crunch data quickly and efficiently, and thus directors can render their decisions in a likewise quick, efficient, and accurate manner.[121]

c. Directors will be released from having to over-rely on senior management, and senior management will not have to over-rely on managers below them, for collecting and collating information. Perhaps more importantly, these same fiduciaries will be released from having to rely on information analyses that might be slanted in a way that is favorable to those underlings providing the analysis.[122]

d. Boards can overcome "groupthink," whereby personal relationships with other fiduciaries can cloud a director's decision-making both pro and con. After all, algorithms are not biased by friendships and respect, and will render unclouded conclusions.[123]

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[118] FLORIAN MÖSLEIN, ROBOTS IN THE BOARDROOM: ARTIFICIAL INTELLIGENCE AND CORPORATE LAW, RSCH. HANDBOOK ON L. A.I., 7–8 (2017).
[119] *See* Kamalnath, *supra* note 114 at 50.
[120] *See* Assaf Hamdani et al., *Technological Progress and the Future of the Corporation*, 6 J. BRIT. ACAD. 215, 230 (2018).
[121] *See* Kamalnath, *supra* note 114 at 49–50.
[122] *Id.* at 56.
[123] *Id.* at 52.

e. Boards can improve the selection process of their members. Some studies suggest that many boards have lost their effectiveness because directors are selected as a result of those personal ties to management.[124] If directors are expected to render their decisions based on objective algorithmic analysis, management will be less incentivized to lobby for the appointment of directors based on those ties. In fact, corporations could use AI tools to identify potential board members based on the needs of the board rather than the relationships of management and current directors, and then vet potential directors based on objective criteria. The result would be a stronger, more independent board,[125] not to mention freeing up members of search committees to focus on corporate strategy rather than finding board members.

f. All corporations, in particular smaller corporations, would find doing business in developing markets easier. AI tools would help with market analysis, regulatory compliance, supply chain vetting, and logistical issues, and thus reduce the transactional costs and start-up risks that are a barrier to smaller businesses entering new markets. Moreover, by identifying the most strategic and correct way of doing business, the hidden costs of and barriers to entry, including fraud and governmental favoritism, that particularly impact smaller companies would be avoided or at least lessened.[126]

Thus, the opportunities offered by corporate AI tools for improving corporate governance, strategic planning, and operational excellence make AI truly a wondrous tool for the future of corporation fiduciaries.

Unfortunately, these wondrous tools could also become traps for the ignorant and unwary corporate fiduciary. Fundamentally, the duty of due care requires corporate fiduciaries, before making a decision, to inform themselves of all material information that is available and make sure they have considered all advice and counsel from reasonably obtainable resources.[127] As AI tools become more readily available, corporate fiduciaries who cannot or choose not to use AI tools that could analyze exponentially more data than the human, will likely be found to have breached their duty of due care because they did not avail themselves of all useful data. Similarly, fiduciaries who rely solely on the analysis and advice of human underlings will violate their duty of due care since algorithmic data-crunching and analysis would provide a more thorough and less slanted analytical result.

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[124] *See, e.g.,* Simran Jeet Singh, *Boards Need Real Diversity, Not Tokenism*, HARVARD BUS. REV. (Aug. 31, 2021), https://hbr.org/2021/08/boards-need-real-diversity-not-tokenism [https://perma.cc/2GRU-9TDP].
[125] Hamdani, *supra* note 120, at 229.
[126] *Id.* at 225.
[127] *See Duty of Care*, LEGAL INFORMATION INST., https://www.law.cornell.edu/wex/duty_of_care [https://perma.cc/2GKC-5RFS].

As for the requirement that fiduciaries seek the expert advice and counsel of others, in the Age of Algorithms, that advice and counsel will come in significant part from algorithmic analysis. Again, human-only analysis will not meet the minimum standards of due care, because algorithmic analysis will demonstrably be able to handle more data and provide more analysis. In fact, machines learn ways to make decisions more effectively than any human alone. Given that AI can uncover correlations and conclusions that humans did not even consider, the corporate fiduciary who fails to use AI tools to uncover alternative and unconsidered strategic options will likely be sued for breaching the fiduciary duty of due care.

Fiduciaries must also be mindful to use AI technology in order to preserve their immunities from claims of a breach of the duty of due care. Section 102(b)(7) of the DGCL grants immunity from such claims unless a fiduciary has not acted "in good faith" or has been involved in "knowing misconduct" or a "knowing violation of the law."[128] Well-designed AI tools will improve a fiduciary's ability to act in good faith, and to learn of misconduct or violations of the law in the business organization. Thus, reliance on artificial intelligence will strengthen a fiduciary's claim to immunity under section 102(b)(7).

Those statutes based upon section 8.31 of the MBCA might actually obligate a fiduciary to use newly available corporate AI tools. The immunity under section 8.31 of the Model Business will not apply to a director who "was not informed" to the extent necessary to make the challenged decision.[129] Nor will section 8.31's immunity provisions apply where there has been a:

> sustained failure of the director to devote attention to ongoing oversight of the business and affairs of the corporation, or failure to devote timely attention, by making (or causing to be made) appropriate inquiry, when particular facts and circumstances of significant concern materialize that would alert a reasonably attentive director….[130]

The best way for a corporate fiduciary to secure this immunity is by remaining fully informed of the "particular facts and circumstances of significant concern" when making a fiduciary decision, and providing the requisite "ongoing oversight", "timely attention," and to make "appropriate inquiry," is to use those AI tools being designed and marketed for these purposes.[131] On the other hand,

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[128] 8 DEL. CODE. ANN § 102(b)(7)(ii).
[129] MBCA, *supra* note 92, § 8.31(a)(2)(ii)(B).
[130] *Id*. at § 8.31(a)(2)(iv).
[131] *Id.*

the fiduciary who fails to make use of these tools would not be meeting these statutory prerequisites for enjoying the immunity granted by statutes incorporating section 8.31 of the MBCA.

In summary, ignorance of the benefits of AI technology is not going to protect the corporate fiduciary who chooses to remain unaware of advancements in corporate AI technology. After all, that fiduciary's improper decisions are going to be evaluated against other corporate fiduciaries who know how and when to use these new AI tools.[132] While a fiduciary might say that neither they nor their contemporaries are aware of AI tools for corporate governance this year, it is inevitable that those tools will be intensely marketed and corporate consultants will be presenting a myriad of seminars on the use of AI by corporate fiduciaries in the coming years, thereby putting the corporate community on notice that they should start adopting those AI tools. In fact, those corporate fiduciaries who have stayed ignorant of advancements in corporate AI tools will surely not meet the objective standard of being a "prudent" corporate manager as the wider corporate community adopts AI tools for their own companies. Thus, as AI technology promises to make corporate fiduciary decision-making easier and better, it also creates grounds for claims that a corporate fiduciary not using this technology is in violation of their duty of due care in the Age of Algorithms.

b. How Deference to and Over-Reliance on AI Can Lead to a Breach of the Duty of Due Care

Unfortunately for fiduciaries, even those who rely on AI tools to make their fiduciary decisions will not simply immunize themselves from claims of a breach of due care by relying on AI, but in fact may be stumbling into a new generation of claims because of that reliance. An exercise in due care might be impossible given the limitations of AI accuracy combined with the infamous Black Box nature of algorithmic processes. So, the very tools that will be the best approach to exercising due care may not fulfill that duty under current legal standards.

First, one must consider the limitations any corporate fiduciary will face in determining if the algorithm on which they rely was designed properly. The duty of due care requires "extensive discussions with competent and independent legal and financial advisors"[133] before a corporate fiduciary can make important decisions. When a fiduciary uses a human consultant to assist that fiduciary, such as a lawyer, financial advisor, or marketing expert, the fiduciary can at least

[132] *See supra* Section III(A).
[133] Lafferty et al., *supra* note 79, at 843.

do reasonable due diligence about that human's training background, experience, and level of performance for other corporate clients. An algorithm, however, requires a new level of expertise input that which might make due diligence difficult or impossible to conduct. Not only must the designer be competent as a designer, but as previously stated,[134] for an algorithmic design to provide truly accurate processing, it will need the input of multiple experts in many fields to in turn advise that designer. However, a corporate fiduciary relying on an AI tool is unlikely to know the expertise of the designer, let alone what, if any, experts were involved in the design process, or what these experts' credentials are. So, substituting an AI tool for a traditional human consultant would preclude a fiduciary from meeting this traditional obligation of screening and evaluating those experts providing guidance to that fiduciary.

Second, a fiduciary will have to question if all the relevant data needed to make the decision was provided to the algorithm and if that data is accurate. A data set can often be filled with errors or have gaps in data collection, and these errors are only multiplied the more data sets an algorithm uses. Moreover, these gaps can materially affect the randomness of the data or how representative it is of the real word.[135] Multiple examples already exist where human decision-makers relied on algorithms that did not have sufficient data, accurate data, or data relevant to a specific entity resulting in embarrassingly wrong decisions that harmed many people.[136]

Unfortunately, if challenged, a fiduciary will be hard-pressed to identify what data was made available for the algorithm, let alone whether the available data was all relevant, accurate, and representational data. Indeed, the "Black Box" nature of algorithms will mean that even if sufficient accurate and relevant data existed for the algorithm to use, a fiduciary cannot know whether the algorithm used the correct data, or instead relied on inaccurate data. Add to this dilemma the ramifications of machine-learning capabilities, meaning that an algorithm will change its originally designed analytical process if the algorithm determines a more efficient and accurate process exists to get to an accurate conclusion. As a result, even the original designer of the AI tool, let alone the corporate fiduciary, will not know if the algorithm is using the data as intended, or if the algorithm is ignoring the accurate data in order to obtain a "more efficient" answer. If a fiduciary is unable to exercise any care in determining that the proper data is being relied upon or that it is being analyzed properly, the fiduciary certainly cannot state that they are exercising due care in relying on that algorithm.

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[134] *See supra* Section II(A).
[135] *See* Danah Boyd & Kate Crawford, *Critical Questions for Big Data: Provocations for a Cultural, Technological, and Scholarly Phenomenon,* 15 INFO., COMM, & SOC. 662 (2012).
[136] *See supra* Section II(B).

Third, the Black Box nature of algorithms may negate any claim that due care was exercised by a fiduciary.[137] The duty of due care, after all, focuses on the analytical process of the fiduciary. A fiduciary must be "informed," a fiduciary must act in a "deliberative manner," and must proceed with a "critical eye" in assessing the information upon which a decision will be made.[138] A fiduciary must consider multiple alternatives to the proposal before them and decide which is the best course of action, not just passively agree to the option presented.[139] A corporate fiduciary who relies on AI cannot be said to have done any of these things, since the Black Box nature of algorithmic processes precludes anyone being "informed" about the process, or having "deliberated" about that opaque process. It also cannot be said that a corporate fiduciary has cast a "critical eye" on that process.[140] In fact, that fiduciary would in no way be considering multiple alternatives or options to a question before the fiduciary. Any such considerations would have been done by an algorithm, and no guarantees could exist of how many, or indeed if any, alternatives were evaluated beyond the one that is contained in the algorithm's conclusion.

Furthermore, the corporate fiduciary might mistakenly assert that their reliance on high technology should be sufficient to fulfill their fiduciary duties. After all, a corporate fiduciary is held to an objective standard of what a reasonable fiduciary could do in the same role, with the proper skills and expertise.[141] Even this article asserts that using an AI tool is not only a reasonable judgment on the part of a corporate fiduciary, but to fail to use available AI tools could in fact be a breach of that duty. Moreover, if no fiduciary could overcome the algorithmic Black Box problem, then arguably no fiduciary could be found to violate their duty of care by deferring to an algorithm. So, the "reasonable fiduciary" standard would seem to call for use of AI tools and ignore any deficiencies from the Black Box problem.

However, condoning complete reliance by corporate fiduciaries on AI is fundamentally unsound, because that rationale would result in a complete misuse of good technology to the point it would be turning good technology into bad technology. One must always remember that no algorithm is going to be 100% accurate, simply because the time, energy, and computer hardware necessary to reach anywhere near 100% would practically negate any ability to use a near-

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[137] *See* Lafferty et al., *supra* note 79, at 842.
[138] Smith v. Van Gorkom, 448 A.2d 858, 884 (Del. 1985); Lafferty et al., *supra* note 79, at 842–43.
[139] *See Revlon, Inc. v. MacAndrews & Forbes Holdings, Inc.,* 506 A.2d 173 (Del. 1986).
[140] Lafferty et al., *supra* note 79, at 842.
[141] *See* Goldberg, *supra* note 81, at 406; Graham v. Allis-Chalmers Mfg. Co., 188, A.2d 125, 130 (Del. 1963); Domark & Gomez-Rodon, *supra* note 72, at 2.

perfect algorithm.[142] No AI manufacturer puffery can negate the reality that every algorithm will make mistakes, and thus the fiduciary must not grant that algorithm total deference. Otherwise, at some point the fiduciary is bound to rely on an inaccurate result which could hobble or destroy the corporation.

This obligation to avoid complete deference on AI has been adopted in other fields where AI has been adopted by professionals, particularly in the medical field. Experience has taught those professionals that AI is a valuable tool, but not so perfect as to be worth total deference. For example, when AI was used for developing cancer therapies, the AI was found sometimes to recommend "unsafe and unsound" cancer treatments, and so doctors were advised against giving total deference to any AI decisions.[143] The good news is that when oncologists complemented AI advice with their own years of training and experience, the error rate in selecting cancer treatment was reduced 85%.[144] The lesson for corporate fiduciaries is that while using AI is a sound and necessary step to fulfilling a duty of due care, the limitations of AI mean a fiduciary's deference to AI can turn that sound decision into a bad one.

To allow complete deference would, in fact, be making one of the most fundamental mistakes a human can make with any artificial intelligence. As stated previously,[145] humans have a misplaced reliance on artificial intelligence called "automation bias":

> The impulse to follow a computer's recommendations flows from … the "use of automation as a heuristic replacement for vigilant information seeking and processing". [fn. omitted] Automation bias effectively turns a computer program's suggested answer into a trusted final decision.[146]

Anyone exercising important decisions that might affect others, whether an oncologist[147] or a jumbo jet pilot,[148] must remember not to succumb to this dangerous deference. Thus, this approbation against automation bias should be adopted anytime a corporate fiduciary is being accused of violating their duty of due care by passively deferring to artificial intelligence.

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[142] *See supra* Section II(A).
[143] Kamalnath, *supra* note 114, at 54; s*ee also* Claudia Haupt, *Artificial Professional Advice,* 21 YALE J. L. & TECH. 57, 70 (2019).
[144] *See* Executive Office of the President, PREPARING FOR FUTURE OF ARTIFICIAL INTELLIGENCE 11 (Oct 2016).
[145] *See supra* Section II.
[146] Citron, *supra* note 8, at 1271–72, quoting Linda J. Skitka, et al, *Automation Bias and Errors: Are Crews Better Than Individuals?*, 10 INT'L J. AVIATION PSYCH. 85, 86 (2000).
[147] Haupt, *supra* note 143, at 71.
[148] Skitka, *supra* note 146, at 994.

In the end, this should be completely unsurprising. Corporate fiduciaries have never been deemed to fulfill their duty by deference to third-party expertise. Rather, corporate fiduciaries are forbidden from passively accepting third-party advice, and must review such advice actively with a "critical eye."[149] Fiduciaries only avoid liability if they rely in good faith on advice that the fiduciaries knew was rendered within the expert competence of the advice-giver.[150] However, the errors introduced into AI output by problematic algorithmic design, data usage deficiencies, and Black Box processing must all preclude any assertion of good faith by the unwary fiduciary.

Finally, the best algorithms will introduce a serious fiduciary oversight problem that no human expert would ever pose for a corporate fiduciary. With a human consultant, the fiduciary can expect that the human hired by that fiduciary will be the same human providing the consultation. That cannot be said for the machine-learning algorithm which teaches itself what data it will use and how it will draw correlations. As a result of machine learning, the algorithm the fiduciary initially purchased could be different from the algorithm being used at any given time by the fiduciary.[151] This self-change through machine learning could be highly beneficial, especially if the algorithm makes suggestions the fiduciary never would have considered. But if the machine learning was the result of bad data, or the algorithm picked up on historical bias in the data set used, that self-change could also produce incorrect or illegal results. When confronted with those bad results, a fiduciary could not claim in good faith that they acted with due diligence in selecting the algorithm, since the algorithm they selected was not the same algorithm they relied upon. For this reason, no fiduciary should ever assume deference to an algorithmic result will fulfill their duty of due care.

c. Why the Business Judgment Rule Should Not Apply to a Fiduciary's Deference to AI

Nonetheless, a corporate fiduciary might invoke the Business Judgement Rule[152] to avoid liability for violating their duty of due care. After all, reliance on modern technology to evaluate a complicated corporate decision would meet the highest standards of fiduciary care, and thus not be subject to questioning under the Business Judgment Rule. Moreover, by relying on an AI tool—absent evidence that that AI tool was intentionally designed to be biased—the fiduciary would unquestionably act without self-interest by relying on the objective

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[149] Lafferty et al., *supra* note 79, at 842.
[150] 8 DEL. CODE ANN. § 141(e).
[151] *See* Section II(C)(1).
[152] *Business Judgment Rule*, LEGAL INFORMATION INSTITUTE, https://www.law.cornell.edu/wex/business_judgment_rule#:~:text=The%20business%20judgment%20rule%20provides,the%20parameters%20of%20the%20rule [https://perma.cc/5V73-PCMY].

algorithm. Certainly, such reliance on a state-of-the-art objective AI tool could never be considered gross negligence[153] on the part of the fiduciary.

Nonetheless, the prerequisites of the Business Judgment Rule would, and should, preclude such a deferential use of AI tools. The Business Judgment Rule cannot even be invoked until fiduciaries have fulfilled their "duty to inform themselves, prior to making a business decision, of all material information reasonably available to them."[154] In other words, as the *Van Gorkom* court so clearly opined, "Under the Business Judgment Rule there is no protection for directors who have made "an unintelligent or unadvised judgment."[155] Rather, for the rule to apply and attach to a particular transaction, "directors 'have a duty to inform themselves, prior to making a business decision, of all material information reasonably available to them. Having become so informed, they must then act with requisite care in the discharge of their duties.'"[156]

A fiduciary relying solely on the data selection and processing by the algorithm will be unable to aver that the fiduciary used "all material," and thus will be unable to assert that the fiduciary, in turn, relied upon all material information. Moreover, as a result of the Black Box opaqueness of algorithmic processes and the change in those processes wrought by machine learning, a fiduciary is literally making an unadvised judgment, since they are deferring to algorithms that provide no "advice" about how the algorithmic processes were carried which resulted in the conclusions being relied upon. In turn, the fiduciary is likewise "uninformed" during any deliberation on the decision in question, and thus must be considered to have acted in gross negligence.[157] Therefore, a fiduciary relying on AI will not meet the prerequisites for invoking the Business Judgment Rule.

Even if a fiduciary's deference to AI does not negate the Business Judgment Rule, the presumptions arising from the Business Judgment Rule should readily be overcome by a plaintiff's counsel. After all, the Business Judgment Rule is not an absolute immunity barrier, but rather a rebuttable presumption.[158] The presumption can be overcome if a plaintiff can prove "that directors, in reaching their challenged decision, breached any one" of their fiduciary duties.[159] When a corporate fiduciary defers to an AI-based decision,

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[153] Smith v. Van Gorkom, 488 A.2d 858, 873 (Del. 1985).
[154] Aronson v. Lewis, 473 A.2d 805, 812 (Del. 1984).
[155] *Smith*, 488 A.2d at 87 quoting Mitchell v. Highland-Western Glass, 167 A. 831, 833 (Del. Ch. 1933).
[156] *Aronson*, 473 A.2d at 812.
[157] *Smith*, 488 A.2d at 881.
[158] Cede & Co. v. Technicolor Inc., 634 A.2d 345, 360–61 (Del. 1992).
[159] *Id.* at 361.

that deferral will, for the reasons outlined in this article, be a breach that will overcome the presumption of the Business Judgment Rule.

Once the Business Judgment Rule presumption falls, the burden will shift back to the fiduciary to prove that their decision was "entirely fair."[160] "Fair dealing" requires that directors have full disclosure of the deal's ramifications.[161] If a fiduciary relies on AI tools to justify a transaction or decision, there will be no "disclosure" except that end conclusion. The fiduciary will neither know what data the algorithm is using as a basis for its conclusions, the process by which that algorithm made that decision, or the alternative decisions rejected during the algorithmic process. Indeed,

> [a]s a large mass of raw information, Big Data is not self-explanatory. And yet the specific methodologies for interpreting the data are open to all sorts of philosophical debate. Can the data represent an 'objective truth' or is any interpretation necessarily biased by some subjective filter or the way that data is 'cleaned?' [citation omitted].[162]

This total lack of disclosure cannot support a conclusion that the deal was fair.

On the contrary, a fiduciary's complete deference to AI should be considered a per se violation of the Business Judgment Rule. The fiduciary made no decision at all, let alone a "fair" one, and so there is no reason for a court to bless that non-decision with deference. Moreover, given all the possibilities for an algorithm to give a wrong conclusion, it would be harmful for courts to protect fiduciaries who fail to exercise their decision-making in deference to an algorithm. Therefore, even if the current jurisprudence on the Business Judgment Rule does not specifically prohibit a corporate fiduciary from deferring to an algorithm, courts should soon make that prohibition clear for the sake of shareholders and corporations.

d. Why Immunity-Granting Statutes Do Not Apply to the Use of AI by a Fiduciary

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[160] Shamrock Holdings, Inc. v. Polaroid Corp., 449 A.2d 257, 271 (Del. Ch. 1989), *citing* Mills Acquisition Co. v. Macmillan, Inc., 550 A.2d 35 (Del. Sup. 1988); Unocal Corp. v. Mesa Petroleum Co., 493 A.2d 946, 958 (Del. 1985); *Smith*, 488 A.2d at 893.

[161] Valeant Pharms. Int'l v. Jerney, 921 A.2d 732, 746 (Del. Ch. 2007) (internal quotations and footnotes omitted); Thomas A. Uebler, *Reinterpreting Section 141(e) of Delaware's General Corporation Law: Why Interested Directors Should be "Fully Protected" in Relying on Expert Advice,* 65 BUS. LAWYER 1023, 1028 (August 2010), available at https://www.rlf.com/wp-content/uploads/2020/05/TBL-65-4-01Uebler-original.pdf.

[162] Boyd & Crawford, *supra* note 135, at 10.

For the same reasons, statutes granting full or limited immunity will not shield a fiduciary who defers to AI tools when making the fiduciary's corporate decisions. As a preliminary matter, many of these statutes refer only to human-based advice, not advice from AI. For example, DGCL section141(e), which grants fiduciaries immunity who rely on the advice of others, shields a fiduciary who relies upon information and reports supplied by the corporation's "officers or employees" or by "any other person" acting as a consultant.[163] Likewise, section 8.30 of the MBCA, which grants similar immunity, refers repeatedly to "officers or employees" or "other persons."[164] Thus, these laws, given a literal interpretation, will not shied a fiduciary relying on a non-human algorithm.

Some may argue this interpretation is over-limiting, since these statutes were drafted before the advent of AI tools when only human-sourced advice was available to fiduciaries. However, a liberal interpretation of these laws could allow their shield to be extended to algorithm-based decisions. For example, the U.S. Copyright Office has refused to extend copyright protection to algorithms that have created works on the grounds copyright law protects only humans.[165] Likewise, the U.S. Patent & Trademark Office has refused to recognize algorithms as inventors because U.S. patent law refers only to humans when discussing "inventors."[166] This restrictive interpretation has been upheld in federal court.[167] Thus, under standard rules of statutory interpretation, a fiduciary relying upon a non-human decision would not be entitled to claim immunity under these statutes.

More substantively, statutes based upon section 8.31 of the MBCA would not grant immunity, since the fiduciary was not adequately "informed" to passively accept any algorithm-based decision. Section 8.31(a)(2)(ii)(B) states that a director who "was not informed" to the extent necessary to make the challenged decision will not be immune.[168] Similarly, section 8.31(a)(2)(iv) will not allow immunity where there has been a:

> sustained failure of the director to devote attention to ongoing oversight of the business and affairs of the corporation, or failure to devote timely attention, by making (or causing to be made)

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[163] 8 DEL. CODE ANN. § 141(e).
[164] MBCA, *supra* note 92, § 8.30(c)-(e).
[165] U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT PRACTICES § 306 (3d ed. Sept 29, 2017).
[166] Russ Pearlman, *Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S. Intellectual Property Law*, 24 RICH. J. L. & TECH., ¶10 (2018), *reprinted at* https://jolt.richmond.edu/recognizing-artificial-intelligence-ai-as-authors-and-inventors-under-u-s-intellectual-property-law/ [https://perma.cc/EPP7-KGTU].
[167] *See* Thaler v. Hirshfeld, 558 F.Supp. 3d 238 (E.D. Va 2021).
[168] MBCA, *supra* note 92, § 8.31(a)(2)(ii)(B).

> appropriate inquiry, when particular facts and circumstances of significant concern materialize that would alert a reasonably attentive director.[169]

No director could prove they made "appropriate inquiry," since the directors themselves did not make the inquiry, and the Black Box, machine-learning nature of algorithmic process would make it impossible for a director to know if all the "material facts and circumstances" became part of an algorithm's analysis of the dataset provided to it.[170] Indeed, between the fact that no algorithm will be anywhere near 100% accurate, and the ever-present risk of undiscoverable error and bias from a machine-learning Black Box algorithm, algorithmic inquiry could not never be presumed, let alone proven, to be "appropriate." Therefore, the immunities afforded by section 8.31 would not be available to the director deferring to AI tools.

It is worth noting, once again, the paradox this creates for directors relying on such AI tools. On one hand, good AI tools will make accumulation and analysis of the data generated by corporate operations far easier and more comprehensive for the modern director than any oversight review by the most conscientious director prior to the Age of Algorithms.[171] So, any contemporary director's inquiry that does not include artificial intelligence is arguably not sufficiently "sustained" or "appropriate", as required by section 8.31. Yet, on the other hand, complete deference to such AI-based inquiries would also not be sufficiently appropriate, given the deficiencies and non-transparencies of any algorithmic process.

Section 102(b)(7) does not use the same language as section 8.31, and thus may provide more immunity to corporate fiduciaries relying on algorithms. Most certainly, its text alone completely bars monetary claims based on a breach of the duty of due care.[172] However, the wording of section 102(b)(7) contains two notable exceptions when immunity may not be granted by a corporation to its fiduciaries. First, there can be no immunity for "intentional misconduct."[173] In light of the limitations of algorithmic processes, passively deferring to AI decision-making should be considered "intentional misconduct" when the inevitable AI error leads to a corporate disaster. Furthermore, the corporate fiduciary who fails to demand that AI tools be designed to ameliorate these algorithmic deficiencies will be committing the "omissions … which involve intentional misconduct" that will negate the immunity in section 102(b)(7)(ii).[174]

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[169] *Id.*, at § 8.31(a)(2)(iv).
[170] *Id.*
[171] *See* Section III(B)(1).
[172] DEL. CODE ANN. tit. 8, § 102(b)(7)(iii).
[173] *Id.* at (b)(7)(ii).
[174] *Id.*

The second notable exception that negates immunity under section 102(b)(7) is a claim involving a breach of loyalty, including a breach of good faith.[175] As argued in the next section, a corporate fiduciary's under-reliance and over-reliance on artificial intelligence would trigger a breach of loyalty claim, which will negate protections under section 102(b)(7). So, the lesson is becoming redundantly clear: the Age of Algorithms will require concerted, yet critical and wary, use of artificial intelligence if corporate fiduciaries wish to avoid breaches of fiduciary duty and the liability that comes from those breaches.

V. A Deeper Analysis of the Duty of Loyalty and the Use of AI

a. How AI Can Fulfill the Duty of Loyalty and, In Fact, Become a Necessary Tool for Corporate Fiduciaries

AI tools offer super-human data processing and multi-factor analysis, which can pass the bar for meeting a fiduciary's duty of loyalty, as well as the sub-duties that are built into the overall duty of loyalty. Those fiduciaries who use these tools, and thus provide a higher level of compliance with all the elements of a duty of loyalty, will readily avoid or withstand claims of a breach of that duty. On the other hand, fiduciaries who fail to use these AI tools properly will be held culpable for any breach of the duty of loyalty attributable to their archaic attempts to fulfill a duty of loyalty without using these AI tools.

The "classic" claim of breach of the duty of loyalty involves a conflict of interest on the part of the fiduciary. That conflict of interest could be in the form of profit-making proposal for the fiduciary, benefits or rights to the fiduciary or third parties connected in some way to the fiduciary, or placing the interests of the fiduciary and/or those third parties ahead of the interests of the corporation. As shareholders, holders of options for shares, and holders of management and/or board positions which pay attractive compensation, corporate fiduciaries will inevitably face the possibility of some gain or loss from mergers, asset or entity sales, and other transactions requiring their input or vote.[176] In such instances, fiduciaries could use AI tools to analyze proposals, consider alternatives, and report on the best approach or mixes of approaches that would be the most advantageous to the corporation. Assuming they are designed objectively, AI tools will be free from the financial interests and inter-human emotional connections that would sway a ruling solely by a human, and thus be unable to

[175] *Id.*
[176] Velasco, *supra* note 12, at 62.

have conflicts of interest.[177] Thus, even if a fiduciary has a potential conflict of interest, so long as the fiduciary has disclosed that possible conflict, they can defend their vote as one based on an objective algorithm and not any personal bias or emotion from the disclosed conflict.

AI tools will be equally valuable to a fiduciary faced with one of the "sub-duties" that fall under the duty of loyalty.[178] Perhaps the most important of these, in light of recent Delaware court rulings, is the duty of good faith. This duty of good faith has become two separate obligations: a duty of good faith when considering corporate transactions,[179] and a different duty of good faith to monitor corporate compliance during day-to-day operations.[180] Again, a fiduciary using artificial intelligence to meet either obligation will have a compelling argument that they are acting in good faith, but failing to avail themselves of artificial intelligence could result in a claim that their actions were too deficient to be deemed in good faith.

The transaction-related duty of good faith arises from the *Revlon*[181] and *Lyondell*[182] cases. The duty of good faith during transactions is simple—obtain the best deal for the corporation and the shareholders. While bad faith might be found only due to an "utter failure" to obtain the best deal will be considered a breach of good faith, corporate fiduciaries nonetheless have an obligation to make some "attempt to obtain the best price." [183] Practically, the more evidence a fiduciary can present that they fulfilled this obligation, the less likely they are to be sued, and if sued, the quicker and more cheaply they can get the case against them dismissed.[184] Using a well-designed AI tool to analyze a transaction, look at alternatives, price the transactions being considered using market data, and perhaps even offer an alternative, such as another party that would offer a better price or "fit", would show that the fiduciary not only acted in good faith in testing the transaction via the AI tool, but would provide a basis for shutting down any critique of that proposal by a plaintiff.

The operations-related duty of good faith, based on the *Caremark*[185] and *Marchand*[186] cases can be referred to as a duty to monitor. Those cases held that a corporate fiduciary must both make sure that a system is implemented whereby

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[177] Kamalnath, *supra* note 114, at 56.
[178] Kelly, *supra* note 86, at 17.
[179] Christopher M. Bruner, *Good Faith in Revlon-Land*, 55 N.Y.U. L. REV. 581, 587 (2011).
[180] *Id.* at 588.
[181] Revlon Inc. v. MacAndrews & Forbes Holdings, Inc., 506 A.2d 173 (Del. 1986).
[182] Lyondell Chemical Co. v. Ryan, 970 A.2d 235 (Del. 2009).
[183] *Id.* at 244 (citing Stone v. Ritter, 911 A.2d at 369 (Del. 2006)).
[184] *See* Celotex Corp. v. Catrett, 477 U.S. 317, 325 (1986) ("the burden on the moving party may be discharged by 'showing' . . . an absence of evidence to support the nonmoving party's case").
[185] *In re* Caremark Int'l Inc. Derivative Lit., 698 A.2d 959 (Del. Ch. 1996).
[186] Marchand v. Barnhill, 212 A.3d 805 (Del. 2019).

the fiduciary can oversee company operations, and then that fiduciary must be able to monitor that system.[187] That system must ensure that the company is meeting safety, environmental, and other legal standards that are most critical to its operations and its consumers.[188] The traditional way to fulfill this duty to monitor, as noted in *Marchand* ,[189] is to create a system that identifies significant risks, and to use "third party monitors, auditors, or consultants."[190]

In the Age of Algorithms, the traditional way to monitor would more efficiently and effectively be undertaken by AI tools. This monitoring could range from how often and how quickly spills are cleaned up for safety reasons, to tracking every ounce of hazardous material from delivery to use to disposal, to tracking every financial transaction and flagging those that look redundant or do not have adequate backup. Companies could also more readily track and monitor their vendors and customers to ensure that transactions with them are not illegal or unwise. Moreover, corporate fiduciaries will receive these reports in a far more efficient, comprehensive, and timely manner than traditional third-party humans could provide. Thus, the modern fiduciary should take advantage of the quality of monitoring available via artificial intelligence in order to fulfill the fiduciary's duty to monitor.

Even the sub-duty of disclosure could be better addressed using AI. Corporate fiduciaries must communicate with shareholders in a manner that is "full and fair,"[191] and provide shareholders all material information to explain the fiduciary's actions and judgments.[192] As the court in the case of *In re Citigroup Shareholder Litigation* stated:

> [E]ven in the absence of a request for shareholder action, shareholders are entitled to honest communication from directors, given with complete candor and in good faith. When there is no request for shareholder action, a shareholder plaintiff can demonstrate a breach of fiduciary duty by showing that the directors '*deliberately* [sic] misinform[ed] shareholders about the business of the corporation, either directly or by a public statement.'[193]

[187] *Id.* at 821, 824 (phrasing this concept as a failure to "make a good faith effort to exercise its duty of due care").
[188] *Id.*
[189] *Id.* at 823–24
[190] *Id.*
[191] Domark & Gomez-Rodon, *supra* note 72, at 5.
[192] Lafferty, Schmidt, & Wolfe, *supra* note 79, at 848–49.
[193] In re Citigroup S'holder Litig., 964 A.2d 106, 132 (Del. 2009) (footnotes and citations omitted).

Thus, if a corporate fiduciary's communications are "deceptive or incomplete," then the fiduciary has violated their duty of disclosure.[194] Certainly, in a tense environment where shareholders feel they have been deceived or left in the dark about an important corporate matter, no fiduciary wants to have to worry that their words could be considered by shareholders, or ultimately a fact-finder in court, to be "deceptive or incomplete."

Recently developed AI tools could prevent this situation from occurring, by facilitating interaction between a questioning party and the information provider that is far superior to traditional press releases and FAQ listings on websites. Directors could even provide in their own words the reasons for their decisions without actually having to speak to one or more shareholders, or face a hostile environment while doing so. Take, for example, a museum in Cleveland that created a display celebrating the life of a local civil rights icon to have a "conversation" with the museum visitor. Speeches and recorded conversations of Rev. Otis Moss, Jr. were incorporated into a database that visitors could access by asking questions to an image of Rev. Moss. Using machine-learning, an algorithm would determine the best answer to the question being asked, develop answers to questions that had not been pre-programmed, and display a segment of Rev. Moss's recordings as a direct answer to those questions from the visitor.[195]

Similar algorithmic technology would allow a fiduciary to provide full and accurate information to shareholders. Every question a shareholder might ask could be answered fully and objectively by an AI tool at any time and via a "conversation" that could last as long as the shareholder wanted it to. Fiduciaries could be interviewed prior to the conversation, so the explanation could be in the fiduciaries' own words, and their personal explanations (presumably after careful vetting) could provide the answers to disgruntled shareholders, without a risk that mis-phrased answers could cause problems or that a shareholder could complain the allotted time for answering questions was too short. The AI tool could also track when the question was asked, what was asked, and the specific answer to the question, so there would be no question about when and how an answer was phrased. Corporate fiduciaries would rest assured that not only did shareholders receive complete and accurate disclosures, but there would be an evidentiary trail of exactly what the responses were.

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[194] In re InfoUSA, Inc. S'holders Litig., 953 A.2d 963, 990 (Del. Ch. 2007).

[195] Jeff Piorkowski, *Maltz Museum seeks your help in testing new AI version of Rev. Otiss Moss Jr.: Press Run*, CLEVELAND.COM (Sept 2, 2022 6:39 PM), https://www.cleveland.com/community/2022/09/maltz-museum-seeks-your-help-in-testing-new-ai-version-of-rev-otis-moss-jr-press-run.html [https://perma.cc/7BYP-PSDR].

On the other hand, as AI-based communication tools become readily available to corporate fiduciaries, the failure to use those tools could be considered a breach of fiduciary duty. After all, what would not be an "incomplete" answer today, due to practical and traditional limitations of fiduciary communications, would tomorrow be considered evasive and deceptive in light of these new AI tools. Human fiduciaries could not claim that it was impossible for them to answer virtually endless questions from all shareholders in full detail on a wide range of subjects in the future. With AI tools available to do just that, these human limitations could be considered simply unjustifiable excuses for failing to meet fiduciary standards of communications in the Age of Algorithms.

b. How Deference to and Over-Reliance on AI Can Lead to a Breach of the Duty of Good Faith and Loyalty

i. Breaching the Underlying Concepts of the Duty of Good Faith

Unfortunately, as with the duty of due care, over-reliance and deference by a fiduciary on AI tools could create new exposure to liability. Before considering how "pre-high tech" case law and statutory language could lead to liability for the corporate fiduciary relying on AI, it is worth considering the concept of "good faith" and what it means to "fulfill" that requirement, even if just in common parlance. This raises the question how passive deference to artificial intelligence can in any way equate to actively "fulfilling" a fiduciary duty? In simple English, deference means the fiduciary chose not to take an action themselves,[196] so practically speaking, deference to AI tools is the same as a fiduciary choosing not to fulfill their duty.

More importantly, how could passive deference to AI tools that are never perfect, and can be flawed by errors introduced by designers, the misuse of data or use of bad data, and machine-learning gone wrong, ever be considered acting in good faith? On the contrary, especially given the Black Box nature of algorithmic process, it would seem against public policy to allow fiduciaries to be immunized from liability by deferring to or adopting erroneous AI-based conclusions, especially when the non-transparency of the process will make it difficult for aggrieved parties to prove what caused them harm. Fiduciaries who completely defer to AI tools that cause harm to the corporation or shareholders should not be

[196] *Deference*, DICTIONARY.COM, https://www.dictionary.com/browse/deference [https://perma.cc/2UP5-BWLE].

rewarded with immunity for this deference, but instead should be found to have failed to act in good faith, and thus violated the fiduciary's duty of loyalty.

These practical considerations of what should be considered "good faith" in the Age of Algorithms is buttressed by the jurisprudence that pre-dates AI tools. This jurisprudence ultimately requires that, as with the duty of due care, corporate fiduciaries should not be allowed to defer to artificial intelligence but should be required to retain responsibility for their decision-making on behalf of shareholders and the corporation. Granted, the state of corporate fiduciary jurisprudence should be updated to address these new AI-based risks, as will be delineated in Part VI below, but traditional standards can nonetheless provide a solid basis for these updated legal standards.

First, consider that a basic tenet of the fiduciary duty of loyalty is that corporate fiduciaries breach their duty of good faith when they utterly fail to attempt to fulfill this duty.[197] This, in turn, is premised on the even more basic definition of a fiduciary, meaning a person with expertise or skill who offers that expertise for the benefit of the beneficiary.[198] Just as common parlance would infer, the failure to do anything when the fiduciary defers to artificial intelligence cannot be considered fulfilling this fiduciary duty, because the fiduciary has not taken any action to fulfill their duty. In other words, they have utterly failed to do anything. More fundamentally, the fiduciary has not used the expertise or skill that made them a fiduciary in the first place, which demonstrates why such deference must be considered an utter failure to fulfill the classic definition of a fiduciary.

A fiduciary might argue that they do not utterly fail if the AI tool they defer to is a state-of-the-art "information and reporting system" to monitor for illegal or dangerous activity by the corporation.[199] But, if corporate fiduciaries are to retain any responsibility for their decisions, and thus be required to actively "oversee the company's operations,"[200] they cannot hand off this responsibility to AI tools that cannot be passively relied upon given their imperfections. In short, deferring to artificial intelligence is not "overseeing" anything; rather, deference is handing over responsibility completely. Thus, a fiduciary who simply defers to algorithmic decisions violates this legal tenant.

In fact, the same prerequisites for a fiduciary relying on human-based guidance would result in reliance on artificial intelligence being a breach of loyalty. The fiduciary is expected to communicate with human third-party experts

[197] In re Caremark Int'l Inc. Derivative Litig., 698 A.2d 959, 971 (Del. Ch. 1996); Marchand v. Barnhill, 212 A.3d 805 (Del. 2019).
[198] Domark & Ashley Gomez-Rodon, *supra n*ote 72.
[199] *Id.*
[200] Marchand, 212 A.3d at 820.

to ascertain their competence and independence and understand the bases for their recommendations.[201] Put a different way, a fiduciary should actively interact with those providing counsel and advice if that fiduciary wants to claim they are overseeing the decision-making process. Unfortunately, a fiduciary will, for obvious reasons, never be able to communicate with an algorithm. The fiduciary might communicate with the sales representative promoting the AI tool, or even the designer who made the tool. However, neither of those humans could answer most of the questions a fiduciary should raise about data use and analytical process, because they would not know what databases the AI tool used, or how the algorithm used those databases. Moreover, assuming the algorithm has machine learning capabilities, those humans would have no idea how dissimilar the algorithm process in question was to the one they designed and sold. Thus, the fiduciary could have no way to actively oversee the very algorithm upon which the fiduciary relies. This, in turn, means that the fiduciary would violate their oversight obligations under the duty of loyalty.

Furthermore, courts must hold that passive deference to artificial intelligence is *per se* not "reasonable." Algorithmic tools will not be perfect and may be materially inaccurate due to the inherent limitations on algorithmic accuracy.[202] Those limitations arise from the design process, the datasets provided to the algorithms, and the simple fact that algorithms are going to be materially inaccurate. Add to this the non-transparency of algorithmic processes that make many errors hard or impossible to discover until it is too late.[203] All these factors mean that a corporate fiduciary who simply relies whole-cloth on an AI tool is derelict in their duty, and thus must be adjudged to act "unreasonably" in violation of their fiduciary duty of good faith.

ii. Why Relying on AI is not the Same as Relying on Human Experts When Fulfilling the Duty of Good Faith and Loyalty

The corporate fiduciary might ask why relying on an algorithm is different than relying on experts and knowledgeable company employees when making a decision, as allowed by Delaware Code section141(e)[204] and MBCA section8.31.[205] The fundamental distinction is that a human's decision-making processes can prevent many of the errors that would arise in algorithmic processes. First, unlike algorithms, human thought processes do not need at least two separate layers of expertise: one layer to decide what is important to consider,

[201] Lafferty et al., *supra* note 79, at 842.
[202] Matthew Stewart, *The Limitations of Machine Learning*, TOWARDS DATA SCIENCE (Jul. 29, 2019), [https://perma.cc/23K8-6P8M].
[203] *Id.*
[204] DEL. CODE ANN. tit. 8, § 141(e).
[205] MODEL BUS. CORP. ACT, § 8.31 (1969) (AM. BAR ASS'N, amended 2016).

and another layer to design software to undertake those considerations. This precludes the situations where a well-intentioned software designer has failed to build in all the considerations needed to make proper correlations and predict outcomes, or the correlations anticipated by well-intentioned experts were not adequately designed into an algorithm by the designer. Thus, one significant area that can lead to algorithm failure, the design process, does not exist when human experts are being used.

The second distinction is that most humans will be incentivized to provide advice and counsel to a fiduciary for reasons that will never affect an algorithmic process. Human experts want to avoid the embarrassment of giving bad counsel, they do not want that bad counsel to besmirch their reputation and possibly ruin their consulting business, they do not want to be sued for malpractice, and they do not want to be co-conspirators in criminal, unethical, or immoral behavior. Thus, their decision-making will be the result of multiple and redundant analysis, not to mention critical discussion within their consulting practice, in order to discover internally any errors before those areas are discovered externally. Thus, while humans and algorithms are both fallible, human experts undertake an analytical process that includes finding errors before others do, while in algorithmic processes those errors might simply be chalked up to being part of the expected error rate.

The third important difference between human experts and algorithms is that algorithms cannot be programmed (at least for the foreseeable future) with the subjective nature of analysis that makes human involvement so important in a decision-making process. Artificial intelligence is bad at balancing short-term versus long-term priorities,[206] which is paramount when a corporate fiduciary is considering everything from the use of assets for expansion, to making strategic purchase and sales of subsidiaries and product-lines, to determining a long-term strategic plan for a corporation. Ironically, this failure to balance temporal priorities means the corporate fiduciary using AI tools of the future should not use those tools to actually plan for the future.

Furthermore, humans base their decisions on skills that are absent in algorithmic problem solving. Algorithms are not swayed by concerns for their reputation, or issues of legalities and morality, or basic empathy, because those are human traits which cannot be programmed into algorithms.[207] Thus, algorithms will never be concerned that they might be subject to ridicule, civil liability, or criminal convictions that would otherwise be a strong incentive for a human expert to give carefully considered advice to a corporate fiduciary.

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[206] Martin Petrin, *Corporate Management in the Age of AI,* 2019 COL. BUS. L. REV. 965, 986 (2019).
[207] *Id.* at 987–88.

In fact, algorithms can never be considered to "act badly," because they do not have the ability to decide to be bad. Any bad acts on the part of algorithms must be attributable to a human who designed them to act badly or who provided the algorithms with datasets infected with bias and discrimination, knowing the algorithms would pick up on these correlations and adopt them,[208] or in the case of the corporate fiduciary who deferred to AI tools to make decisions for them. At any rate, unlike a human expert on which a fiduciary relied, the party providing the bad analysis or conclusion will is unlikely to be the same party who ultimately assessed the costs of that wrong-doing.

Finally, evidentiary problems arise when proving causation of algorithmic failures that simply do not exist if a human expert had provided advice to the fiduciary. A human expert can provide evidence to buttress the fiduciary's good faith reliance on that human. Who can the corporate fiduciary accused of bad faith turn to in order to justify the fiduciary's reliance on the algorithm, and to testify that the fiduciary's reliance was indeed in good faith? That algorithm cannot, of course, explain itself in a shareholder meeting or, worse, be a witness in a courtroom. The designers of the algorithms that created the AI tool possibly could explain their design process, but they will not be able to explain, due to the Black Box nature of algorithms, how the algorithms ultimately undertook the analysis. Indeed, the better the algorithm design, the more likely that the algorithm's machine learning transformed itself into a fundamentally different product from when its manufacturer designed or sold it.[209] That would make the testimony of a designer or manufacturer irrelevant to prove, and the designer and manufacturer legally incompetent to testify about the algorithm's analytical process that caused the contested problem. To add to these evidentiary problems, those designers and manufacturers, indeed the corporation itself, might be precluded from explaining the questioned algorithmic process due to non-disclosure agreements that are part of almost every AI tool sale.[210] So, those evidentiary problems would leave the corporate fiduciary unable to defend their decision as being made in good faith, leaving them fully exposed to a breach of fiduciary duty of loyalty.

iii. How Reliance on AI Can Violate the "Sub-Duties" of Monitoring and Disclosure Falling Under the Duty of Loyalty

Take a step further and consider the ramifications of using algorithmic processes to fulfill the sub-duties falling under the duty of loyalty, the sub-duties of monitoring and disclosure. The jurisprudence of fiduciary duties in its present

[208] Balkin, *supra* note 1, at 1223.
[209] Stewart, *supra* note 202.
[210] Cowger, *supra* note 18, at 9.

state will result in liability for the corporate fiduciary who defers to algorithms. First, consider the requirement that a corporate fiduciary adequately monitor the business operations to avoid illegalities and safety issues.[211] If a fiduciary cannot explain how monitoring actually occurred by using an AI tool, because the fiduciary would have no idea how the algorithm was designed to operate, the fiduciary cannot claim that monitoring via the AI tool would be adequate. Even knowledge of the initial design parameters might would not be enough, because the ever-changing nature of machine-learning algorithms, combined with the Black Box non-transparency of those algorithms, would preclude the fiduciary from knowing that on-going monitoring remained adequate. Thus, the fiduciary would not be exercising their monitoring function at all, let alone doing it in a reasonable and diligent manner.[212]

To make matters worse, the fiduciary, who relies on an AI tool to monitor against illegal behavior, could instead find themselves accused of deferring to an algorithm that actually promotes illegal behavior. As previously discussed, algorithms have an unfortunate tendency-as they machine learn-to undertake analytical processes more efficiently, to uncover discriminatory or other statutorily proscribed prior bad acts hidden in corporate data and adopt those efficient, yet illegal processes.[213] Algorithms have recommended decisions that result in a wide range of discriminatory government acts on the basis of race, ethnicity or national origin.[214] Algorithms used for employment screening have resulted in discrimination on the basis of gender[215] and religion.[216] Thus, those algorithms that a fiduciary might be happily relying on to monitor against discrimination could actually be promoting it. The fiduciary who relied on a discriminatory or biased algorithm would readily be described as "disabling themselves from being informed of risks or problems requiring their attention," and thus be considered a violation of the duty of loyalty.[217]

Algorithms also raise special legal issues involving the use of databases that human experts would not. First, the data used by the algorithm, particularly if it is pseudo-public data because the corporation's dataset is too small, could be filled with illegally collected data in violation of contemporary data protection laws. It could also contain information that was protected by confidentiality

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[211] *See,* Section V(A).
[212] Velasco, *supra* note 12, at 72.
[213] *See* Section II(B).
[214] Margaret Hu, *Algorithmic Jim Crow,* 86 FORD. L. REV. 633, 695–96 (2017).
[215] *See* Dastin*, supra* note 38.
[216] Rowaida Abdelaziz, *Samsung Accused of Rejecting Muslim Job Candidate Because He Doesn't Drink,* HUFFINGTON POST (Nov. 19, 2018), https://www.huffingtonpost.com/entry/samsung-complaint-muslim-job-interview_us_5bef3369e4b0b84243e25772 [perma.cc/YC8W-D8PV].
[217] Marchand v. Barnhill, 212 A.3d 805, 821, (Del. 2019) (quoting Stone v. Ritter, 911 A.2d 362, 370 (Del. 2006)).

provisions under law or contained in private agreements.[218] Even data collected by a corporation about its consumers or employees could be subject to numerous state laws that strictly regulate use of that data by AI-based decision-making.[219] It would be an ironic but unquestionable violation of a fiduciary's duty of loyalty, if the algorithm that was supposed to be monitoring against illegal activity was an illegal activity because of its use of data.

Second, those databases could contain competitors' pricing, sales, and market territory information that would be considered an antitrust violation if humans shared that information and used it to make business decisions.[220] Keep in mind that many AI tool marketers offer their own databases to overcome deficiencies in a single customer's database.[221] Unless those databases were scrubbed completely of any data that would be considered an antitrust violation if shared between competitors, the corporate fiduciary might once again discover themselves relying on an algorithm that caused legal violations rather than monitoring against those violations.[222]

The next sub-duty that could be breached by relying on AI tools is the duty to shareholders to provide information contained in, and allow access to, corporate records.[223] Since this duty is relatively easy, if tedious, to fulfill in the normal course of business, one may underestimate the exposure this duty could create in the Age of Algorithms. The shareholders' right to access corporate records is long-standing,[224] and has been adopted by every state's corporate

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[218] Pasquale, *supra,* note 37, at 43.
[219] *See* Shannon Yavorsky, *New U.S. State Privacy Laws Zero in on Artificial Intelligence*, ORRICK INSIGHTS (Aug. 11, 2022), https://www.orrick.com/en/Insights/2022/08/New-State-Privacy-Laws-Zero-in-on-AI [perma.cc/3GSE-N7FZ].
[220] *Artificial Intelligence and Antitrust: When do Algorithms Violate Competition Laws?*, QUINN EMANUEL, https://www.quinnemanuel.com/media/vdwbb1ag/client-alert-artificial-intelligence-and-antitrust-when-do-algorithms-violate-competition-laws.pdf [perma.cc/YL3R-V7E9].
[221] Armour & Eidenmüller, *supra* note 31, at 97–98.
[222] There is also a broader antitrust concern involving those platforms which collect data that mostly likely will be relied upon by algorithms in the future, such as Amazon, Meta (Facebook), or Alphabet (Google). They could themselves be accused of antitrust violations because of the market power and economic influence they possess as Big Data companies. Like Big Oil in the early part of the 20th Century, Big Data could find itself being disassembled and prohibited from using its databases because of these antitrust issues. That, in turn, could mean any corporate fiduciary relying on an AI tool that incorporates Big Data's databases could find those databases blocked from use, or the basis for an antitrust violation against the fiduciary's corporation, neither of which would bode well for the fiduciary relying on those algorithms to fulfill their duty of monitoring, and thus duty of loyalty. *See Cowger*, *supra* note 18, at 163–64; Hamdani et al., *supra* note 120, at 235–36.
[223] DEL. CODE ANN. tit. 8 § 220(b).
[224] Robin Hui Huang & Randall S. Thomas, *The Law and Practice of Shareholder Inspection Rights: A Comparative Analysis of China and the U.S.,* 53 VANDERBILT J. TRANSNATIONAL L. 907, 909 (2020).

laws.[225] These records include "all documents … of proceedings of directors."[226] However, requests can go well beyond traditional requests for board minutes and the like, and can include any record that might be evidence of "a possible breach of fiduciary duty by the board or management."[227] Record requests can now include electronic records, if paper records will not provide the same information as those electronic records.[228]

However, a myriad of problems might make such a disclosure impossible and thus result in a finding that the fiduciary breached their duty of loyalty. First, many terms and conditions of purchase for AI tools contain non-disclosure provisions.[229] A corporation may face the dilemma of either violating disclosure statutes or violating a sales term not to make the very disclosures required by the statute.

The more fundamental problem is that a fiduciary is likely foreclosed from providing any record of how the algorithmic process worked. The Black Box deficiencies of algorithm-based decisions will mean that there will be no records, electronic or otherwise, to determine if the shareholder's claim of a breach of fiduciary duty is cognizable. Corporations that have been unable to provide records to defend against allegations of wrong-doing have faced court-imposed adverse inferences that the wrong-doing occurred.[230] If an adverse inference was made against the fiduciary, this would shift the burden to the fiduciary to prove that relying on the AI tool was not a breach of a fiduciary duty. That fiduciary would be as equally precluded from providing information about the algorithmic underpinnings of the fiduciary's decision. The result would be a finding that the fiduciary violated the duty of loyalty, and thus would not be afforded statutory immunities to liability. In other words, the long-standing records disclosure statutes could be a reinvigorated tool on which to base claims against fiduciaries in this new Age of Algorithms.

iv. Deferring to Algorithms Is an Improper Delegation of Authority by the Corporate Fiduciary

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[225] *Id. See also, e.g.,* 8 DEL. CODE ANN. tit. 8 § 220.
[226] Del. Code Ann. Tit. 8 § 220.
[227] Michael B. Micheletti & Jenness E. Parker, *This Ain't Your Grandparents' Books and Records Demand*, SKADDEN ARPS (October 7, 2021), https://www.skadden.com/insights/publications/2021/10/the-informed-board/this-isnt-your-grandparents-books-and-records#:~:text=Section%20220%20of%20the%20Delaware,by%20the%20board%20or%20management [perma.cc/8HBN-7ZDG].
[228] *Id.*
[229] *See* Cowger, *supra* note 18, at 9.
[230] *See, e.g.,* Fed. R. Civ. P. 37(e); Shira A. Scheindlin & Natalie M. Orr, *The Adverse Inference Instruction After Revised Rule 37(e): An Evidence-Based Proposal,* 83 FORD. L. REV. 1299 (2014).

Going beyond these duties of monitoring and disclosing, the corporate fiduciary relying on an AI tool to make corporate decisions will run afoul of statutes and the common law that strictly limit the ability of the fiduciary to delegate their fiduciary responsibilities. Traditionally, corporate directors were not permitted to delegate any of their responsibilities and authorities, but over time, courts, then legislatures, permitted some regulated delegation by directors.[231] Today's corporate directors often delegate their decision-making to the extent permit by statutes,[232] or by the organizational documents of the business entity[233] and are in fact expected to do so.[234] However, as a preliminary matter, none of the statutes permitting delegation state that this delegation can go to a non-human algorithm.[235] Thus, fiduciaries who delegate their decision-making to an AI tool will violate the plain language of the statutes that allow delegation.

Since, as will be detailed below, AI tools may soon be available to replace humans in part or completely in corporate management roles, let us assume that this human-delegation requirement is eventually rescinded. After all, similar statutes requiring a human presence to bestow a right, such as laws granting copyrights and patents, have been rescinded in non-U.S. jurisdictions on the grounds that the archaic requirement ignored the important role of algorithms in modern commerce and society, and acted as an unnecessary deterrent to exploiting the potential benefits of algorithms.[236] Assuming fiduciaries are not prohibited from delegating their responsibilities to non-humans, legal limitations will still exist that makes passive deference by a fiduciary akin to illegal delegation of authority.

The first restriction can be found in the very statutes that allow such delegation. For example, section 141(e) states:

> A member of the board of directors, or a member of any committee designated by the board of directors, shall, in the performance of such member's duties, be fully protected in relying in good faith upon the records of the corporation and upon such information, opinions, reports or statements presented to the corporation by any of the corporation's officers or employees, or committees of the board of directors, or by any other person as to matters the member

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[231] Charles E. M. Kolb, *The Delegation of Authority to Committees of the Board of Directors: Directors' Liabilities,* 9 BALT. L. REV. 189, 192–93 (1980).
[232] DEL. CODE ANN. tit. 8 §141(c). *See also In re* Disney, 906 A.2d 27, 54 (Del. 2006).
[233] *E.g.*, 8 DEL. CODE ANN. §141(a). *See also* Zapata Corp. v. Maldonado*,* 430 A.2d 779, 788–89 (Del. 1981). *See also* Obeid v. Hogan*,* C.A. No. 11900-VCL (Del. Ch. Jun. 10, 2016).
[234] Velasco, *supra* note 12, at 74–75.
[235] *Id.*
[236] *See* Cowger, *supra* note 18, at 174, 177.

> reasonably believes are within such other person's professional or expert competence and who has been selected with reasonable care by or on behalf of the corporation.[237]

Thus, for delegation to the algorithm to be permissible under this provision, the director relying on others must do so "in good faith," must have a "reasonable" belief that the decisions and actions of those others is within their "professional or expert competence," and that those others were selected "with reasonable care."

Once again, the fiduciary who relies on an algorithm is foreclosed by the Black Box nature of the algorithm, as well as by the ever-changing machine-learning nature of algorithms, from verifying that the algorithm acted "professionally" or "competently." That algorithm could just as well, due to bad data or programming, develop improper or illegal means to draw correlations and render decisions, which would not be considered professional or competent. Moreover, given the algorithm will have an unavoidable error rate, it is conceivable that the maximum price the corporation can afford for that algorithm, as well as the maximum hardware available to run that algorithm, would not be sufficient to find that algorithm was "selected with reasonable care." Then, since the algorithm would be constantly changing via machine learning,[238] the fiduciary could not reasonably state that the algorithm making the fiduciary decision would be similar to the algorithm that was purchased, meaning that the fiduciary could not say with any confidence that they "selected" the algorithm being relied upon. In fact, for reasons previously delineated, a fiduciary is inevitably foreclosed from asserting, let alone proving, that they acted in "good faith" in passively deferring to any algorithmic decision. Thus, virtually every statutory criterion for delegating fiduciary decisions to algorithms could not be met.

Going beyond the statutory language, court opinions considering the delegation of authority would likewise result in other courts holding that a human corporate fiduciary cannot simply defer to artificial intelligence when acting as a fiduciary. As stated in *Grimes v. Donald*:

> Directors may not delegate duties which lie "at the heart of the management of the corporation." *Chapin v. Benwood,* Del.Ch., 402 A.2d 1205, 1210 (1979), *aff'd sub nom. Harrison v. Chapin,* Del.Supr., 415 A.2d 1068 (1980). A court "cannot give legal sanction to agreements which have the effect of removing from directors in a very substantial way their duty to use their own best judgment on management matters." *Abercrombie v.*

[237] 8 DEL CODE ANN. § 141(c).
[238] *See* Hamdani, *supra* note 120, at 229.

> *Davies*, Del.Ch., 123 A.2d 893, 899 (1956), *rev'd on other grounds*, Del.Supr., 130 A.2d 338 (1957).[239]

Applying these proscriptions to the delegation of authority to an algorithm, a corporate fiduciary cannot passively defer to an algorithm any decision that goes to the "heart of the management of the corporation." Moreover, the actions of a corporate fiduciary deferring to AI tools will inarguably have the "effect of removing themselves" from using "their own" judgment in reliance on AI. Just as is the case with the duty to monitor, the corporate fiduciary who defers to AI tools must be deemed to have violated the limitations placed on their right to delegate to those AI tools.

Even if somehow the fiduciary's initial purchase of and reliance on an AI tool did not violate these standards of delegation, very soon the fiduciary would face liability due to the machine learning self-alterations by that AI tool. The fiduciary must always retain the duty of oversight over the delegated responsibility.[240] That means the fiduciary is responsible to instruct, supervise, and ultimately control the party to whom the power was delegated, or the fiduciary will be deemed to have violated their fiduciary obligations arising from that delegation.[241] Though the AI tool may not be a human party, the fiduciary using AI should still be required to continually oversee the instruction, supervision, and control of the AI tool.[242] However, an AI tool's machine learning capabilities will mean that the fiduciary will quickly lose track of how the algorithm is operating, which will preclude fulfilling that continual oversight obligation. Certainly, the fiduciary will be playing no role in how the algorithm is instructing, supervising, and controlling itself via machine learning. Thus, the fiduciary will inevitably and eventually violate their oversight obligations for delegating their fiduciary obligations to that AI tool and will be considered illegally abdicating their fiduciary duty.

To make matters worse for the delegating fiduciary, if the unsupervised machine-learning algorithm teaches itself inappropriate analytical processes, the fiduciary will be liable for claims resulting from the algorithm's newly learned behavior. Traditional fiduciary jurisprudence holds that, when a fiduciary has bestowed power on a third party to assist in fulfilling the fiduciary's duties, the fiduciary will be liable even if that third party misused that bestowed power contrary to the expectations of the fiduciary.[243] Given the tendency of algorithms

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[239] Grimes v. Donald, 673 A.2d 1207, 1214 (Del. 1996).
[240] Ellis Carter, *The Pitfalls of Delegation (and how to avoid them),* CHARITYLAWYER (April 6, 2020), https://charitylawyerblog.com/2020/04/06/the-pitfalls-of-delegation-and-how-to-avoid-them/ [https://perma.cc/SAP6-U6BL].
[241] MÖSLEIN, *supra* note 118, at 10.
[242] *Id.* at 11.
[243] Bayne, *supra* note 72, at 104–05.

to adopt the biases and otherwise illegal "shortcuts" into their processes as part of their machine learning,[244] the risk is high to the delegating fiduciary that the algorithm will act wrongfully. The fiduciary will be liable for the harms from that wrongful AI behavior, and the fiduciary will have no defense that they could not foresee or themselves know of the wrongful AI processes.

The ramifications to a fiduciary found to have unlawfully delegated their decision-making to AI tools are substantial. Delegating decision-making is a proactive decision, and thus must be considered intentional. Furthermore, "intentional dereliction of duty" and a "conscious disregard for one's responsibilities" are considered bad faith behavior.[245] Moreover, an intentionally bad faith act by a fiduciary nullifies the application of the Business Judgment Rule to that decision.[246] Thus, the Business Judgment Rule would not apply to claims involving the improper delegation of authority by a corporate fiduciary to an algorithm. Likewise, since intentional bad behavior also nullifies the statutory immunities that may be granted that fiduciary under immunity statutes like DGCL section102(b)(7), those exculpatory statutes will not protect the fiduciary who has delegated their authority to algorithms.[247] Thus, the fiduciary who chooses to passively defer to artificial intelligence will not only be liable for breaching their fiduciary duty via this improper delegation of responsibility, but the fiduciary will have none of the protections or immunities otherwise afforded them under either the Business Judgment Rule or statutory immunities.

v. As Artificial Intelligence Becomes More Sophisticated, The Liability of Corporate Fiduciaries Will Become Greater

Up until now, this discussion has been about the theoretical implications of delegating fiduciary duties to artificial intelligence. Now, considering the AI tools that currently exist and will be developed soon, these theoretical implications can be applied to the actual types of AI tools that corporate fiduciaries can expect to be marketed to them in the near future. Not only do AI tools exist that could make decisions on a case-by-case basis on behalf of a human fiduciary,[248] but many commentators believe that artificial intelligence could soon take over all or part of human fiduciary functions in corporations.[249] However, the human fiduciary who delegates their responsibilities to such sophisticated AI tools could discover that, as fascinating and attractive the idea

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[244] *See generally* Hamdani, *supra* note 120, at 219.
[245] *In re* Disney, 906 A.2d 27, 54 (Del. 2006). *See also* Bishop, *supra* note 99, at 494.
[246] Bishop, *supra* note 99, at 494.
[247] *See also* Kolb, *supra* note 231, at 201.
[248] Petrin, *supra n*ote 206, at 980.
[249] *Id.*

might be to substitute humans with sophisticated AI tools, the ultimate breach of fiduciary duty will be to substitute human fiduciaries with AI tools.

The degree to which fiduciaries incorporate artificial intelligence into their fiduciary functions will determine when permissible delegation of authority to artificial intelligence becomes an abdication of fiduciary responsibility. The least offensive use of AI would be purely in an administrative capacity. AI administrative tools, which already are being marketed to corporations, can collect and collate data for operational reports like company sales trends and marketing analysis, government filings such as tax returns, and safety and health compliance, or administer vendor or sales contracts.[250] AI administrative tools would fulfill these functions more efficiently, more quickly, and more cheaply than a human staff.[251] Assuming checks and balances exist internally to prevent these tools from violating laws and corporate policies in the course of their administrative activities,[252] the fiduciary who takes advantage of the increased efficiencies and lower costs from using AI administrative tools would in no way be breaching their fiduciary duty. Administrative AI would play no role in providing advice on fiduciary matters, let alone assuming any of the fiduciary responsibilities of the fiduciary. Thus, this latest trend in corporate use of artificial intelligence bears little risk of violating corporate fiduciary law.

Moving up one level of sophistication would be the use by fiduciaries of AI tools in an advisory capacity. This is the level of AI use that begins to trigger potential breaches of fiduciary duties. Unlike administrative AI tools, advisory AI tools will, by design, actually advise the fiduciary on fulfilling the fiduciary's responsibilities.[253] If these tools are used purely in an advisory capacity, either because they are not designed or promoted to be a final decision-maker or because the fiduciary is careful not to simply defer to the decisions of the AI tool, these tools would be a valuable asset in carrying out corporate fiduciary duties without giving rise to breaches of fiduciary duties. In fact, the capacity of these tools to collect and analyze data, and draw conclusions from this data, would make them a valuable complement to a human fiduciary's decision-making process.[254] Thus, as previously asserted, these tools might become a necessary part of a fiduciary's oversight obligations.

The legal problems arising from using these advisory AI algorithms will occur when a fiduciary accedes to AI tools that are designed to make autonomous

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[250] *Id.*
[251] Petrin, *supra* note 206, at 980, 985; Hamdani, *supra* note 120, at 219–20.
[252] *See generally* Petrin, *supra* note 206 (explaining that the corporate fiduciary would have to be mindful of their duty to have in place monitoring policies and procedures to prevent internal illicit behavior, just as if the tasks were being performed by humans).
[253] *See* Petrin, *supra* note 206, at 981–82.
[254] *See id*. at 987–88.

decisions. It will soon be feasible for AI tools to participate in fiduciary functions, such as sitting on Boards with human directors or even replacing some or all humans on a Board or in C-level positions. In fact, some businesses have already tried to claim that they appointed machine-learning algorithms to their boards and/or management teams.[255] In 2014, a Hong Kong-based venture capital group, Deep Knowledge Ventures, announced that it had appointed VITAL, a machine-learning algorithm, to make decisions regarding life sciences investments.[256] In 2016, a Finnish company made a similar announcement that it had "appointed Artificial Intelligence as a member of the leadership team."[257] Even corporate management may become expendable—for example in 2018, a California software provider, SalesForce, stated that it had started bringing an AI program called "Einstein" to weekly staff meetings.[258]

However, the replacement of a multitude of human managers by a limited number of AI tools could bring serious liability issues into corporate operations. First, these AI tools would replace those management consultants and in-house professional staff to whom corporate fiduciaries have turned for legal, regulatory, and financial compliance.[259] Following in the departing footsteps of these professionals would be senior management who traditionally fulfilled the most impactful positions in the company,[260] but whose jobs could allegedly be done just as effectively but more cheaply by algorithms. Since these senior manager roles were the result of consolidation of middle manager roles from the 70's to the 90's, concentrating these already consolidated functions under AI tools would mean that their impact on corporate operations could be substantial if those tools were to take a wrong turn because of their machine learning.[261] Furthermore, corporate fiduciaries would lose the level and variety of human resources that

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[255] *See id*. at 966–67.
[256] Charles Groome, *Deep Knowledge Venture's Appoints Intelligent Investment Analysis Software VITAL as Board Member,* CISION PRWEB (May 13, 2014) , https://www.prweb.com/releases/2014/05/prweb11847458.htm [https://perma.cc/98HE-RZSD].
[257] Jessica Diktonius, *Tieto the First Nordic Company to Appoint Artificial Intelligence to the Leadership Team of the New Data-Driven Businesses Unit*, BUSINESS WIRE (Oct. 17, 2016, 2:48 AM), https://www.bloomberg.com/press-releases/2016-10-17/tieto-the-first-nordic-company-to-appoint-artificial-intelligence-to-the-leadership-team-of-the-new-data-driven-businesses-unit [https://perma.cc/YM5A-N25N].
[258] David Reid, *Marc Benioff brings an A.I. machine called Einstein to his weekly staff meeting*, CNBC (Jan. 25, 2018, 4:49 AM), https://www.cnbc.com/2018/01/25/davos-2018-ai-machine-called-einstein-attends-salesforce-meetings.html [https://perma.cc/5SDC-2YFQ]. *See also* Armour & Eidenmüller, *supra* note 31, at 88, 98.
[259] *See* Petrin, *supra* note 206, at 992 (citing RICHARD SUSSKIND & DANIEL SUSSKIND, THE FUTURE OF THE PROFESSIONS: HOW TECHNOLOGY WILL TRANSFORM THE WORK OF HUMAN EXPERTS 18, 78–84 (1st ed. 2015)).
[260] *See id*.
[261] *See id*. at 1027–28; Daniel Markovits, *How McKinsey Destroyed the Middle Class*, THE ATLANTIC, https://www.theatlantic.com/ideas/archive/2020/02/how-mckinsey-destroyed-middle-class/605878/ (Feb. 6, 2020, 9:54 AM) [https://perma.cc/L8YG-97FA].

traditionally have served as checks and balances against the promotion of bad decisions by a few bad actors. The combination of an increased risk from AI tools and the loss of human resources for fiduciaries to monitor and adjudge these AI tools, would mean the fiduciary who defers to these tools would have greater exposure to fiduciary breach claims.

The final step in the assumption of corporate duties by artificial intelligence is when the ramifications to businesses and society become too dangerous, and thus corporate fiduciaries should be prohibited from authorizing the replacement of humans by AI tools in order to fulfill corporate duties, regardless of the benefits to profit margins and efficiency. Research suggests that corporations could ultimately become non-human operations run exclusively by artificial intelligence.[262] Lynn Lopucki has described a number of intercompany frameworks whereby "Algorithmic Entities" (AE) would autonomously run businesses, such as parent companies that operate via AE subsidiaries, AE-based partnerships, foreign AE entities that run domestic AEs, and even limited liability companies organized under existing laws.[263] She has also described how AEs could hire humans when necessary to act as "nominee" or "constituency" directors, just as hedge funds currently appoint human directors to represent those funds on boards.[264] Furthermore, she describes how AEs would have the legal capacity to enter into contracts with vendors, and could even make payments via bitcoin.[265] Where human administration is needed, the AE could hire or enter into independent contracts with advisors, lawyers, accountants, and other human professionals. Assuming the AE runs a successful business, the AE's operations would generate money via profit-making endeavors that would pay for operating costs and contracts, and so it would become completely self-sufficient.[266]

For now, practical limitations exist that will minimize the likelihood of such a wholesale substitution of humans for algorithms in the immediate future. First, artificial intelligence has simply not yet advanced to the technological level necessary for AEs, or even algorithm-based managers or directors.[267] One need only look at recent news stories reporting on accidents involving autonomous vehicles to know that truly reliable autonomous products using machine-learning artificial intelligence will not exist for years.[268] In the case of artificial intelligence

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[262] *See* Petrin, *supra* note 206, at 979–996.
[263] *See* Lynn M. Lopucki, *Algorithmic Entities*, 95 WASH. U. L. REV. 887, 907–12 (2018).
[264] *See id*. at 913–15.
[265] *See id*. at 899 (quoting Shawn Bayern, *Of Bitcoins, Independently Wealthy Software, and the Zero-Member LLC*, 108 NW. U. L. REV. 1485, 1494 (2014)).
[266] *See id*.
[267] *See* Armour & Eidenmüller, *supra* note 31, at 107.
[268] *See, e.g.*, Morgan Simon, *At Tesla and Other Big Tech Firms, It's Not the Machines But the Assumptions Behind Them Causing Problems*, FORBES (Feb. 13, 2023, 2:08 PM), https://www.forbes.com/sites/morgansimon/2023/02/13/at-tesla-and-other-big-tech-firms-its-not-

in the corporate setting, experts in one study estimate that this occurrence is at least one to two decades away.[269] Still, that is a very short time frame, considering the time it may take for courts and legislatures to sufficiently understand artificial intelligence such that they can adequately address the ramifications of replacing human corporate fiduciaries with AI tools and robots.

Second, at least for now, statutes dictating the formation of corporations and other business entities seem to be a bar to non-human fiduciaries. For example, the machine-learning algorithm VITAL was not actually given a board seat because under Hong Kong law only natural persons and corporate bodies may be directors.[270] The laws of some U.S. states as well as the MBCA also seem to permit only humans to be directors.[271] However, other jurisdictions do not specifically require that directors or officers be human; in fact, a few jurisdictions allow non-human algorithms to be in a director capacity so long as a human is designated as that non-human's representative in board functions.[272] In fact, some U.S. scholars argue that because statutes allow corporations to do away with directors completely there should be no bar to removing human directors and replacing them with AI-based directors.[273] Some scholars have even posited how AE corporate structures can be created using only AI—notwithstanding the supposed prohibitions against non-human fiduciaries.[274] Thus, AEs may be closer than current jurisprudence on corporate fiduciaries is prepared to address.

The potential harm these AEs could create have caused experts in the AI field to sound an alarm against permitting AEs to ever exist.[275] Leading futurists from Bill Gates to Stephen Hawking have warned against allowing artificial

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the-machines-but-the-assumptions-behind-them-causing-problems/?sh=59e82b763b56 [https://perma.cc/84J4-MN4B]; Jack Ewing & Cade Metz, *Tesla's Self-Driving Technology Come Under Justice Dept. Scrutiny*, N.Y. TIMES (Jan. 31, 2023), https://www.nytimes.com/2023/01/31/technology/tesla-autopilot-investigation.html [https://perma.cc/T74S-37DD]; George Maliha & Ravi B. Parikh, *Who Is Liable When AI Kills?*, SCI. AM. (Feb. 14, 2023), https://www.scientificamerican.com/article/who-is-liable-when-ai-kills1/ [https://perma.cc/UC9H-TJWF].

[269] Carl Benedikt Freya & Michael A. Osborne, *The future of employment: How susceptible are jobs to computerisation?*, 114 TECH. FORECASTING & SOC. CHANGE 254, 262 (2017).

[270] Nicky Burridge, *Artificial intelligence gets a seat in the boardroom*, NIKKEI ASIA (May 10, 2017, 10:52 PM), https://asia.nikkei.com/Business/Companies/Artificial-intelligence-gets-a-seat-in-the-boardroom [https://perma.cc/FY6U-XBE6]; Companies Ordinance, (2022), Cap. 622, § 643 (H.K.).

[271] *See* Petrin, *supra* note 206, at 997.

[272] *See* MÖSLEIN, *supra* note 118, at 15. Pity the human who is given this designation—they have none of the prestige or power of being a board member, but probably bear at least some liability should that algorithm violate a fiduciary duty.

[273] Lopucki, *supra* note 263, at 907.

[274] Lopucki, *supra* note 263, at 898–99; Petrin, *supra* note 206, at 1024–25; Shawn Bayern, *The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems*, 19 STAN. TECH. L. REV. 93, 101–02 (2015).

[275] Lopucki, *supra* note 263, at 891–92, 894.

intelligence to reach the board of director's level.[276] The first concern is that the anonymity of AEs would exacerbate existing problems caused by business formation statutes that do not require the disclosure of who the real beneficial parties of these businesses are, and thus who the wrong-doers are when businesses commit crimes.[277] In fact, smart designers could create layers of parent and subsidiary AEs using a dazzling multitude of algorithms to run business organizations. The result would be that parent AEs and their anonymous shareholders are shielded from liability should any machine-learning algorithm misbehave.[278]

Such misbehavior is more likely to happen because algorithms have no reason, or more correctly, skills of reasoning, to avoid misbehavior. On the contrary, the benefits of ignoring laws, ethics, and morality in order to increase profits and/or reduce costs could readily be learned by well-designed algorithms,[279] creating "a huge legal, moral and political hazard."[280] An algorithm would not be deterred like a human might by the risk of remorse, criminal punishment, or even pain or death.[281] As a result, AEs could become worldwide criminal syndicates, creating safety and environmental crises wherever they operated. The algorithms could go so far as to shift the literal and figurative fallout from these crises to jurisdictions that the algorithms determine are not able or willing to enforce statutes prohibiting these behaviors. AEs would continually figure out how to skirt regulatory, safety, and environmental responsibilities, making it difficult for legitimate human-run businesses that shoulder these compliance costs of complying to compete with these AI outlaws. The resulting harm to the economy, the environment, and to society worldwide dictates that human corporate fiduciaries should not be allowed to use their oversight powers to create and then defer to or be replaced by AE business organizations.

If these seemingly apocalyptic concerns seem too far-fetched, the threat of AEs to shareholder interests is more discernable. The primary function of corporate fiduciary duty is the protection of its shareholders.[282] However, artificial intelligence is currently bad at making value judgments about competing interests, developing multiple layers of shared strategic plans, and working toward consensual goals.[283] This, in turn, means that AI tools running AEs probably

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[276] *Id.* at 892–93.
[277] *Id.* at 894.
[278] *Id.* at 891, 894; Pasquale, *supra* note 37, at 1918.
[279] Petrin, *supra* note 206, at 1025.
[280] Fraser Myers, *AI: Inhuman after all?, S*PIKED (June 14, 2019), https://www.spiked-online.com/2019/06/14/ai-inhuman-after-all/.
[281] Lopucki, *supra* note 263, at 892.
[282] *Id.* at 890–91.
[283] Petrin, *supra* note 206, at 1028.

would not adequately address the often-competing interests of small versus large shareholders, common shareholders versus other investors such as bond holders or preferred shareholders, or even corporate short-term profit goals versus shareholder long-term interests. The AI-based management tools' inability to juggle these competing interests could easily lead to conflicts of interest claims, amounting to a breach of loyalty claim against the human fiduciaries who have delegated decision-making to these tools. Going one step further, any large shareholder favored by AI tools over smaller shareholders might find themselves being accused of having violated a fiduciary duty to the smaller shareholders. Thus, the deficiencies inherent in AI processes could not only increase the number of fiduciary claims arising in a corporate structure, but could increase the number of defendants of those claims.

In addition, given these serious risks of harm to the economy and society from AEs, legislatures might find it expedient to expand corporate fiduciary obligations from shareholders to "stakeholders", thereby increasing the liability risks of fiduciaries who delegate their duties to artificial intelligence. "Stakeholderism" is a relatively modern fiduciary concept whereby corporate fiduciaries should consider the impact of corporate decisions on not just shareholders, but bondholders, employees, creditors, suppliers, and even the community where the corporation is operating.[284] This concept arose during the corporate takeover mania of the 1980s and 1990s, and was intended to address the threats to stakeholders' well-being from these takeovers.[285] State legislators passed laws State defining who can be considered stakeholders, and thus whose interests should be considered when making major corporate decisions.[286]

It would be easy to see how legislatures in the Age of Algorithms, in response to the above-described new level of threats from AEs to stakeholders, would want to reinvigorate this concept for the benefit of stakeholders just as legislatures did in the 1980's.[287] As a result, human fiduciaries can expect not only greater fiduciary duties and obligations to a wider circle of beneficiaries, but also that they will not be permitted to delegate these new duties to the very artificial intelligence that created the new threats to the economy and society at large. Thus, any trend of fiduciaries delegating their authority to otherwise attractive AI tools, or removing humans from the process via the creation of AEs, is simply going to be met with an increased exposure to fiduciary duty claims due to that delegation of authority.

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[284] Lucian A. Bebchuk et al., *For Whom Corporate Leaders Bargain,* 94 S. CAL. L. REV. 1467, 1470 (2021); Thomas J. Bamonte, *The Meaning of "Corporate Constituency" Provision of the Illinois Business Corporation Act,* 27 LOYOLA U. CHIC. L.J. 1, 5 (1995).
[285] *Id.*
[286] *Id.* at 1485–86.
[287] Zurich Ins. Group & Microsoft, *supra* note 36, at 20.

VI. New Legal Standards and Practices to Meet Corporate Fiduciary Duties in the Age of Algorithms

The issues previously mentioned persist: how can a corporate fiduciary fulfill their fiduciary obligations using artificial intelligence in the Age of Algorithms without relying on AI tools to a degree that violates longstanding principles of corporate fiduciary duty? This requires a multi-faceted approach. The European Commission's High-Level Expert Group on Al suggests that trustworthy Al is the result of three goals: "lawful (complying with all applicable laws and regulations)," "ethical (ensuring adherence to ethical principles and values)," and "robust (both from a technical and social perspective, since, even with good intentions, Al systems can cause unintentional harm)."[288] In the case of corporate fiduciaries and artificial intelligence, the "lawful" component can be subdivided into laws passed by legislative bodies and new or modernized legal principles of corporate fiduciary law arising from court rulings. The "ethical" and "robust" goals are best met by parallel efforts aimed at identifying the technical standards for use of AI tools that both fiduciaries and their corporations need to meet to be considered acting ethically—and, ultimately, meeting the fiduciary duties of the corporate fiduciary.

a. New Legislation for New AI Tools

Although self-governance by fiduciaries and their companies when selecting and using AI tools is, as detailed below, the best strategy for avoiding fiduciary breaches when using those tools, statutes and updated common law standards complement that self-governance. New applications of traditional laws aimed at defective products, as well as new concepts of and grounds for liability, in Age of Algorithms are needed to address the new and unique substantial impacts, both good and bad, of artificial intelligence corporate fiduciaries, their business organizations, the economy, and society in general. Thus, new laws, legal principles, and a generation of corporate fiduciary jurisprudence, are required to address these impacts.

The first element in this new jurisprudence are statutes drafted specifically to address the development, marketing, and use of artificial intelligence in the business world. The EU is, far ahead of the United States in considering new AI legislation and is currently drafting and discussing a proposed Artificial Intelligence Act.[289] Under this proposed legislation, a regulatory body would rank AI tools and products by the risk of harm's seriousness in the event of a

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[288] EUROPEAN COMMISSION, PROPOSAL FOR A REGULATION LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (April 21, 2021), Document No. 2021/0106 (COD) https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0206&from=EN [https://perma.cc/Z39E-UN96].

[289] *Id.* at § 5.2.2.

failure. Then, set a licensing scheme to regulate the sale of those tools and products, or an outright prohibition on AI with the highest risk.[290] This proposal is admirable in that for high-risk products, it mandates better standards for preventing errors during the design process,[291] sets requirements to ensure fewer errors and misuse of data,[292] and considers the issues arising from accuracy of AI products.[293] Furthermore, the Proposal recognizes the need to minimize the problems arising from Black Box processes by mandating "transparency"[294] and requiring audit trails.[295] Most importantly, the Proposal recognizes the need for human oversight in the use of algorithms and analyzing the outcomes of algorithms.[296] Thus, many of the problems and deficiencies of AI tools that can lead to a breach of a corporate fiduciary duty are addressed in the EU proposal.

The problem now, however, is that these mandates cover only "high-risk" AI tools, and corporate management tools do not fall under that designation. In fact, except for a mention of tools used for employment practices, including corporate hiring,[297] there is no mention of corporate management or operations, let alone decisions expected of corporate fiduciaries. Thus, as comprehensive as this Proposal is, it is virtually inapplicable to the issues raised here about AI and corporate fiduciaries.

Furthermore, the United States is far behind the EU in developing legislation specifically applicable to AI products. The White House has issued a number of White Papers addressing AI concerns in the Age of Algorithms, including most recently a "*Blueprint for an AI Bill of Rights: Making Automated Systems Work for the American People*".[298] Unlike the EU Proposal, this Bill of Rights does not address artificial intelligence as a component in products, and thus does not propose laws or regulatory regimes aimed at AI as a commercial product. Rather, the *Blueprint* addresses AI as a general risk to the public due to unsafe AI products, discrimination as a result of AI products, and misuse of personal data.[299] Like the EU proposal, it does mention the need for legislation to prevent design flaws, to overcome transparency problems by requiring better audit and monitoring, and to regulate the selection and use of data.[300] It also

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[290] *Id.* at Title III, Art. 9 ¶ 7.
[291] *Id.* at Title III, Art. 9 ¶ 7.
[292] *Id.* at Title III, Art. 10.
[293] *Id.* at Title III, Art.15.
[294] *Id.* at Title IV, Art. 52.
[295] *Id*. at Title III, Art. 12.
[296] *Id*. at Title III, Art. 14.
[297] *Id.* at Annex III, ¶4.
[298] WHITE HOUSE OFFICE OF SCI. AND TECH. POLICY, BLUEPRINT FOR AN AI BILL OF RIGHTS (October 2022), https://www.whitehouse.gov/wp-content/uploads/2022/10/Blueprint-for-an-AI-Bill-of-Rights.pdf.
[299] *Id.* at 5–6.
[300] *Id.* at 16–19.

mentions the need for human involvement in oversight and decision-making.[301] However, it does not, nor was the *Blueprint* intended to, address the specific issue of corporate fiduciary duty when using AI tools.

This means that the current state of legislation proposals is inadequate to address corporate fiduciary issues. Granted, the EU and US proposals both identify the threats raised herein from bad AI development, data selection and use, the failure to monitor algorithms for unexpected problems or machine-learned errors, and the Black Box non-transparency of algorithms that severely limits how to identify problems and avoid bad result from relying on AI tools.[302] Most importantly, both the EU and US have identified the need for humans to be an integral part of the decision-making for which the AI product has been purchased.[303] Thus, broadly speaking, the US and EU are highlighting some of the greatest risks associated with the use of artificial intelligence. However, neither the US nor EU proposals mention the risks of AI in business operations. Hence, both countries lack guidelines to address the specific issues raised by the use of AI tools by corporate fiduciaries.

At this early stage in the Age of Algorithms, legislative bodies might be inclined to want to meet the challenges and risks of artificial intelligence proactively, and thus start passing legislation to prescribe and proscribe AI use, including the use in business organizations. However, legislators cannot know of the specific risks and responsibilities that must be addressed by legislation, and thus could exacerbate the problems of AI use by business organizations. On one extreme, legislators might be excessive in their prohibitions, and thus stymie the potential beneficial use of algorithms by businesses and fiduciaries. On the other extreme, if legislators are charmed by "automation bias", they might be too deferential to the burgeoning AI industry, and thus fail to address those risks and harms that are already apparent in the AI products being created by the AI industry.

Therefore, legislatures should start by addressing the most obvious harms that could arise when corporate fiduciaries defer to algorithms, eliminate humans from decision-making involving AI tools, or worst of all, transition to AEs. Indeed, the first step is to make AEs illegal. As asserted above, AEs are too likely to turn into harmful organizations that immunize and hide human owners who are intent on profit, regardless of the crimes an AE would commit, the antitrust violations they commit, the damage they cause to stakeholders, and the personal and property damage they cause to consumers and communities. Legislatures

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[301] *Id.* at 7.
[302] *See generally Id.*; *See also* EUROPEAN COMMISSION, *supra* note 288.
[303] *See* EUROPEAN COMMISSION, *supra* note 288, at Title III, Art. 14; *See also* WHITE HOUSE OFFICE OF SCI. AND TECH. POLICY, *supra* note 298, at 7.

could eliminate the worst outcomes from the evolution of AI tools in the business world by ensuring the worst end-result of that evolution, AEs, does not occur.

Legislatures could also re-consider the concept of "stakeholders." Both stakeholders are for purposes of fiduciary decision-making, and how to balance the interests of shareholders and stakeholders. Some of this could be accomplished by re-considering bankruptcy laws that give priority to Wall Street lenders and venture capital groups when determining who to protect in the reorganization process over vendors, employees, and local communities facing environmental harms and economic disasters. That re-prioritizing in the bankruptcy process would immediately roll over to the strategizing and risk-taking of fiduciaries, and thus impact the design of AI tools to assist in those analyses. More importantly, the debate that led to a re-prioritization of stakeholder interests in bankruptcy reorganizations would provide a roadmap for a broader legislative process to codify these new concepts of stakeholder interests into corporation law. Those new stakeholder interests would then become protected by fiduciary obligations expected of corporate fiduciaries.

Finally, when algorithms are used by fiduciaries, legislatures should restrict the immunities granted via the Business Judgment Rule and statutes such as DGCL section 102(b)(7). Specifically, business laws should prohibit fiduciaries from totally deferring to either algorithmic processes or those managers and consultants who themselves would passively defer to algorithms. Fiduciaries should be required to undertake the same reasonable oversight and investigations when using AI tools that are required when fiduciaries rely on third party humans for decision-making. If fiduciaries cannot demonstrate that they adequately evaluate the accuracy and applicability of AI tools to their business organizations and the issues being addressed, the fiduciaries critiqued the outcomes proposed by AI tools, and all AI proposals faced human review and debate, then they should be denied statutory immunity and face liability for their failures to fulfill their fiduciary obligations.

It is worth noting at this point that while calling for the creation of new laws and legal concepts, the legal community should remember that traditional laws related to product design and manufacturing can also help address new problems that AI tools pose for society, including corporate fiduciaries. First, because AI tools are products their manufacturers and marketers should be treated like any traditional product manufacturer and marketer. Rather than relying on fiduciary law, traditional UCC warranty laws can be applied against AI products that cause harm, including AI products used by corporate fiduciaries. The wise corporate fiduciary would demand express warranties to ensure that an AI tool was designed to work as marketed to that corporation. Implied warranties of merchantability would compel designers to avoid shortcuts in the design process to make those AI tools cheaper to produce, because they would not meet a

merchantability standard for algorithms. Implied warranties of fitness for a particular purpose would help prevent the problems arising from algorithms that are too general in their design, and thus introduce correlations that are inapplicable to a particular company or ignore correlations that should be made for that company. Those potentially liable for violating these implied warranties would be the original designer-manufacturer, any party customizing an "off the shelf" AI tool for a specific company, and anyone providing the platform or otherwise providing the services and computer hardware to run the AI tool.[304]

Traditional product liability laws could likewise be readily adopted for use in cases of allegedly defective AI tools. The concepts of defects introduced during design, defects introduced during the manufacturing process, and even "failure to warn", any of which would result in a product liability claim, could be applied to those AI tools that were improperly designed or had inherent deficiencies that would prevent a fiduciary from knowing the limitation of their use for decision-making.[305] Not only would this provide a remedy, and someone to be responsible for that remedy, but the risk of liability would result in better AI tools available to corporate fiduciaries, just as the exposure to product liability suits results in safer consumer products.

The drawback to relying on warranty and product liability laws is they fail to address any deficiencies in algorithmic processes introduced by machine-learning. Since machine learning is considered a state-of-the-art feature in algorithms, a manufacturer cannot be held liable because the algorithm undertook machine learning. Thus, any "defect" introduced by machine learning cannot be deemed a defect present at the time the product was sold, and so cannot be considered a manufacturing defect or design defect, or a risk that requires a warning.[306] For this same reason, the manufacturer could not be held to violate implied warranty laws.[307] Therefore, all the harms that could befall corporate fiduciaries will not be addressed by traditional warranty and product liability laws.

A more nefarious problem is that the Black Box nature of algorithmic processes could foreclose traceability of product defects to AI tool manufacturers. Those processes are non-transparent, and thus it is impossible to determine what or who was the cause of any problem in the analytical problem which results in a bad decision upon which a corporate fiduciary would rely. Indeed, because that non-transparency would prove a valuable feature for manufacturers wishing to

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[304] David Graves*, Electronic Person Status for Robots—Response to the EU Proposal, GWS ROBOTICS BLOG* (Jan. 14, 2017), https://www.gwsrobotics.com/blog/electronic-person-status-robots-response-eu-proposal.
[305] *See* Cowger, *supra* note 18, at 184–94.
[306] *Id.* at 195–96.
[307] *Id.* at 200–201.

avoid litigation and liability, AI tool manufacturers are incentivized to keep algorithmic processes as "Black Box" as possible.[308] As such, traditional product liability and warranty laws are not able to address all of the harms caused by AI-based products in the course of fiduciary decision-making, nor incentivize anyone to make the products better for the hapless corporate fiduciary.

Three remedies could address the problem of non-traceability. First, just as manufacturers cannot disclaim warranties under the Magnusen Moss Act[309] for consumer products, manufacturers of corporate AI tools should not be able to disclaim liability for harms caused by their poorly designed, self-audited, and untraceable products.[310] Second, a new cause of action could be legislated that would address "algorithmic nuisance." These statutes would create a means for aggrieved parties to recover from algorithms that cause or result in (a) defamation of individuals or loss of reputation because of the assessments made against them by algorithms; (b) discrimination by the algorithms; or (c) coercion of humans to act contrary to their interests, the law, or ethics to avoid bad algorithm-based analyses against those humans or comply with the outcomes generated by algorithms.[311]

Third, in conjunction with these laws, the concept of strict liability should be applied in cases involving algorithms. The strict liability standard was developed in part to address the evidentiary problems plaintiffs faced when suing manufacturers for negligence.[312] Likewise, an algorithm's Black Box non-transparency and machine-learning nature precludes parties aggrieved by an AI tool from proving how they were harmed by that algorithm. Thus, the rationale behind the strict liability applies well to claims involving AI tools.[313] This would prevent AI manufacturers from taking advantage of the Black Box nature of algorithms and untracked machine learning to shield those manufacturers from the harm caused by AI tools they introduce to the market. The result would be a strong incentive for AI manufacturers to introduce into their AI tools a means to track the use of data, the way the algorithm processed that data, and how the AI tool changed as a result of machine-learning. This would greatly lessen one of the most harmful aspects of artificial intelligence. In turn, this would mean corporate fiduciaries would be more likely to avoid fiduciary breaches because they would not know how the AI tools worked on which they would rely.

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[308] Pasquale, *supra* note 37, at 17.
[309] 15 U.S.C. §§ 2301–2312.
[310] Demo F. Clarke, *Robo-Advisors—Market Impact and Fiduciary Duty of Care to Retail Investors* (Feb. 13, 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3539122; *see, e.g.,* Pasquale, *supra* note 37, at 1245.
[311] Balkin, *supra* note 1, at 1238–39.
[312] Richard E. Byrne, *Strict Liability and the Scientifically Unknowable Risk,* 57:4 MARQUETTE L. REV. 660, 662-63 (1974).
[313] Balkin *supra* note 1, at 1239; Armour & Eidenmüller, *supra* note 31, at 111.

In addition to these basic but fundamental actions by legislatures, as the Age of Algorithms progresses, new harms either from AI products or how they are used by fiduciaries could emerge that will require honed responses by legislative bodies. In the meantime, even at this early stage of AI tool usage in the corporate world, these proposals would address, the most obvious and problematic aspects of artificial intelligence. Thus, it behooves legislative bodies to act proactively to begin drafting fundamental statutes, rather than waiting for either the benefits of AI tools to be hampered by courts trying case-by-case to develop their own standards of product liability, or the inherent dangers from AI tools to unnecessarily harm businesses and societies.

b. New Concepts of Fiduciaries in the Age of Algorithms

In conjunction with legislative developments, the concept of responsible fiduciaries in American jurisprudence must be modernized to address the rise of artificial intelligence in the corporate world. In addition to traditional corporate fiduciaries, i.e., senior managers, directors, and (in some instances) controlling shareholders or partners in a business organization, the obligations of a fiduciary could be extended to the manufacturers and developers of the AI tools marketed to corporate fiduciaries. In the alternative, an entirely new concept of fiduciary duty—the "information fiduciary"—could be adopted. Some commentators have proposed that AI tools themselves become fiduciaries, and thus become their own legal "persons".[314]

The first new concept under corporate fiduciary law would be to include designers, manufacturers and customizers of corporate AI tools under the heading of "corporate fiduciary." This idea first arose out of the debacle of DAO, in which an investor-directed venture capital fund was created that was to run as a "decentralized autonomous organization."[315] Unfortunately, after the equivalent of $150 million in investments had been made, due to an error in DAO's code, a hacker was able to steal about $60 million of those investments.[316] After this debacle, Angela Walch posited that if AI tool designers are going to develop and promote tools to take over the responsibilities traditionally performed by fiduciaries, such as acting as financial repositories for investments, they should accept the fiduciary duty that traditional fiduciaries held.[317] This idea has gained traction because the concept of a corporate fiduciary is not new to courts, and thus

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[314] Rafael Dean Brown, *Property Ownership and the Legal Personhood of Artificial Intelligence*, 30 INFO. & COMMC'NS TECH. L. 208, 210 (2021).
[315] Cryptopedia Staff, *What Was the DAO?*, GEMINI TRUST CO. [BLOG] (updated Mar. 16, 2022), https://www.gemini.com/cryptopedia/the-dao-hack-makerdao.
[316] *Id.*
[317] *See generally* ANGELA WALCH, IN CODE(RS) WE TRUST: SOFTWARE DEVELOPERS AS FIDUCIARIES IN PUBLIC BLOCKCHAINS, REGULATING BLOCKCHAIN: TECHNO-SOCIAL AND LEGAL CHALLENGES 59, 58–81 (OXFORD UNIV. PRESS 2019).

simply applying existing principles of fiduciary duty to these new parties would be easy for courts.[318] Furthermore, AI designers would simply be treated like other professionals who have been designated fiduciaries, such as lawyers, doctors, and investment advisors.[319]

If one considers the underpinnings of fiduciary law, this new approach of designating AI manufacturers as fiduciaries makes some sense. Fiduciaries are traditionally those who offer themselves as having a unique expertise that their beneficiaries do not have. As a result, those beneficiaries place their trust in the fiduciary to act in the best interests of the beneficiary. The fiduciaries open themselves to loss of property and power if the fiduciary misuses that trust or fails to fulfill the promise that the fiduciary's expertise will benefit the beneficiary.[320] Although AI manufacturers may be a further step removed from shareholder beneficiaries than is a corporate fiduciary, since those AI manufacturers market their product as being so beneficial to the direct corporate fiduciary that the corporate fiduciary defers to their product, then they should be deemed to step into the fiduciary role of that corporate fiduciary.

Unfortunately, this proposal to extend fiduciary status to AI manufacturers faces several problems. First, fiduciary status is always bestowed on service providers, not product manufacturers.[321] In order to require AI manufacturers to be subject to implied warranties and product liability laws, they have to be considered product manufacturers, not service providers.[322] More importantly, AI manufacturers should never be considered service providers, since that would suggest other persons, such as the corporate fiduciary or the management and professionals on which that corporate fiduciary relies, do not have to do their own independent, if complementary, task of critiquing the AI output. Therefore, AI manufacturers cannot, and should not, be deemed corporate fiduciaries.

The better alternative is to create an entirely new concept of fiduciary that would be applicable to AI tool manufacturers. The concept of an "information fiduciary" was first proposed by Jack Balkin and Jonathan Zittrain in 2015.[323] The intent behind this concept is that consumers should have a right to be

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[318] Pasquale, *supra* note 37, at 1919–20.
[319] *Id.* at 1929; Styhre, *supra* note 104, at 119; *see also* STUCKEY INSURANCE CO., *Why You Need to Avoid Fiduciary Duty,* https://stuckeyinsurance.com/why-you-need-to-avoid-fiduciary-duty/ (last visited Feb.18, 2023).
[320] Walch, *supra* note 317, at 59, 64–69.
[321] *Id.* at 64.
[322] Francis Scott Baldwin, *Products Liability as it Applies to Service Transactions* 43 J. AIR L. & COM. 323, 324 (1977).
[323] Whitt, *supra* note 78, at 80; *see also* Jack M. Balkin & Jonathon Zittrain, *A Grand Bargain to Make Tech Companies Trustworthy,* THE ATLANTIC (Oct. 3, 2016), https://infoweb.newsbank.com/apps/news/document-view?p=WORLDNEWS&docref=news/15FD22CA1AE6F680&f=basic.

protected from harm caused by those who would have access to the consumers' data.[324] Thus, those entities who use consumers' data, in particular social media sites, should have a fiduciary obligation to consumers not to use that data in ways that could harm the consumer.[325] This information fiduciary concept could extend to any person or entity using individuals' data, such as doctors and attorneys, as well as online marketers and other internet-based businesses using this data. In other words, anyone using the data of another has a duty to act in a trustworthy manner when using that data.[326]

This concept of an information fiduciary could readily be extended to the AI tool manufacturers marketing to corporate fiduciaries. After all, these manufacturers are holding themselves out as experts at data processing and the use of algorithms to make corporate decisions.[327] Corporate fiduciaries are consumers of those products, and would be relying on the representations of the AI tool manufacturers about how the corporation's data will be used. If the AI tools are not designed properly, such that the data is not processed properly, the tool reiterates data bias into the process, or errors in the AI process are hidden by the failure of those tools to have adequate self-auditing or tracking capabilities, then the corporate fiduciary/consumer will be harmed by breach of the information fiduciary duties of the AI tool manufacturer.

This new concept, though not originally intended for businesses or corporate fiduciary, would be a valuable addition to corporate fiduciary jurisprudence. It eliminates the problem of a traditional fiduciary having to be a service provider, since the information fiduciary concept is premised on being applicable to any collector and processor of data. Furthermore, its foundation is a duty of good faith owed by the AI tool manufacturer, specifically a duty to not cause harm to the corporate fiduciary through the improper use of the corporation's data.[328] Thus, if a corporate fiduciary is found to have violated their duty of good faith due to failures of the AI tool, including if the corporate fiduciary is found to have wrongfully delegated the corporate fiduciary's duty to that AI manufacturer, then the corporate fiduciary will have a cause of action against the AI manufacturer that is parallel to the fiduciary's exposure. That, in turn, would create a major incentive for AI tool providers to be more careful in their designs, to be more forthright in explaining the limitations of their products and, most importantly, to invest in improved designs that overcome some of the risks from Black Box processing and untracked machine learning.

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[324] Balkin & Zittrain, *supra* note 323.
[325] Whitt, *supra* note 78, at 81–83; Pasquale, *supra* note 37, at 1244.
[326] Whitt, *supra* note 78, at 84.
[327] Jeremy Kahn, *Deep Learning Pioneer Andrew Ng Says Companies Should Get 'Data-Centric' to Achieve A.I. Success*, FORTUNE (Newsletter) (June 21, 2022, 2:44 PM), https://fortune.com/2022/06/21/andrew-ng-data-centric-ai/.
[328] Balkin, *supra* note 1, at 1230.

One interesting aspect of the original concept of information fiduciary was the proposal of a "grand bargain" for those entities accepting the obligations of an information fiduciary.[329] In exchange for accepting the standards and obligations of being an information fiduciary as set forth in a "Digital Millenium Privacy Act," those entities would avoid having to meet different and conflicting standards as a result of myriad state and local laws.[330] The Act would proscribe use that would violate privacy expectations of data providers, would prevent discrimination arising during data processing, and would make abuse of a consumer from use of that data illegal.[331]

This concept of a grand bargain could be extended to corporate AI tool manufacturers. In exchange for meeting certain prescribed standards, and accepting liability for breaches of those standards, the AI tool manufacturer would avoid the difficulty of addressing the standards and liabilities that otherwise might arise within multiple state jurisdictions as they address an AI tool manufacturer's complicity for breaches by corporate fiduciaries. This creation of one standard of compliance would be even more important if states were to broaden corporate fiduciary obligations to stakeholders instead of just traditional obligations to shareholders. The timely creation of one national standard would also avoid the time it would take for courts and legislatures to determine how AI tool manufacturers are to be shoehorned into traditional concepts of fiduciary duty, including the extent the Business Judgment Rule would apply to their product designs, not to mention the conflicting standards that would be issued in court rulings during that developmental period. Thus, American fiduciary jurisprudence might have a chance of keeping up with technological evolution as the Age of Algorithms proceeds.

One interesting aspect of this variant on the information fiduciary model proposed by Prof. Balkin is that it clarifies to whom this fiduciary duty is owed.[332] A chief complaint of the concept of an information fiduciary is the conflict of interest it would create in social media companies.[333] These companies would have traditional fiduciary obligations to make profits for their shareholders that would conflict with their newly created duty not to harm the consumers who are generating these profits.[334] This problem would not arise where the information fiduciary duty owed by the AI tool manufacturer would be to the corporation and

[329] Balkin & Zittrain, *supra* note 323.
[330] *Id*.
[331] *Id*.
[332] Jack M. Balkin, *Information Fiduciaries and the First Amendment*, 49 U.C. DAVIS L. REV. 1183, 1229 (2016).
[333] *Id.*
[334] Lina Kahn & David E. Pozen, *A Skeptical View of Information Fiduciaries,* 133 HARV. L. REV. 497, 504 (2019).

shareholders, just as is the duty owed by the corporate fiduciary. Thus, in some respects, the concept of an information fiduciary duty seems even more apropos to a business setting that it does in the mass market of social media businesses.

One final concept that should be avoided is to make AI a "person" under law. For example, the European Commission has been tasked by European Parliament to consider creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.[335]

In other words, the rationale behind extending legal personhood to artificial intelligence is that it can be subject to liability for harms it "causes" just a natural person or a corporation.[336] This concept would, therefore, place responsibility on the harm caused by an algorithm, particularly one that has machine learned itself into something no human created, on the algorithm, not any human. Under this concept, a corporate fiduciary who has been adjudged to breach their fiduciary duty due to improper reliance on an AI tool would be able sue that AI tool.

This idea should be avoided both for practical and conceptual reasons. The conceptual problem is the same that was raised with AEs. Artificial intelligence does not intend to commit harm. It does not feel remorse for causing harm, nor would it be deterred by the civil or criminal sanctions assessed against it for causing the harm.[337] Creating a new level of legal responsibility via a grant of personhood to artificial intelligence would not defer AI malfeasance, but by directing liability to the AI "person", real humans would be shielded from responsibility for the creation or misuse of the product.[338]

As a practical matter, granting personhood would create a morass of procedural problems that would merely delay and complicate recovery by aggrieved parties. For example, where would the personal jurisdiction of a non-person algorithm exist? A corporation's jurisdiction is based on the "minimal contacts" of that corporation, which would be determined by the presence of its human managers and operations in the jurisdiction, its sales of products in

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[335] European Parliament Resolution of 16 February 2017 with Recommendations to the Commission on Civil Law Rules on Robotics §59(f) (Report No. A8-0005/2017, Text No. P8_TA(2017)0051, Procedure File No: 2015/2103(INL)) (Feb. 16, 2017). https://www.europarl.europa.eu/doceo/document/TA-8-2017-0051_EN.html.
[336] Myers, *supra* note 276.
[337] Lopucki, *supra* note 263, at 892.
[338] Pasquale, *supra* note 37, at 1918.

jurisdiction, and to some degree the connection of a lawsuit's claims to the activities of the defendant in the jurisdiction.[339] An algorithm would have neither human representatives nor an office from which it works. In fact, it would have no presence in a jurisdiction because it is incorporeal. Since it would be a separate person, the location of its manufacturers could not be the basis for jurisdiction over it. So, would there be any jurisdiction where the AI could be sued?

The most trying aspect of any lawsuit against an algorithm would be having a trial at all. Who would be deposed on behalf of the algorithm and aver other discovery responses? What human, if any, would be competent to testify in court in the algorithm's stead, especially in the case where Black Box processes and machine learning preclude any human from knowing how the algorithm operated? In fact, who would assert and exercise any decisions a human would normally make in trial if an algorithm cannot make such decisions? Without a defendant competent to participate in its defense, the sheer number of unresolvable procedural and even constitutional issues would preclude liability against an AI "person," and thus, negate the very reason to make AI a person in the first place. As such, there appears no actual benefit in making AI its own legal person.

c. New Standards for Using AI Tools—What is Expected of the "Reasonable" Corporate Fiduciary and Their Corporation

Ultimately, the best approach would be the most practical approach, namely creating new standards of practice expected of corporate fiduciaries in the Age of Algorithms. These standards will help fiduciaries and the companies they represent better understand how to adopt AI into their fiduciary deliberations. This, in turn, will lead to preventative self-policing by proactively following these standards, rather than seeking remedies after disaster has struck due to ignorant deference to AI tools. Moreover, these standards can be a foundation for a modern shared understanding of what in the Age of Algorithms is required of the "reasonable" fiduciary to meet their obligations, including what it means to be fully informed of the AI processes that are impacting their companies and their decision-making. Fiduciaries will understand how to better use the benefits of AI to make fiduciary decisions, without being ensnared in the traps of database misuse, Black Box non-transparency, and mis-directions by machine learning. Perhaps most importantly, fiduciaries will always remember that artificial intelligence is a complement to human intelligence, and thus fiduciaries cannot defer to AI, or rely on management and consultants who wrongly defer to AI, when exercising their duties as corporate fiduciaries.

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[339] Bristol-Myers Squibb Co. v. Sup. Ct. of Cal., 137 S.Ct. 1773, 1780 (2017).

Based on the recommendations of a variety of experts, the following might be a good list of these standards of knowledge and practice expected of corporate fiduciaries:

1. Modern corporate fiduciaries should have the expertise to seriously evaluate the AI tools being offered to them. Fiduciaries in the past have been required to know how to evaluate the management and outside professionals the corporate fiduciaries might hire. Thus, it is not unreasonable to expect fiduciaries to be able to evaluate the viability and risks of the AI tools they might purchase in lieu of those traditional human advisors.[340]

2. Corporate fiduciaries should know the general benefits of using AI tools in their decision-making, since those benefits can result in less costs, more efficiencies, and ultimately better decisions on the party of the fiduciaries.[341]

3. Corporate fiduciaries must also know the limitations of AI tools, so they are not misled by AI marketers, or use AI tools beyond the limits of their benefits.[342] Those limitations include the level of accuracy and error rate to be expected. The fiduciary should ask for a frank and open statement of the risks in using the algorithm,[343] including those arising from the company itself such as its limited database, the limitations of the expertise of the designers in the specific area to be analyzed by the algorithm, and if the AI tool was customized for the fiduciary's company or was an "off the shelf" tool.

4. In conjunction with learning the limitations of the AI tools being considered, the fiduciary should require assistance from human experts and managers to define the goals to be met via the AI tool, evaluate and "cleanse" the company's data to be used, and consider alternative AI products.[344]

5. The fiduciary should understand the built-in self-auditing features, if any, of the AI tool that would catch errors or analytical problems before the analysis is presented to the fiduciary. The fiduciary should clarify how errors made by the algorithm or misuse of data can be discovered beyond self-auditing features, especially in light of Black Box and machine-learning processes that make discovery of those errors difficult. The fiduciary should also understand what additional protocols and reviews are in place to catch errors or other

[340] Kamalnath, *supra* note 114, at 44.
[341] *Id.* at 45.
[342] *Id.* at 56.
[343] Caiazza & Rosenblum, *supra* note 229, at 2.
[344] Delua, *supra* note 46, at 2.

problems caused by machine learning, misuse of databases, or even hacking or other human-introduced changes.[345]

6. Fiduciaries must be reminded to avoid "automation bias", and thus not place too much trust in the alleged abilities of AI tools or the accuracy of the outcomes.

7. Fiduciaries must be reminded that AI tools are to complement, not replace, the analysis and decision-making of human fiduciaries. Thus, fiduciaries should always retain the power and right to make the final decision on a matter falling under their fiduciary duty, and never defer without a reasonable basis to an algorithm's outcome or recommendation.

Although this may seem like a large number of new areas of expertise for corporate fiduciaries, the fiduciaries do not have to understand all the technical aspects of the coding that went into the algorithm's creation, but they should have a general understanding of how the algorithm is intended to work.[346] Furthermore, under existing laws such as DGCL section141,[347] fiduciaries can always, as has been the case in the past, seek the advice and counsel from experts within and outside of the corporation to meet these obligations. Otherwise, the corporate fiduciary risks falling below the standard expected of fiduciaries in the Age of Algorithm, and thus being liable for a breach of their fiduciary duty.

In addition to these standards specific to corporate fiduciaries, corporations should also be expected to have policies for the use of AI tools within their organization. In other words, like any other area of exposure, corporations should have risk management policies and codes of conduct in place specifically for the use of AI tools, including by the corporate fiduciaries of those corporations.[348] In fact, the European Commission's proposal to draft legislation to regulate the creation and use of AI tools includes a provision calling on companies and industry trade groups that are involved in AI development to adopt codes of conduct for the creation and use of their AI tools.[349]

A joint effort of Microsoft Corporation and the Zurich Insurance Group led to the first six policies listed below:

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[345] Caiazza & Rosenblum, *supra* note 229, at 1. *See also* FINRA, REPORT ON DIGITAL INVESTMENT ADVICE (Mar. 2016), https://www.finra.org/sites/default/ files/digital-investment-advice-report.pdf [https://perma.cc/3UBV-LAQV].
[346] Petrin, *supra* note 206, at 1014–15.
[347] DEL. CODE ANN., *supra* note 112.
[348] For example, Microsoft Corp. has adopted six responsible Al principles to guide the use of AI tools in its business: Fairness, Reliability and Safety, Privacy and Security, Inclusiveness, Transparency, and Accountability. *See* Zurich Ins. Group & Microsoft, *supra* note 36, at 20.
[349] EUROPEAN COMMISSION, *supra* note 288.

1. Establish a systematic risk analysis and examination of the proposed AI system to uncover potential failures;
2. Establish performance metrics based on the sensitivity and use of the system to ensure targets are achieved;
3. Build correction mechanisms and/or fallback options to detect and correct underperformance or allow human interaction to rectify issues;
4. Maintain a version control system to document development and history of the AI system;
5. Adhere to best practices for responsible use of technology;
6. Adopt standards and/or certification of the AI system, which can provide assurance of technical performance and adherence to ethical standards; and
7. Develop standards and procedures by which humans experienced in the matters subject to the algorithm processes review outcomes and recommendations of those processes, in order to complement the algorithmic processes with human analytical skills and expertise.[350]

The seventh risk management policy is recommended by this author, since the deficiencies in algorithmic processes will continue to mandate a human review of those processes.[351] Not only would these standards be useful for proving a fiduciary and its corporation are fulfilling their duties to monitor set by *Marchand v. Barnhill*,[352] but they would go far in assuring that fiduciaries do not rely too much on AI tools, and thus improperly delegate their fiduciary duties to them.

VII. Conclusion

Artificial intelligence will be both a blessing and a curse for corporate fiduciaries in the Age of Algorithms. By complementing a fiduciary's expertise and experience with the analysis powers of artificial intelligence, AI tools will allow corporate fiduciaries to fulfill their duties more efficiently and more accurately. This should mean fewer mistakes by corporate fiduciaries, and thus fewer claims of fiduciary breaches. However, misuse of AI tools by corporate fiduciaries will have the opposite effect. As a result of analytical error caused by design flaws, contaminated data, and analytical errors introduced by machine

[350] *See* ZURICH INSURANCE CO., *Artificial intelligence gives rise to 'algorithmic liability'* (Jul. 29, 2021), https://www.zurich.com/en/knowledge/topics/digital-data-and-cyber/artificial-intelligence-gives-rise-to-algorithmic-liability [https://perma.cc/KMN5-EDXR].
[351] Petrin, *supra* note 206, at 1028–29. *See also* Sergio M.C. Avila Negri, *Robot as Legal Person: Electronic Personhood in Robotics and Artificial Intelligence*, FRONTIERS IN ROBOTICS AI (Dec. 23, 2021), https://www.frontiersin.org/articles/10.3389/frobt.2021.789327/full [https://perma.cc/FY78-NW3M].
[352] *See* Featherstone, *supra* note 116.

learning, corporate fiduciaries who unwisely defer to AI outcomes, could find the decisions condoned by those fiduciaries to be wrong. Not only will such deference be a breach of their fiduciary duties, but the Black Box nature of algorithms will preclude those fiduciaries from defending their deference as nonetheless fulfilling their duties of due care or loyalty.

The harm to corporations, shareholders, and society at large from the misuse of AI tools needs to be addressed by new legislation. Traditional concepts of corporate fiduciary duty need to be updated to address these risks, including creating a new type of fiduciary, the "information fiduciary." Perhaps more importantly, corporate fiduciaries and their companies need to adopt standards of AI use that will prevent violations of fiduciary law, and thus proactively avoid the harms AI can cause to a business organization. Most importantly, regardless of the advancement of AI tools in the Age of Algorithms, human fiduciaries must never be replaced or usurped in the corporate fiduciary decision-making process, but rather must retain their preeminent position as the final decision-maker for all corporate fiduciary decisions.