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Articles

Genetic Equity: How CRISPR Gene-Editing Technology Will Reshape Society and Healthcare

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I. Introduction

The advent of CRISPR technology is a potential turning point in the history of the human species. It is not like other drugs and procedures developed to improve outcomes that represent a step forward in the treatment of specific ailments. Rather, CRISPR is more akin to the invention of algebra where an entirely new method of problem solving was unlocked, built upon, and utilized to advance society. Instead of variables, CRISPR has introduced the tool of genetic modification to scientists and physicians.[1] To analogize further, imagine a chef tasked with creating a beautiful steak dish, but the chef receives a cut of pork instead of a steak. The chef uses his mastery of cuisine, advanced technologies, and exotic culinary chemicals to try to make the pork taste like steak, and he does make progress in that regard, but in the end the pork is still not quite a steak. That is how doctors currently treat diseases with a genetic origin; they use technologies and drugs to get the patients' bodies to function as closely as possible to normal but cannot change the nature of the gene that is causing the disease. Now imagine that the chef can simply use CRISPR to change the pork into steak. That is the potential of CRISPR in treating genetic disease.[2]

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[1] KEVIN DAVIES, EDITING HUMANITY: THE CRISPR REVOLUTION AND THE NEW ERA OF GENOME EDITING 4 (2020).
[2] See Human Genome Editing, WORLD HEALTH ORGANIZATION [WHO], https://www.who.int/health-topics/human-genome-editing#tab=tab_2 (last visited Apr. 14, 2025) (describing use of genome editing in treating disease).

Currently, CRISPR researchers are focusing on developing treatments for some of the most serious genetic diseases, as is morally appropriate.[3] Many of these diseases lack cures or effective non-genetic treatments, so developing these treatments is paramount.[4] These diseases include things like sickle-cell anemia, muscular dystrophy, some cancers with genetic origins, and more.[5] These will be referred to as potentially fatal genetic diseases (PFGDs). While the American healthcare system is deeply flawed,[6] most insured Americans in need should be able to access CRISPR treatments for PFGDs since such a treatment will be considered "necessary" under the medically necessity framework that determines whether insurance will cover a procedure.[7]

While providing effective treatment for people suffering from PFGDs is an incredibly exciting prospect for its potential to drastically improve people's chances at a comfortable life, there are also countless Americans suffering from non-fatal genetic diseases (NFGDs). While not necessarily life-threatening, these diseases, which include things like Tourette's syndrome, some forms of infertility, Alopecia Areata, and albinism, undoubtedly significantly affect the patient.[8] Not only do these diseases impose costs of treatment for the patient, they also are often externally noticeable, making the patient more likely to suffer from body dissatisfaction or appearance-based discrimination. While PFGDs constitute a more concrete category of disease due to their objective risk of death in common, NFGDs include a wide range of conditions.

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[3] See Pipeline, CRISPR THERAPEUTICS, https://crisprtx.com/pipeline (last visited April 18, 2024).
[4] How are Genetic Diseases Treated or Managed?, Medline Plus (May 1, 2021), https://medlineplus.gov/genetics/understanding/consult/treatment/; Deanna Cross & James K. Burmester, Gene Therapy for Cancer Treatment: Past, Present, and Future, 3 CLINICAL MED. & RSCH. 218, 218 (Sept. 1, 2006).
[5] See supra note 4.
[6] See generally ELISABETH ROSENTHAL, AN AMERICAN SICKNESS (2017).
[7] See NAT'L ASSC. INS. COMM'R, UNDERSTANDING HEALTH CARE BILLS: WHAT IS MEDICAL NECESSITY?, https://content.naic.org/sites/default/files/consumer-health-insurance-what-is-medical-necessity.pdf.
[8] See generally Genetic Disorders, HEALTHDIRECT, https://www.healthdirect.gov.au/genetic-disorders (last visited April 18, 2025).

Though this paper will focus on distinct NFGDs that have an established genetic cause, science might call for an expansion of this category as the causes of more diseases come to be understood, especially psychological disorders. Unlike PFGDs, treatments for these diseases will not clearly be covered under the medical necessity framework because treatment for these diseases is not necessary to avoid significant physical pain or death, and therefore is not always medically necessary as the term is used in Insurance.[9]

This paper will explore the consequences of applying the current medical necessity framework used in coverage determinations to CRISPR treatments for NFGDs. It will begin by briefly explaining the history of genetic editing in medicine and the development of CRISPR. It will then explain how CRISPR works and why the technology is revolutionary. From there, the paper will highlight the societal impacts of CRISPR if left in the current regulatory framework and make a policy recommendation for how best to integrate the technology into the American healthcare system without redesigning it entirely. Finally, the paper will conclude with a forward-looking examination into the moral and sociological implications of the suggested policy and advancement of the technology.

A. History of Gene Editing

The science of gene editing can be traced back to the discovery of how viruses work. In 1961, Howard Temin showed that chicken cells exposed to the Rous sarcoma virus (RSV)

[9] See supra note 8.

inherited genetic mutations that caused the cells to reproduce the RSV virus.[10] This was important for two reasons. First, this experiment showed that eukaryotic cells[11] could uptake and integrate genetic material into their chromosomes.[12] Second, because RSV is an RNA virus, the experiment showed that genetic information could flow from RNA to DNA, rather than the previously popular notion that this translation process was limited to DNA into RNA.[13] These discoveries in combination showed that viruses could insert genetic information into existing eukaryotic cells.[14]

Years passed before Temin's discoveries were applied to human trials.[15] In 1973, Rogers et al. purposefully infected two children with the Shope-papilloma virus in an attempt to treat their urea cycle disorder.[16] The idea was that this virus would introduce the gene for producing arginase into the children's cells, which they lacked due to their urea cycle disorder.[17] Unfortunately, this trial was unsuccessful, and it was several years before clinical trials on humans resumed.[18] Things began picking up steam again in 1988 when the first protocol for introducing foreign genes into humans was approved by the Recombinant DNA Advisory Committee.[19] While this protocol merely inserted a gene to produce a tracking molecule in tumor infiltrating lymphocytes, its success led to subsequent approval to insert tumor necrosis factor

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[10] Thomas Wirth, Nigel Parker, & Seppo Ylä-Herttuala, History of Gene Therapy, 525 SCI. DIRECT 162, 164 (2013).
[11] Eukaryotic cells are complex cells that comprise multi-cellular organisms and have membrane bound organelles, as opposed to much simpler prokaryotic cells which are typically single-celled bacterium and have no organelle. Chromosomes are the DNA and protein structures that store DNA in a compact way within Eukaryotic cells. See, e.g., Alberts, et al., Cells: The Fundamental Units of Life, in ESSENTIAL CELL BIOLOGY 1, 15(4th ed. 2016).
[12] Wirth, Parker, & Ylä-Herttuala, supra note 11, at 164.
[13] Id.
[14] Id.
[15] Id.
[16] Id.
[17] *Id.*
[18] Id.; Nabil A. Alhakamy, David T. Curiel, & Cory J. Berkland, *The Era of Gene Therapy: From Pre-clinical Development to Clinical Application*, 26 Drug Discovery Today 1602, 1609 (2021).
[19] Wirth, *supra* note 10 at 164-65.

into these same lymphocytes ex vivo, which, when reinjected, was proven to be an effective treatment for melanoma.[20]

Since that discovery, gene editing experiments and trials have proliferated widely: there have been more than 46,000 clinical trials involving gene editing since that experiment. However, the field faced an ethical setback when, in 2018, Chinese Biophysicist He Jiankui announced that the first children with CRISPR mediated gene edits had been born.[21] The father of these twins had HIV, so Jiankui attempted to edit the genome of these children to make them immune to HIV (though they were not at risk of being born with the disease).[22] Luckily, these twins are alive and healthy today, but Jiankui's actions were a massive breach of numerous ethical codes and international standards as he conducted this experiment divorced from any regulatory body.[23] This episode serves as an important reminder of the potential for serious abuse these technologies present if improperly regulated. Despite the ethical concerns raised by Jiankui, gene therapies have already entered the market.[24] Though these approved therapies have the potential to improve and save countless lives, regulators should keep the lessons learned from He Jiankui in mind as they allow for the development of this market.

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[20] Lymphocytes are a type of white blood cell that are part of the body's immune response. Tumor Necrosis factor is a protein that is part of the body's natural cancer fighting system and destroys tumors. *Id.* at 165.
[21] Wirth, *supra* note 10; KEVIN DAVIES, EDITING HUMANITY, 10 (2020).
[22] Vera Lucia Raposo, *The First Chinese Edited Babies: A Leap in Faith and Science,* NATIONAL LIBRARY OF MEDICINE (Jul. 19, 2019), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6724388/#:~:text=Several%20notes%20demonstrate%20that%20this,infected%20genetic%20material%20was%20used.
[23] John Ruwitch, *His Baby Gene Editing Schocked Ethicists. Now He's in the Lab Again*, NATIONAL PUBLIC RADIO (June 8, 2023), https://www.npr.org/2023/06/08/1178695152/china-scientist-he-jiankui-crispr-baby-gene-editing; Esra Bilir et al., *Ethical and Scientific Issues of Gene-Edited Twin by Clustered Regularly Interspaced Short Palindromic Repeats Cas9 Technology,* NATIONAL LIBRARY OF Medicine (June 8, 2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC 7294836/.
[24] *See, e.g., CASGEVY® (exagamglogene autotemcel), Casgevy Patient Information, https://www.casgevy.com/sickle-cell-disease?gad_source=1&gclid=CjwKCAjwp8--BhBREiwAj7og1-wa7K9Yhgqctu56px_jBSKwTi0pqoV_HdtnSFyp-Lho4EwmMAkHSBoCLdwQAvD_BwE&gclsrc=aw.ds (last visited Mar 14, 2025).*

B. Explanation of CRISPR and its Medical Implications

CRISPR technology is a bit of a misnomer. CRISPR stands for clustered regularly interspersed short palindromic sequences, which are DNA sequences composed of a succession of repeats, each separated by unique sequences called spacers.[25] When a virus attacks a prokaryote, it inserts genetic material (RNA or DNA[26]) into the cell in order to 'highjack' the cell into producing more copies of the virus. This is done when the cell's natural transcription proteins transcribe the viral genetic material.[27] In natural settings, many prokaryotes have genes that encode Cas proteins, which function as scissors that cut strings of genetic material. They also produce RNA sequences, known as sgRNA or guide RNA sequences, reciprocal to common viral DNA.[28] This sgRNA combines with a Cas protein to bind to a reciprocal viral genetic DNA or RNA string.[29] The sgRNA Cas complex is then able to cut the viral DNA, rendering its genetic information unable to be transcribed, thus protecting the prokaryote from viral infection.[30] Therefore, the name CRISPR derives from the discovery of this prokaryotic immune response to viruses that is the scientific basis for CRISPR technologies today.

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[25] Ibtissem Grisa et al., *Clustered Regularly Interspaced Palindromic Repeats (CRISPRs) for the Genotyping of Bacterial Pathogens*, NATIONAL LIBRARY OF MEDICINE (Feb. 2, 2024), https://pubmed.ncbi.nlm.nih.gov/19521870/.
[26] DNA is double stranded genetic information. Its double stranded nature ensures that it is not transcribed accidently. RNA, by contrast, is single stranded genetic information and is therefore able to be bound to and transcribed or cut by proteins. *See generally,* ALBERTS ET AL., *Chapter 7: From DNA to Protein: How Cells Read the Genome*, *in* ESSENTIAL CELL BIOLOGY (4th ed. 2019).
[27] Transcription is the process of building a protein based on a sequence of genetic material. Each three base pairs of an RNA or DNA molecule correspond to an amino acid, which when connected in a chain, fold into a protein that serves a specific cellular function. *See* id.
[28] *CRISPR Timeline*, BROAD INSTITUTE (Feb. 2, 2024), https://www.broadinstitute.org/what-broad/areas-focus/project-spotlight/crispr-timeline.
[29] Reciprocity is based on matching base pairs, each of which has a corollary. *See,* ALBERTS ET AL., *Chapter 5: DNA and Chromosomes*, *in* ESSENTIAL CELL BIOLOGY (4th ed. 2019).
[30] *Id.*

As a gene editing tool, CRISPR technology essentially utilizes this natural system with precision. First, a gene is targeted for alteration. From there, scientists develop a custom piece of sgRNA, but instead of designing it to be reciprocal with viral genetic material, it is instead designed to be reciprocal to the target gene.[31] The sgRNA is mixed with Cas9 protein and introduced to the target area or body at large.[32] Once in the cell, the sgRNA binds with the patient's DNA, which activates the Cas9 protein to cut through both strands of the DNA.[33] From there, the cell can be relied on to repair the DNA through non-homologous end joining (which is the standard biological repair mechanism for repairing double stranded DNA breaks[34]), but this system is prone to generating damaging mutations.[35] Rather, CRISPR treatments will typically use homology driven repair (HDR) for which scientists will introduce template DNA[36] along with the sgRNA – Cas9 complex for the target cells to uptake at the locus of the double stranded cut.[37] Because of the relative simplicity of this system, scientists have been able to use CRISPR to modify up to five genes at a time, which is incredibly useful for experimentation and may greatly simplify treatments for which multiple simultaneous edits are necessary.[38]

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[31] Misganaw Asmamaw Mengstie & Belay Zawdie Wondimu, *Mechanism and Applications of CRISPR/Cas-9-Mediated Genome Editing*, 15 BIOLOGICS: TARGETS AND THERAPY 353, 354-55 (2021).
[32] Jocelyn Kaiser, *CRISPR Injected into the Blood Treats a Genetic Disease for the First Time*, SCIENCE (June 26, 2021), https://www.science.org/content/article/crispr-injected-blood-treats-genetic-disease-first-time.
[33] Asmamaw Mengstie & Zawdie Wondimu, *Mechanism and Applications of CRISPR/Cas-9-Mediated Genome Editing* at 354-55.
[34] This internal cellular system is basically the process of random nucleotide bases trying to bind with either end of cut DNA. Because nucleotide bases can only bind to particular other bases in particular ways, this random selection reliably repairs short DNA breaks, but cannot reliably replace a longer section of nucleotide bases. *See generally,* BRUCE ALBERTS ET AL., ESSENTIAL CELL BIOLOGY ch. 7 (Garland Science ed., 4th ed. 2014).
[35] Asmamaw Mengstie & Zawdie Wondimu, *Mechanism and Applications of CRISPR/Cas-9-Mediated Genome Editing* at 355.
[36] Homology driven repair refers to the cell replacing a damaged gene with DNA compatible with both ends of the double stranded break. This is how a healthy gene is introduced. This process is as simple as injecting a target area with template DNA; the cell will automatically place that DNA in its chromosome if it is there. *See id.*
[37] *Id.*
[38] *See CRISPR Timeline*, BROAD INST., https://www.broadinstitute.org/what-broad/areas-focus/project-spotlight/crispr-timeline [https://perma.cc/Y38K-SD27].

Studies are currently undergoing for in utero CRISPR uses.[39] Scientists are already able to identify genetic diseases in utero.[40] CRISPR has the potential to allow doctors to rectify these diseases during prenatal development.[41] Many genetic diseases cause significant morbidity or mortality shortly before or after birth and therefore must be treated in utero.[42] Others cause irreversible tissue damage resulting in lifelong disability, and therefore must be treated in the same manner.[43] Despite the obvious importance of in utero genetic treatments, none have been developed to approval thus far.[44]

What makes CRISPR revolutionary is the fact that scientists are quite capable of designing and synthesizing sgRNA, and there are already sgRNA synthesis 'kits' available for sale.[45] As a consequence, CRISPR should allow physicians to modify or replace any gene they can identify.[46] While this capability will allow physicians, in turn, to directly treat countless genetic diseases and make new medical treatments, this goal is by no means the limit of what can be done with CRISPR.[47] Human beings are amalgams of their genes. Unlocking the ability to alter these genes begs the question of whether, through this technology, we are transcending what it means to be human beings.[48]

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[39] Avery C. Rossidis et al., *In Utero CRISPR-Mediated Therapuetic Editing of Metabolic* Genes, 24 NATURE MED. 1513 (2018), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6249685/ [https://perma.cc/XE7P-D92H].
[40] *See id*.
[41] *Id.*
[42] *Id.*
[43] *See id.*
[44] *See* Sourav K. Bose et al., *In Utero Gene Therapy: Progress and Challenges*, 27 TRENDS IN MOLECULAR MED. 728 (2021), https://pmc.ncbi.nlm.nih.gov/articles/PMC8713252/ [https://perma.cc/3QHH-VKEK].
[45] PCR is a laboratory technique for creating copies of a specific section of genome. These copies can be used to transcribe sgRNA. *See generally Polymerase Chain Reaction (PCR)*, NAT'L HUMAN GENOME RSCH INST. (Apr. 15, 2025), https://www.genome.gov/genetics-glossary/Polymerase-Chain-Reaction [https://perma.cc/JD2U-J84X]; *sgRNA Ordering: Only Target Sequence Required,* SYNTHEGO, https://www.synthego.com/order/crispr-kits/synthetic-sgrna/ [https://perma.cc/6DHL-KMRN].
[46] Davies, *supra* note 1 at 4-5.
[47] Michael Specter, *The Gene Hackers*, THE NEW YORKER (Nov. 8, 2015), https://www.newyorker.com/magazine/2015/11/16/the-gene-hackers#:~:text=With%20CRISPR%2C%20scientists%20can%20change,defect%20associated%20with%20cystic%20fibrosis [**https://perma.cc/M7HP-YDAU].**
[48] *Id.*

II. NFGDs under the Medical Necessity Framework

A. Medical Necessity

The medical necessity framework that insurance companies generally abide by when making coverage determinations does not derive from the law but is so ubiquitous in the industry that it acts as de facto common law upon which each insurance organization has structured their more specific policy.[49] The framework is simple, and in its most general form, asks whether a test, treatment, or procedure is necessary to maintain or restore health or to treat a diagnosed medical problem.[50] To look at one specific example, Medicare defines medical necessity as "services or supplies that are needed to diagnose or treat your medical condition and that meet accepted standard of medical practice."[51] The second clause in that policy highlights an important part of this framework as insurance companies generally only cover treatments that have been approved by the FDA for that specific reason.[52] Therefore, insurance companies may refuse to cover a treatment, even if it has been FDA approved, if it has not been approved for the specific use contemplated.[53] However, insured patients may seek coverage for these drugs by

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[49] *See, e.g., Definition of Medical Necessity*, BLUE CROSS BLUE SHIELD MASSACHUSETTS (Feb. 2, 2024), https://www.bluecrossma.com/common/en_US/medical_policies/Definition%20of%20Med%20Nec%20Inv%20Not%20Med%20Nec%20prn.pdf [**https://perma.cc/N6UE-LDFD]**; *Glossary of Terms*, AETNA (Feb. 2, 2024), https://www.aetna.com/glossary.html [**https://perma.cc/58Q2-7CHA**].

[50] Michael Bihari, *The Definition of Medical Necessity in Health Insurance*, VERYWELL HEALTH (June 16, 2024), https://www.verywellhealth.com/medical-necessity-1738748 [**https://perma.cc/N6YZ-SG73].**

[51] *Id.*

[52] *See Understanding Unapproved Use of Approved Drugs "Off Label"*, U.S. FOOD AND DRUG ADMINISTRATION (Feb. 2, 2024), https://www.fda.gov/patients/learn-about-expanded-access-and-other-treatment-options/understanding-unapproved-use-approved-drugs-label

[53] *See id.*

petitioning for an "off-label" exception.[54] Another possible exception to the medical necessity framework is for experimental or investigational applications, in which a patient may petition for coverage for an intervention that is not FDA approved.[55]

Under this framework, there is little doubt that CRISPR treatments developed for PFGTDs will be covered for insured patients. These diseases are debilitating or fatal, so any potential treatment for them would be medically necessary. However, the same cannot be said for NFGDs.[56] Is it medically necessary to ensure an alopecia patient is able to grow hair when they can buy a wig for less? Or for a woman to have a child when they can adopt?

B. Insurance

Examining current treatment of NFGDs, coverage varies significantly based on a patient's state and Insurance. For those with employer sponsored coverage where the business has 50 or more employees, coverage can be regulated in two ways. If the employer purchases health insurance for their employees on the private market, coverage will be regulated by the State and the Employee Retirement Income Security Act of 1974 (ERISA).[57] However, when the

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[54] *See id.*

[55] *See Experimental or Investigational Treatment*, DeBofsky Law, https://www.debofsky.com/experimental-or-investigational-treatment/ [**https://perma.cc/T8VD-WUSD**]

[56] *See, e.g.*, Nancy Lovering and Alina Sharon, *The Hidden Costs of Alopecia Areata*, HEALTHLINE (Feb. 28, 2024), https://www.healthline.com/health/alopecia-areata-financial-costs [**https://perma.cc/TL9J-ACHB**] (explaining that insurance may or may not cover different treatments for alopecia); Tanya Wanchek and George Wehby, *State Mandated Coverage of Cleft Lip and Cleft Palate Treatment*, NATIONAL LIBRARY OF MEDICINE (Mar. 16, 2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7357273/#R9 [**https://perma.cc/X8W7-MJ64**](explaining that coverage for cleft palate and cleft lip repair varies significantly per state, and there are 19 states with no insurance mandate related to cleft lip or palate); *Insurance Coverage by State,* RESOLVE: THE NATIONAL INFERTILITY ASSOCIATION (accessed Apr. 15, 2024), https://resolve.org/learn/financial-resources-for-family-building/insurance-coverage/insurance-coverage-by-state/ [**https://perma.cc/PN8B-PPES**](explaining that only 21 states mandate insurance coverage for variance of infertility treatments).

[57] Louise Norris, *What Is Self-Insured Health Insurance,* VERY WELL HEALTH (Nov. 9, 2024), https://www.verywellhealth.com/what-is-self-insured-health-insurance-and-how-is-it-regulated-4688567 [**https://perma.cc/5H73-MYHU**].

employer funds the insurance (group insurance), then coverage is regulated only federally by ERISA.[58] ERISA requires that the offered insurance meet affordability, minimum value, and minimum essential coverage (MEC) standards.[59] The affordability standard, which is determined under the Affordable Care Act (ACA), is that insurance premiums must amount to less than 8.39% of an employee's household income.[60] The minimum value standard is that the insurance must cover 60% of medical costs for a standard population.[61] MEC standard means the Insurance must cover the ten essential health benefits specified by the ACA.[62] This regime is optional, but if a large employer does not insure 95% of its employees by offering a sufficiently attractive plan, the employer must pay penalties.[63]

State insurance regulation usually comes in the form of mandates that are enacted by state insurance commissioners, though laws vary by state.[64] Some of these mandates relate to at least some aspects of care for NFGDs. [65] For example, the Insurance Commissioner for Massachusetts has mandated insurance companies cover fertility treatments.[66]

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[58] *See ERISA*, U.S. DEPARTMENT OF LABOR (accessed Feb. 2, 2024), https://www.dol.gov/general/topic/health-plans/erisa#:~:text=The%20Employee%20Retirement%20Income%20Security,for%20individuals%20in%20these%20plans [**https://perma.cc/54LZ-2FKD].**

[59] *Minimum Value and Affordability*, IRS (accessed Apr. 15, 2024), https://www.irs.gov/affordable-care-act/employers/minimum-value-and-affordability [https://perma.cc/FL77-LCY6].

[60] Dorian Smith and Cheryl Hughes, *2024 Affordability Percentage for Employer Health Coverage Drops*, MERCER (Aug. 23, 2023), https://www.mercer.com/insights/law-and-policy/2024-affordability-percentage-for-employer-health-coverage-drops/ [https://perma.cc/6QNG-W5QG].

[61] *Minimum Value,* HEALTHCARE.GOV (accessed Apr. 15, 2024), https://www.healthcare.gov/glossary/minimum-value/ [https://perma.cc/43G5-EJRG].

[62] *Minimum Essential Coverage (MEC)*, HEALTHCARE.GOV (Feb. 2, 2024), https://www.healthcare.gov/glossary/minimum-essential-coverage/ [https://perma.cc/5954-WV5R].

[63] *Employer Responsibility Under the Affordable Care Act*, KFF (Feb. 29, 2024), https://www.kff.org/infographic/employer-responsibility-under-the-affordable-care-act/ [https://perma.cc/465R-PU7C].

[64] Regina Stephenson, *Insurance 101: All About State Insurance Commissioners,* AGENTSYNC (May 3, 2023), https://agentsync.io/blog/insurance-101/all-about-state-insurance-commissioners [https://perma.cc/5F69-2VQ3].

[65] *See, e.g.,* Mass. Gen. Laws chs. 175; 176A; 176B; 176D; and 176G, § 211 CMR 37.00 Infertility Benefits; Tanya Wancheck and George Wehby , *State Mandated Coverage of Cleft Lip and Cleft Palate Treatment*, National Library of Medicine (Feb. 2, 2024), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7357273/#R9 [https://perma.cc/LY52-XTVQ].

[66] *See* 211 Code of Massachusetts Regulation 37.00.

Individuals in group insurance plans may opt-out of their current plan and instead enroll in either a private or ACA marketplace plan, so long as they can afford to do so.[67] This dynamic is exacerbated by premium tax credits, which provide individuals with a tax credit to offset premiums paid for in ACA marketplace plans if their employer sponsored insurance is not compliant with the minimum requirements of ERISA.[68] Since employers typically do not want to pay a penalty for failing to insure enough of their employees, they are incentivized to provide at least as good of coverage as is available through the ACA marketplace (unless such a plan would cost the company more than the penalty they would pay). Thus, individuals with any type of insurance should typically receive more coverage in states with strong insurance regulation since the coverage floor is set by ACA marketplace plans subject to state Insurance Commissioner Mandates, though many Americans have insurance that exceeds the minimum requirements of their state regardless.

Applying the current insurance regulatory framework to treatments for NFGDs, coverage varies significantly based on the nature of one's insurance and the state in which they live.[69] Looking to fertility treatments as a specific example, about 10% of female and 15% of male infertility is due to genetic issues.[70] insurance commissioners have mandated at least some

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[67] Even if they would be unable to afford this, if their employer-sponsored plan does not cover the cost of care equal to at least 8.39% of the individuals income, they may be able to obtain a premium tax credit to better afford the ACA alternative plan. See *What is Sickle Cell Disease?*, NATIONAL HEART, LUNG, AND BLOOD INSTITUTE (Aug. 30, 2023), https://www.nhlbi.nih.gov/health/sickle-cell-disease#:~:text=The%20condition%20affects%20more%20than,born%20with%20sickle%20cell%20trait [https://perma.cc/4BV4-LQA9].

[68] *Premium Tax* Credit, HEALTHCARE.GOV (Accessed Apr. 15, 2024), https://www.healthcare.gov/glossary/premium-tax-credit\ [https://perma.cc/27BV-N3MJ].

[69] *Supra* note 54.

[70] *Is Infertility Genetic?*, GENOME MEDICAL (accessed Apr. 15, 2024), https://www.genomemedical.com/genetic-testing-pregnancy/is-infertility-genetic/#:~:text=Approximately%2010%20to%2015%20percent,cause%20could%20have%20been%20inherited [https://perma.cc/XTW8-KC8X].

coverage for fertility treatments in 21 states and the District of Columbia.[71] Therefore, a person in one of these 22 jurisdictions should be covered for these fertility treatments. For residents of the other 29 states, there is no guarantee of coverage for fertility treatments and individuals must either purchase or receive through their employment insurance that provides such coverage, which is not attainable for many Americans.

While coverage for fertility treatments is merely an example of how coverage for NFGDs works throughout the country, it is a reasonable proxy for understanding how CRISPR treatments for these diseases would be covered.[72] However, many NFGDs are not covered at all due to the simple fact that no effective cure or treatment currently exists.[73] The possibility of developing these treatments is what makes CRISPR technology revolutionary. However, there are always winners and losers in revolution, and if policymakers do not proactively act, the winners in the CRISPR revolution would be only those who could access these expensive treatments, to the detriment of society at large.[74]

III. Policy

A. Equity

[71] *Insurance Coverage by State*, RESOLVE (Feb. 2, 2024), https://resolve.org/learn/financial-resources-for-family-building/insurance-coverage/insurance-coverage-by-state/ [https://perma.cc/5ETS-YFBV].
[72] *Supra* note 36, 54.
[73] *Supra* note 3.
[74] Mollie Barnes, *Analysts Predict Slower Rollout but Ultimate Victory for Casgevy in Race with Lyfgenia*, BIOSPACE (Mar. 27, 2024), https://www.biospace.com/article/analysts-predict-slower-rollout-but-ultimate-victory-for-casgevy-in-race-with-lyfgenia/ [https://perma.cc/L6AC-BGZT].

Although it is very likely costs will come down as CRISPR is able to utilize economies of scale and their patent exclusivity period runs out, these treatments are expensive. Casgevy, the cheapest FDA-approved treatment using CRISPR technology, is priced at $2.2 million per treatment.[75] Because of this exorbitant price, only the extremely wealthy will be able to afford these treatments without insurance. Such a dynamic has negative policy implications that go beyond simple inequitable access to healthcare. Allowing the well insured and wealthy to treat their NFGDs by virtue of their economic power while not providing access to such treatment for the less-well insured or wealthy will allow the middle and upper class to literally artificially select the genes causing NFGDs out of their population all the while the less wealthy will continue to struggle with their ailments. [76] Because people tend to partner with people of the same social and economic class,[77] this dynamic would worsen over generations by concentrating the remaining individuals with NFGDs into a lower economic tiers, which, in turn, would increase the frequency of children born with either one or two copies of NFGD genes within that social class.[78] Because NFGDs are oftentimes externally visible, physical symptoms of these diseases will become indicators of low social class and wealth and therefore compound the stigma these individuals face.[79] This dynamic would, in turn, greatly reduce social mobility for

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[75] Ned Pagliarulo, *Pricey New Gene Therapies for Sickle Cell Pose Access Test*, Biopharma Dive (Dec. 8, 2023), https://www.biopharmadive.com/news/crispr-sickle-cell-price-millions-gene-therapy-vertex-bluebird/702066/#:~:text=Casgevy%2C%20the%20first%20CRISPR%20therapy,is%20priced%20at%20%243.1%20million.

[76] *Artificial Selection*, NATIONAL GEOGRAPHIC (Feb. 2, 2024), https://education.nationalgeographic.org/resource/artificial-selection/

[77] This is called Assortative mating. *See, e.g.,* Richard V. Reeves and Joanna Venator, *Opposites Don't Attract: Assortative Mating and Social Mobility*, BROOKINGS INSTITUTE (Feb. 10 , 201 4), https://www.brookings.edu/articles/opposites-dont-attract-assortative-mating-and-social-mobility/

[78] See Greg Watry, *Study Reveals How Genetic Uniformity Affects Offspring Fertility for Generations,* Letters & Science (Oct. 17, 2023). Just as alleles that confer survival benefit proliferate over time in a population under natural selection, artificial selection for NFGDs will similarly proliferate in a sequestered lower class.

[79] Norman Sartorius, *Stigmatized Illnesses in Healthcare*, CROAT. MED. J. 396, 396 (2007), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2080544/; *Supra* note 54.

these individuals.[80] Taken to a temporal and logical extreme, especially if we consider NFGDs broadly to include things like ADHD, depression, and low IQ, an unregulated market for CRISPR therapies could bifurcate society between those able to rectify NFGDs genes and subsequently reap economic benefit free from stigma and disadvantage, and those unable to afford such treatment that will subsequently face additional barriers to economic mobility.[81]

In order to avoid something like the situation described above, lawmakers must be proactive in their recognition of and reaction to the proliferation of CRISPR treatments. Beyond the societal reasons highlighted above, there are more traditional policy reasons for incorporating CRISPR into the current regulatory insurance framework.

B. Morality

In addition to the long-term equity concerns related to unchanged insurance regulation surrounding CRISPR treatments for NFGDs, there exists a moral imperative for change. An alternative framing of medical necessity is to consider a spectrum with 'treatment' on one end and 'enhancement' on the other.[82] Logically, this mirrors the question of whether something is medically necessary, as something that is enhancement would not be medically necessary. This

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[80] S. Bryn Austin and Jamie Slaughter-Acey, *The Real Cost of Beauty Ideals*, Dove (Oct. 2022).

[81] *See, e.g., Id;* Sevel Kacar et. al., *The Percieved Stigma in Patient's with Alopecia Areata and Mental Disorder: A Comparative Study*, NATIONAL LIBRARY OF MEDICINE (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5007920/; Human Rights Council Res. 23/13 (Jun. 24 2013) , ; Joanna Cox et. al., *Social Stigma and Self-perception in Adolescents with Tourette Syndrome*, Int. J. Trichology (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6573773/#:~:text=TS%20appears%20to%20be%20associated,reported%20by%20patients%20with%20TS.

[82] Alexandre Erler, *The Limits of the Treatment-Enhancement Distinction as a Guide to Public Policy*, 31 Bioethics (Special Issue) (2017), https://pubmed.ncbi.nlm.nih.gov/28901597/.

spectrum will be the x axis, and the closer a medical intervention is to treatment, the more morality demands coverage of that intervention.

Another concept inherent to health insurance is cost-benefit analysis. Indeed, every coverage decision considers a cost-benefit analysis; insurance companies do not cover every possible solution to a medical issue but instead generally only cover FDA approved treatments (with exceptions for experimental and off-label treatments).[83] Furthermore, i Insurance companies often will require "step therapy," where the patient is required to try cheaper treatments before a more expensive one will be covered, as a cost saving tool.[84] This policy is undoubtedly efficient, but it may prolong suffering and could be abused to deny justifiable, but more expensive, coverage to an individual. Despite this, cost benefit analysis is not entirely inappropriate when making coverage determinations as inefficient spending raises the costs for all insured. However, cost benefit analysis can be abused to justify denying coverage for the sake of cost saving.

The y axis represents perceived efficacy regardless of cost. Cost is absent because plotting treatments without consideration of cost illustrates how a pure medical necessity framework would handle CRISPR treatments for NFGDs. If cost saving measure like step therapy or outright denials of viable treatments occur, the below graphs illustrate how such practices would violate Insurance Companies' own stated medical necessity policies.

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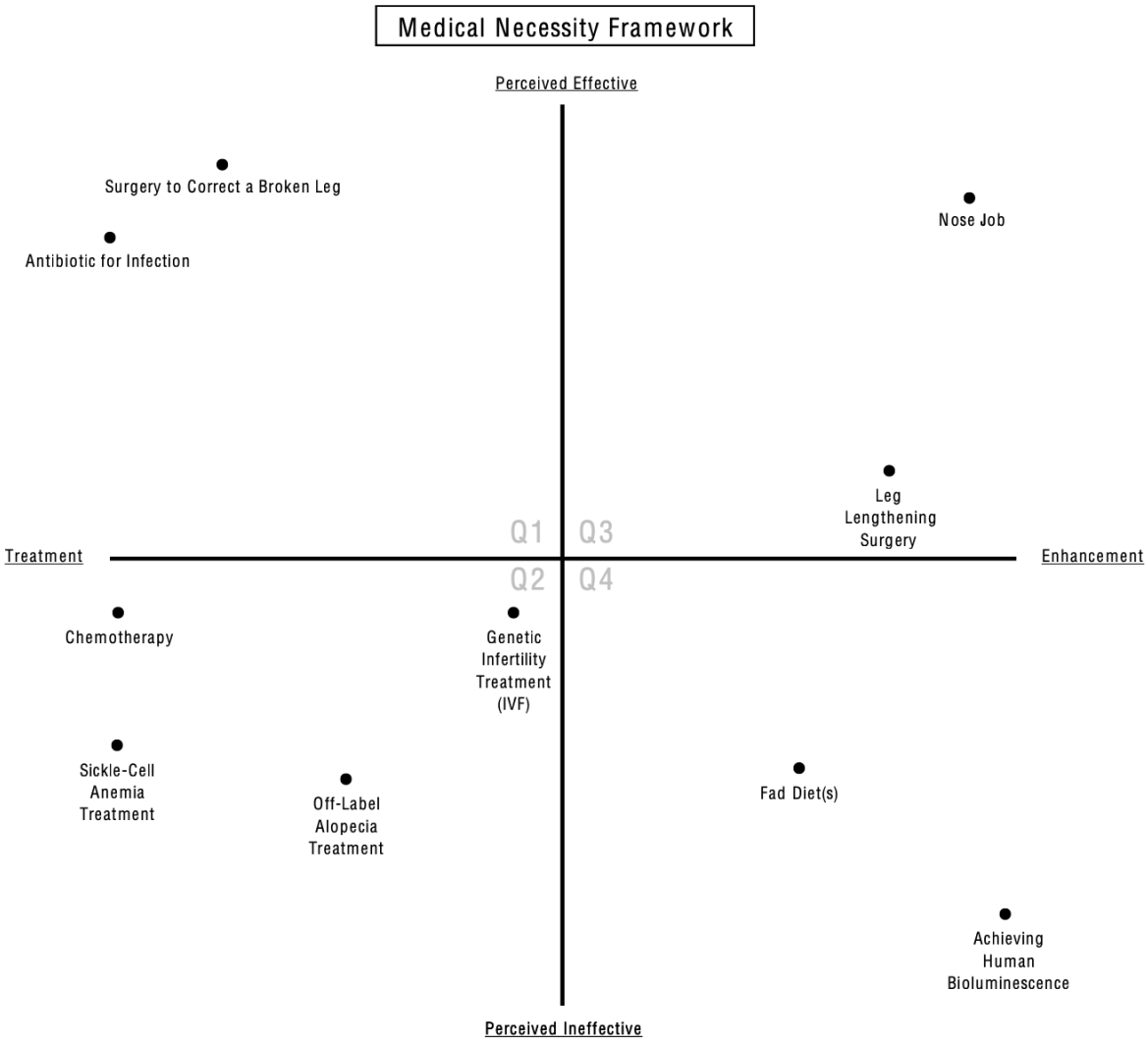
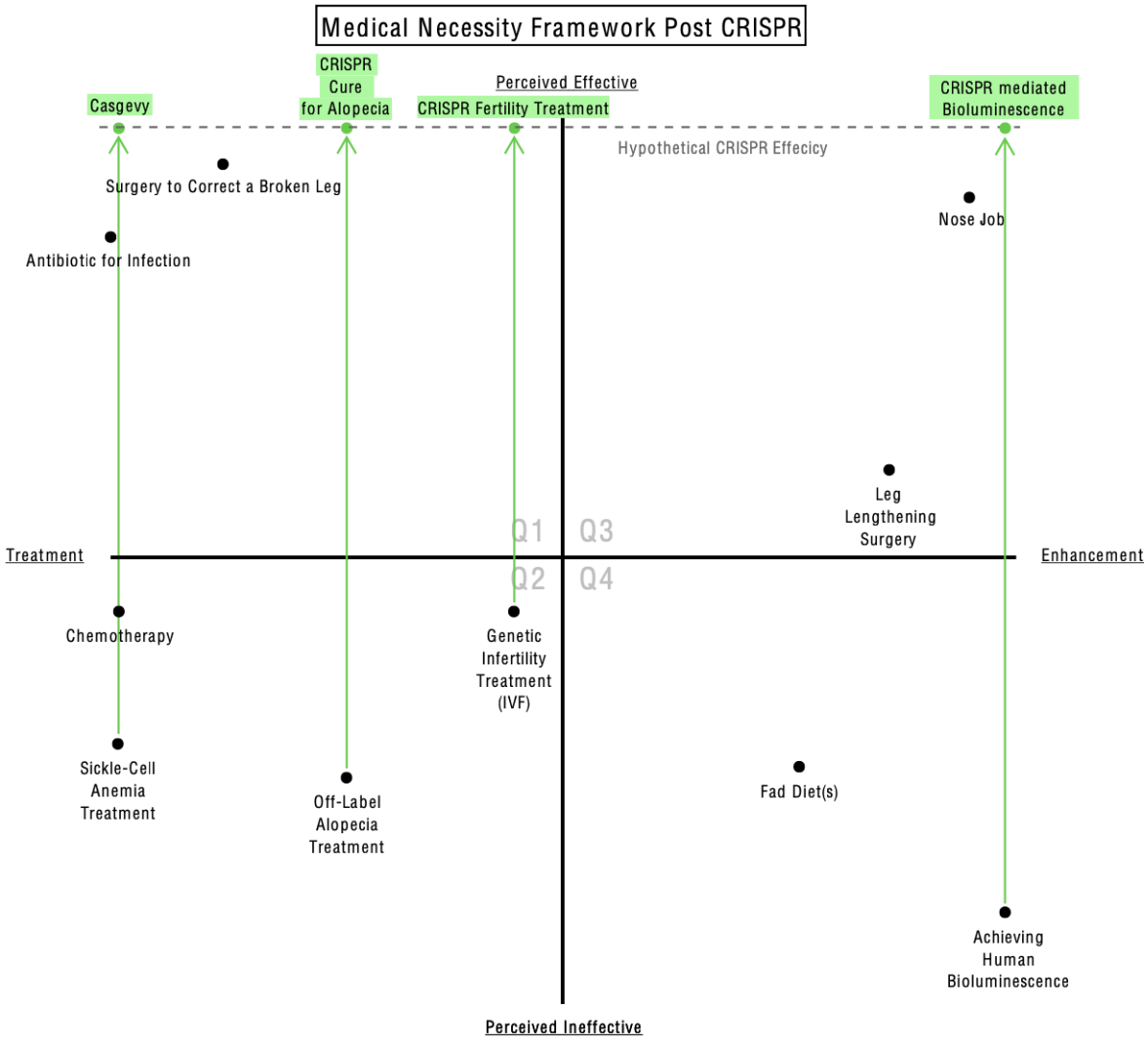
[83] *See generally* David D. Kim and Anirban Basu P *How Does Cost-Effectiveness Analysis Inform Health Care Decisions?*, 23 AMERICAN MEDICAL ASSOCIATION JOURNAL OF ETHICS, 639 (2021). *See also supra* note 21.
[84] Alex Evans, *What Is Step Therapy? How to Get Insurance to Pay for your 'Non-Preferred' Medication*, GoodRX (Feb. 21, 2023), https://www.goodrx.com/drugs/savings/what-is-step-therapy.


Medical Necessity Framework
Perceived Effective
Surgery to Correct a Broken Leg
Antibiotic for Infection
Nose Job
Leg Lengthening Surgery
Q1
Q3
Treatment
Enhancement
Q2
Q4
Chemotherapy
Genetic Infertility Treatment (IVF)
Sickle-Cell Anemia Treatment
Off-Label Alopecia Treatment
Fad Diet(s)
Achieving Human Bioluminescence
Perceived Ineffective



In the first graph, Q1 treatments are almost always covered because providing these treatments are medically necessary and proven effective. Q3 treatments will be covered only in extenuating circumstances, and Q4 treatments are never covered (contingent upon insurance policy and state of residence). Whether or not you agree with the rationale, health insurance basically operates this way.

Q2 treatments are may or may not be covered depending on the individual's state and Insurance provider. It is in Q2 where there is the most potential abuse justified by cost-benefit analysis. While such an analysis may be truthful, it can also justify denying coverage for more expensive, off label, and experimental treatments that may offer better outcomes for patients but which the insurance company is unwilling to pay for. At its extreme, these analyses may lead to Insurance Companies only providing coverage for cheaper, less effective or lower quality treatments where a completely effective, albeit expensive, treatment exists.

Taking Alopecia for example, it is cheaper for an insurance company to cover the cost of a wig than to pay for the available off-label alopecia treatment in the long term.[85] Indeed, 97% of requests for off-label prescriptions in 2022 were denied for Alopecia patients.[86] We see this play out in the two states that have mandated Insurance coverage for Alopecia patients, where they mandate only providing a wig, not covering off-label prescriptions.[87] In a recent study, it was found that 44% of Alopecia patients in the U.S. did not receive any kind of treatment between 2011 and 2018.[88] Furthermore, while the mean cost of treatment was reasonable at $419.12 over this time, the standard deviation of cost of treatment was $1534.99, suggesting costs of treatment varies drastically.[89] In totality, this all suggests financial barriers, exacerbated by lack of Insurance coverage, are preventing people from seeking treatment. One could argue that because these treatments are off-label, and therefore unproven, denying coverage is efficient, but it is

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[85] Nancy Lovering and Alina Sharon, *The Hidden Costs of Alopecia*, *Healthline* (Feb. 28, 2024 https://www.healthline.com/health/alopecia-areata-financial-costs#insurance-coverage.
[86] *Id.*
[87] Health Care Commission and Beidel, P.G. (Jan. 9, 2024). Available at: https://mhcc.maryland.gov/mhcc/pages/plr/plr/documents/2023/lgst_sb0075.pdf.
[88] Senna, M. *et al.* (2021) *Alopecia areata treatment patterns, Healthcare Resource Utilization, and comorbidities in the US population using insurance claims*, *Advances in therapy*. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC8408067/ (Accessed: 14 March 2025).
[89] *Id.*

doubtful that someone with alopecia that has never been able to afford these off-label drugs to see if they work for them would share that opinion.

Regardless of the morality and efficiency of currently covering off-label alopecia treatments, the introduction of each CRISPR treatment for each NFGD will dramatically move treatment for these diseases vertically upwards on the y axis. Without regulatory action or a reaction by Insurance Companies, this will cause many Americans to be denied treatments that are in Q1. Taking infertility as an example once again, coverage for treatment is currently situated in Q2 closer to the mid-point of the x axis than the treatment extreme. It is at this point in the x axis because it is the standard that women are able to get pregnant, so it is treatment, rather than enhancement, to attempt to provide fertility to an infertile woman, but it is not pure treatment as infertility care is not necessary for a women's survival or physical comfort. It is below the x axis because fertility treatment is not at all guaranteed as effective.[90] It's positioning on the graph is correlative to how frequently it is covered (and as a borderline treatment/enhancement and effective/not effective intervention, at least some treatment is automatically covered in about 40% of states).[91] Now, imagine a CRISPR treatment is introduced than can rectify any genetic cause of infertility. The coverage would move vertically upwards into Q1, and therefore should be covered for all, despite it now being automatically covered only for a minority.

Therefore, insurance must be compelled to provide CRISPR treatments for NFGDs for those treatments that CRISPR moves into Q1. Doing so merely complies with the current moral

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[90] *How to Interpret ART Success Rates*, Center for Disease Control and Prevention (Feb. 2, 2024),https://www.cdc.gov/art/success-rates/interpret.html. This source claims that ART treatment is effective about 25% of the time.
[91] *Supra* note 38.

rationale for coverage decisions, so a failure to do so would be morally regressive. Treatments moved into Q3 should similarly be treated like Q3, rather than Q4 treatments.

One could argue that the above graphs show that the health insurance industry is well positioned to react to the proliferation of NFGD CRISPR treatments because it will adjust to cover those speculative Q1 CRISPR treatments. However, the revolutionary nature of CRISPR treatments, and their exorbitant costs, leaves one questioning whether these treatments will be integrated into coverage like traditional treatments. Thus, the above graphs should act as an accountability measure for Insurance Companies; the graphs simply illustrate their own stated policy, so failure to integrate new NFGD CRISPR treatments amounts to an immoral "pick and choose" application of medical necessity by Insurance Companies in the name of their bottom lines. Perhaps Insurance Companies will seamlessly incorporate these treatments, but if they do not, the above graphs demonstrate how their own policies should cover them.

C. Economics

The economic loss caused by NFGDs stems primarily from appearance-based discrimination and body dissatisfaction, with some also coming from cost of treatment.[92] It is well established that appearance-based discrimination leads to economic loss for individuals and the economy as a whole; in a recent study paid for by Dove and conducted by Deloitte and the Harvard School of Public Health, it was estimated that appearance-based discrimination based on

[92] Austin *supra* note 79. Note that these types of losses may also apply to people suffering from PFGTDs, but this paper will not analyze these costs in terms of PFTGDs because the focus of treating these diseases is ensuring survival, rather than rectifying a symptom that may lead to one of these three economic losses.

weight and skin shade alone caused $269 Billion dollars, or 1.3% of U.S. GDP, in additional financial costs in the United States in 2019.[93] While it is unclear what proportion of appearance based discrimination is levied against those with noticeable NFGDs, this study shows that this type of discrimination is extremely costly in the aggregate. While we lack data on whether, with the high cost of initial CRISPR treatments, expenditure on treating noticeable NFGDs would equal the economic benefit of eliminating appearance-based discrimination against those with noticeable NFGDs through treatment, as CRISPR treatments become less expensive over time, the likelihood of receiving a positive return will increase.

It is worth mentioning that traditional attempts to eliminate appearance-based discrimination have focused on educating people to not discriminate against others, rather than treating differences. This is the ideal way to attack this issue for most people suffering from appearance-based discrimination because there is no desire, imperative, incentive, or any reason whatsoever to change those discriminated against.[94] By contrast, people with noticeable NFGDs typically seek treatment to make their diseases less noticeable if possible. This implies the existence of a moral sentiment that treatment of noticeable NFGDs is desired, in a way that would not apply to changing a racial skin tone or some other identity defining feature. This difference may be due to the fact that typical appearance features discriminated against are usually associated with identity, culture, and community. While I cannot speak to the experience of those with noticeable NFGDs, to an outsider's perspective, noticeable NFGDs do not carry the same positive cultural aspects that other features that are discriminated against do. Perhaps it is morally preferable to eliminate appearance-based discrimination through more traditional

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[93] *Id*. The study specifies those who bear this cost as (1) people directly affected, (2) their friends and family, (3) employers, (4) governments, (5) other payers (including private health care insurers) and, (6) the rest of society.
[94] *Id*.

education measures, but let us not ignore a practical and desired solution for an idealistic one.

Body dissatisfaction similarly incurs a significant financial cost in the U.S. The same study mentioned above estimates the financial cost of body dissatisfaction in 2019 at $84 billion.[95] Like with appearance-based discrimination, it is difficult to know what proportion of that figure is attributable to people with noticeable NFGDs. However, the figure is significant enough to contend that eliminating body dissatisfaction through CRISPR cures for whatever percentage of the population that suffers from noticeable NFGDs may be more economically efficient than not providing reasonable access to these cures, at least as cost of treatment comes down.

It is difficult to generalize the economic cost of NFGDs in terms of time and money spent dealing with the disease. Such costs vary considerably based on the individual's diseases, insurance, and state of residence. Anecdotally, however, it is clear that nearly all NFGDs have some associated cost to deal with the disease. Genetic infertility is perhaps the most poignant example; a round of IVF treatment can cost up to $30,000.[96] In 2021, 238,126 patients received 413,776 IVF cycles which led to 97,128 live births, resulting in about a 23.5% success rate per cycle.[97] This means $3.9 billion dollars were spent of IVF treatments that did not even work, much of which is a cost largely born by the women seeking treatment since coverage is only guaranteed for insured patients in 21 of the 51 relevant jurisdictions. Since about 10% of female infertility is genetically caused, this implies $390,000,000.00 was spent on IVF for peoples suffering from genetically caused infertility. Of the group, women went through 1.74 cycles on

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[95] *Id*.
[96] Beth Duff-Brown, *Striking Costs of Infertility Point to Importance of IVF Access and Affordability*, Stanford Institute for Economic Policy Research, (Jul. 12, 2024), https://siepr.stanford.edu/news/striking-costs-infertility-point-importance-ivf-access-and-affordability.
[97] *Assisted Reproductive Technology (ART) Data*, CENTER FOR DISEASE CONTROL (2021), https://art.cdc.gov/

average totaling about $21,500 of expenditure. While the total cost of treatment is modest compared to the aggregate costs of appearance based discrimination and body dissatisfaction, they still add to the economic justification for mandating coverage for NFGD CRISPR cures.

C. Policy Recommendation

The moral and economic imperatives for ensuring broad access to CRISPR cures for people suffering from NFGDs begs the question of how to bring about this change. Potential solutions are infinite, but many of them require a fundamental restructuring of healthcare in America that other papers examine in great sophistication. Solutions in this paper will be limited to those that are compatible with the current systems.

The most obvious and direct way to ensure broad access to CRISPR cures for NFGDs would be to add an eleventh essential health benefit to the ACA ensuring access to genetic cures. Because the ACA acts as a baseline for Insurance providers nationally,[98] changing the ACA in this way would reach all insured people in the United States and therefore satisfy the moral impetus for this change. However, this approach may unduly burden employers and would present considerable additional healthcare costs to Medicaid.

Under such a regime, costs of treatment would be distributed between employers, employee's with employer sponsored insurance, state and federal governments, and the patient through their co-pay. Employer's with over 50 employees would still be beholden to penalties under the ACA if they fail to provide Insurance for 95% of their employees that meet

[98] *Supra* n. 67.

affordability and minimum value standards.[99] Obviously, providing coverage for genetic cures for NFGDs will raise the cost of insurance. The affordability standard for employer sponsored insurance is that the insurance cannot cost the employee more than 8.39% of their yearly income.[100] Therefore, employers would have to absorb much of the additional cost, either directly by paying more for their employee's healthcare (and not raising premiums) or by raising wages in conjunction with premiums to ensure they continue to offer affordable plans. Employee's would face additional burden in the form of higher premiums, at least for those employee's who's wage was not increased to comply with the ACA affordability standard.

The federal and state governments would also face additional costs under this regime. Firstly, insurance premiums paid by either the employer or employee are not taxable, so any increase in these premiums represents lost tax income, as the income spent on these premiums would most likely otherwise been spent on taxable goods. Secondly, the government would obviously have to pay for the majority of additional treatment for those with Medicare and Medicaid. The distribution of all of the above costs could be reallocated to the insured, whether employer or government sponsored, through raising co-pays and deductibles, but the United States already has a medical debt problem that this regime would exacerbate.[101]

The above regime is somewhat efficient for PFGDs because the traditional cost of treatment for these diseases are typically high and ongoing. Casgevy is an excellent example of this cost-benefit analysis.[102] On average, insurer's pay $1.7 million per patient lifetime for

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[99] *Employer Responsibility Under the Affordable Care Act*, KFF (Feb. 29, 2024), https://www.kff.org/infographic/employer-responsibility-under-the-affordable-care-act/.
[100] *Id.* .
[101] Shameek Rakshit et al., *The Burden of Medical Debt in the United States,* PETERSON-KFF (Feb. 12, 2024), https://www.healthsystemtracker.org/brief/the-burden-of-medical-debt-in-the-united-states/.
[102] *Casgevy*, CASGEVY, (Accessed Apr. 15, 2024), https://www.casgevy.com/sickle-cell-disease

treating sickle-cell anemia.[103] Casgevy does cost slightly more, $2.2 million, but, because those suffering from sickle-cell anemia lose around $700,000 over the course of their lifetimes due to their inability to work as an able-bodied person is, it is more $200,000 more efficient per patient to provide Casgevy than remain on traditional treatment (depending on the age and working life of the patient).[104] Because the costs of NFGDs are mostly related to appearance based discrimination and body dissatisfaction, the economic return on treating these diseases will be felt more broadly across the economy than would be the case for treating a PFGD, even if they are largely concentrated in the patient. In short, PFGD treatments are economically viable in individual cases, while NFGD treatments are efficient the aggregate and but may unduly burden those who must pay for them even if society at large is better off.

The above regime would also be unpalatable to the public; the most burdened individuals would be those who's rates, but not wages, would be affected by the policy. It may also be unaffordable for some businesses with many employees whose employer sponsored insurance rates are near the 8.39% affordability threshold of their income. Therefore, such a policy would likely lead to an increase in medical debt and contraction of the labor market. To cause such an effect for what is not-strictly medically necessary treatment would be hard to sell to voters and lobbyists worried about their finances.

Rather than fund treatment of NFGDs through health insurance, the legislature should do so through a progressive tax, justified by the social equity and economic concerns surrounding CRISPR cures that this paper raises. However, considering the federal deficit and many important financial needs in the United States, this paper recommends implementing this tax

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[103] *Researchers Identify the High Costs of Living with Sickle Cell Disease,* NATIONAL INSTITUTE OF HEALTH (May 16, 2022), https://www.nih.gov/news-events/news-releases/researchers-identify-high-costs-living-sickle-cell-disease
[104] *Id.*

through an expansion to the Federal Insurance Contribution Act (FICA). Currently, FICA helps those unable to earn income due to age or disability through Social Security and Medicare. This regime provides insurance in addition to redistributing wealth to those unable to earn. Expanding FICA to fund CRISPR cures for NFGDs would amount to expanding the regime to providing insurance for those disadvantaged in earning, rather than strictly those unable to earn; a modest expansion.

Housing the tax within FICA would also allow the tax to have a redistributive effect in addition to avoiding additional strain on general tax revenue. The structure of this tax would be an additional burden on those who make more than the tax cap for social security, exclusively on their income above that cap.[105] While I lack data to calculate exactly how much revenue such a tax would generate, a rough estimation shows that such a tax at 5% would generate more than $70 billion annually.[106] This would redistribute wealth from the highest earners to the general population by not only shifting the burden of the cost of treatment, but also by eliminating the costs of some appearance based discrimination and body dissatisfaction.

Such an 'equity tax' need not be limited to funding CRISPR cures for NFGDs. There are many reasons to redistribute wealth from the highest earners to the general population beyond NFGDs, and even beyond health equity. However, considering the equity concerns this paper raises, funding NFGD CRISPR cures should receive significant funding. Furthermore, if this

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[105] Data appears to be surprisingly slim. The social security tax cap is based on individual income, and I only have household income data*, infra* note 105.

[106] This was calculated by multiplying the difference between the average income of the top 5% of earners and the tax cap for social security by the tax rate, and then multiplying that result by the number of individuals comprising the top 5%. Elise Gould & Jori Kandra, *Inequality in Annual Earnings Worsens in 2021*, ECON. POL'Y INST. (Dec. 21, 2022) https://www.epi.org/publication/inequality-2021-ssa-data/#:~:text=Key%20findings&text=The%20top%201%25%20earned%2014.6,their%2069.8%25%20share%20in%201979. [perma.cc/2QSZ-TUX4]; *Monthly Civilian Labor Force In the United States from March 2022 to March 2024 (Seasonally Adjusted)*, STATISTA (Apr. 9, 2024) https://www.statista.com/statistics/193953/seasonally-adjusted-monthly-civilian-labor-force-in-the-us/#:~:text=U.S.%20civilian%20labor%20force%20seasonally%20adjusted%202022% [perma.cc/H8CR-LDR4]..

fund were to be started now, before CRISPR cures for NFGDs are available, some of the fund set aside for NFGD treatment could accrue interest.

Of course, this is not the only way to fund access to CRISPR cures for NFGDs. One could expand Medicare to cover those with NFGDs, similar to how it covers those with End Stage Renal Disease.[107] In doing so, the government could either raise the FICA Medicare tax, in a regressive or progressive fashion, or draw on the general tax revenues that already funds 46% of Medicare spending.[108] Considering that the Medicare Hospital Insurance Trust Fund is running out, and the federal deficit remains significant, some additional tax would likely be best.

The government could also use Medicaid to implement this change. However, considering the prohibitive cost of current CRISPR cures (Casgevy), Medicaid would have to allow a considerably larger portion of the population to qualify for assistance, at least in the specific area of CRISPR cures, to provide meaningful access. Furthermore, such a change would further stress the Federal and state governments that pay for Medicaid. However, this system could potentially allow states to opt into the regime, preserving state's rights and, by extension, providing some choice to individuals in whether they would like to contribute to this program (though it is recognized movement between states for individuals carry significant emotional and financial costs that can be prohibitive to movement).

In a similar vein, state insurance commissioners could individually mandate coverage for CRISPR cures for NFGDs. The problem with relying on such a system is that each state would be incentivized to wait as long as possible to make this change. Despite the challenges to

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[107] *Who's Eligible for Medicare?* U.S. DEP'T HEALTH HUM. SERVS. (Dec. 8, 2022), https://www.hhs.gov/answers/medicare-and-medicaid/who-is-eligible-for-medicare/index.html

[108] Juliette Cubanski & Tricia Neuman, *What to Know About Medicare Spending and* Financing, KFF (Jan. 19, 2023), https://www.kff.org/medicare/issue-brief/what-to-know-about-medicare-spending-and-financing/#:~:text=Funding%20for%20Medicare%20Comes%20Primarily,15%25)%20(Figure%208) [perma.cc/G8QZ-KMXA].

mobility in this country, the value of CRISPR cures to people with NFGDs, both in terms of emotional benefit and actual economic cost, are so great that people would likely migrate to take advantage of such a generous mandate. This would significantly and disproportionately raise the cost of Insurance for all in that state, while the states that hold out from this mandate would suffer minimal economic loss, since the proportion of people with NFGDs is rather low.[109] Essentially, there would not be sufficient incentive for states to compete for people with NFGDs.

Finally, the Federal government could implement this change through a new program that draws on general tax revenues. This simplistic approach has the benefit of fitting easily into the current tax system. In this system, the federal government could adjust taxes to generate any additional funding necessary. The main difference between this and the FICA solution is that equitable redistribution is part of the proposed FICA system, whereas in this general system, the general tax revenue used to fund the program would come from the entire population.

It worth explicitly stating that people suffering from NFGDs are generally just as capable as any average person. Though this group may face additional healthcare costs, these diseases do not necessarily inhibit a person from finding success in a chosen field, with some variation. However, the costs in the aggregate, namely costs associated with treating their disease and the emotional and financial costs of body dissatisfaction and appearance-based discrimination, are undoubtedly significant. While there is a moral imperative for implementing a regime like the one discussed here for the benefit of the individual, that justification alone is unlikely to move the needle in American politics. Rather, the main justification for such a tax would be the economic benefit realized through a reduction in the discussed costs. One study conducted by the

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[109] *See, e.g.*, *supra* note 69; *Alopecia areata - national alopecia areata foundation*, NAAF (last visitedMar. 15, 2025). https://www.naaf.org/alopecia-areata/#:~:text=About%202%25%20of%20people%20across,some%20form%20of%20alopecia%20areata [perma.cc/8W6N-U5ZH].

Washington Center for Equitable Growth estimated that the U.S. economy lost out on $7.2 trillion dollars in GDP in 2019 due to inequal economic opportunity based on race, ethnicity, and gender.[110] While inequality due to suffering from an NFGD is not so widespread, there is undoubtedly a similar type of cost associated with those with these diseases.

IV. Conclusion

CRISPR is a revolutionary technology that will change the world. It will start by providing the first truly effective treatments for countless, serious, genetic diseases. This process has already begun with the approval of several gene therapies for sickle-cell anemia[111] and cerebral adrenoleukodystrophy.[112] Other treatments in development include those for cystic fibrosis, cancer, and muscular dystrophy.[113] Once treatments for these diseases are established and CRISPR processes have become more commonplace, new competitors will enter the market and bring new therapies for new diseases as they attempt to establish their niches. Some of these new players will establish niches in treatments for NFGDs. Hopefully, by that time, the policy changes suggested above will have been established.

While CRISPR has the potential to save and improve the lives of countless people, its potential to shape humanity raises countless legal and ethical questions for the future. He

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[110] Robert Lynch, *The Economic Benefits of Equal Opportunity in the United States by Ending Racial, Ethnic, and Gender Disparities*, WASH. CTR. FOR EQUITABLE GROWTH (Jun. 29, 2021), https://equitablegrowth.org/the-economic-benefits-of-equal-opportunity-in-the-united-states-by-ending-racial-ethnic-and-gender-disparities/ [permra.cc/5WAK-FG79].
[111] Judith Stewart, *Casgevy FDA Approval History*, DRUGS.COM (Feb. 2. 2024).
[112] Veronica Salib, *Bluebird's Gene Therapy Costs $3 Million per Treatment,* GENETICS AND GENOMICS NEWS (Sep. 21, 2022), https://lifesciencesintelligence.com/news/bluebirds-gene-therapy-costs-3-million-per-treatment [perma.cc/E6KS-26RU].
[113] *Supra* note 2.

Jiankui's unapproved genetic editing of twin babies in utero is a grim reminder of the potential misuse of CRISPR technology.[114] Bioethicists are especially concerned about the concept of designer babies, which are children edited in utero by their parents to their preferences.[115] Designer babies are somewhat shocking to many current sensibilities and raise questions of what family, individualism, and humanity means. Furthermore, there is the troubling thought of CRISPR being used improperly by a government. They could ethnically cleanse or edit for subservience. CRISPR, like any powerful tool, can be used for good or evil.

Yet, as the medical landscape changes due to dramatic improvements in care, designer babies and other seemingly shocking uses of CRISPR may begin to feel acceptable. Over time, it is easy to imagine that CRISPR treatments will expand to treating neurological disorders like ADHD, anxiety, and depression. Such a development would mirror the historical trend of expanding the number of diagnoses, especially neurological diagnoses.[116] Indeed, what we today label ADHD, was simply an overly energetic child 100 years ago.

Similarly, 100 years in the future, a tendency to overeat may come to be regarded as a treatable neurological condition. As the trend towards categorizing what is now considered normal human behavior as a diagnosable disorder continues, and coverage for more serious issues is provided, humanity may expect treatment for more minor physical and mental defects. Perhaps, for example, being two standard deviations off of average height could be categorized as a deficiency and become treatable with CRISPR. In general, as more conditions are identified and the most extreme ailments are rectified, things that we now perceive as enhancement or

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[114] Davies, *supra* note 1 at X.
[115] Laura Hercher, *Designer Babies Aren't Futuristic. They're Already Here*, MIT TECH. REV. (Feb. 2, 2024), https://www.technologyreview.com/2018/10/22/139478/are-we-designing-inequality-into-our-genes/ [perma.cc/X69N-5WX4].
[116] *Compare* A. Frances et. al., *DSM IV: WORK IN PROGRESS*, 147 Am. J. Psychiatry (Nov. 1990), *with* S. Petrucciani& C. Recchia, *DSM V. S.l.: s.n.* (2014).

unnecessary to change may shift leftwards on the treatment – enhancement axis. In our current world, being below average IQ is just a feature of your person. In the future, when serious diseases have long been mitigated, perhaps such a deficiency will be seen as a treatable disease. For all these treatments, the same societal, moral, and economic concerns as they do with NFGDs; such treatments risk bifurcating society if they are not accessible to all.

Lawmakers, in many ways, failed to properly regulate social media for lack of appreciation of the power of those platforms.[117] The revolutionary nature of CRISPR, in contrast to the internet, is easy to see from a distance. Lawmakers should take advantage of this and recognize that CRISPR must be regulated proactively to avoid the recklessness and abuse that proliferates on the internet; the consequences are too severe to sit passively. Ensuring equitable access to CRISPR treatments for NFGDs is just one, early, step towards proper regulation of this revolutionary tool.

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[117] *See, e.g.,* Barbera Ortutay, *Facebook's System Approved Dehumanizing Hate Speech*, PBS NEWSHOUR, (Feb. 2, 2024), https://www.pbs.org/newshour/world/facebooks-system-approved-dehumanizing-hate-speech; Emily A Vogels, *Teens and Cyberbullying 2022*, PEW RSCH. CTR. (Feb. 2, 2024), https://www.pewresearch.org/internet/2022/12/15/teens-and-cyberbullying-2022/ [perma.cc/WTT9-TKK3].

Trademark Law: Insights from Hermès Int'l v. Rothschild For the Fashion Industry in the Metaverse

Bruna Graff

A. INTRODUCTION

The legal field has a variety of areas to be studied and understood. There are traditional ones such as contract, constitutional, criminal, and tort law. There are also others that are more recent as "official" areas of the law but are nonetheless well-established, like intellectual property and administrative law. Also, there are areas of the law that are more focused on a particular industry, such as health law, banking law, sports law, fashion law, and technology law. This last field has seen increasingly growth with the constant advances of technology and its increasing presence in our lives. In this sense, the law has been trying to keep up with technological advances that may cause ethical and legal issues in society. There is value, then, in understanding how traditional areas of the law, which are already established, interact with scientific innovations.

With this in mind, this Note proposes to address the idea of how trademark protection will be applied to the Metaverse by analyzing the case *Hermès International v. Rothschild.*

[1] Additionally, it proposes trademarks as the favorable protection for fashion brands in the virtual world just as it is already the preferred method for this industry in the real world. To better understand this development of the fashion industry in the metaverse, the Note will make comparisons through other cases that refer to different types of virtual goods and video games, as "the technology behind the metaverse is a confluence of the technology behind video games, social networks, e-commerce, and computer simulation that has developed over the last twenty years."[2]

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[1] No. 22-cv-384, 2023 WL 4145518 (S.D.N.Y. June 23, 2023). *See generally* Hèrmes Int'l v. Rothschild, 678 F. Supp. 3d 475 (S.D.N.Y. 2023)

[2] Justin Davidson, *Gaming and Law: What Business Need to Know Part 2: Gaming, IP rights and the metaverse*, NORTON ROSE FULBRIGHT (October 2023), Nortonrosefulbright/publications/gaming-ip-rights-and-the-metaverse [https://perma.cc/NM9L-MT54]

The Note also intends to analyze relevant events and cases that showcase the impact that technology has in the fashion industry, bringing legal issues with it. Lastly, the Note will conclude with a discussion on what should be expected to happen in the near future.

B. WHERE DO WE START?

1. Fashion & the Law

Clothes are our first method of communication.[3] Through them we can express our personality, economic status, profession, values, and the importance we give to a determined occasion.[4] They allow us to showcase who we are without the need of words, and throughout human history fashion has played an impactful role to the point that today, "as a whole, the world's citizens acquire 80 billion apparel items annually."[5] Furthermore, to explain the fashion industry relevance in economic terms, in the past thirty years, the fashion industry has grown from a $500 billion-year trade to a $2.4 trillion-year trade.[6] Thus, it should not be a surprise that an industry as impactful as the fashion industry would have, throughout the years, left a mark on the legal field, providing legal scholars with relevant cases for analysis, and developing a new area of the law known as fashion law.

Still, what is fashion law? Fashion law is the legal area that covers the legal issues faced by fashion designers and companies, where its applicability can be understood in the same way as entertainment law, art law, or sports law.[7] While this area incorporates business into the law, it also applies important concepts of contracts law, international trade, intellectual property, corporate law, employment law, and real estate, among others.[8] The idea of an area of the law dedicated to

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[3] DANA THOMAS, FASHIONOPOLIS: WHAT WE WEAR MATTERS 2 (2019).
[4] *Id.*
[5] *Id.* at 3.
[6] *Id.* at 4.
[7] *See* GUILLERMO C. JIMENEZ & BARBARA KOLSUN, FASHION LAW: A GUIDE FOR DESIGNERS, FASHION EXECUTIVES, AND ATTORNEYS, 2 (2d ed. 2014).
[8] *See id.*

fashion is fairly new, but fashion law cases have been relevant and impactful for many years. For instance, *Wood v. Lucy, Lady Duff-Gordon*[9] in 1917 explains about implied promises in contracts law. *Kieselstein-Cord v. Accessories by Pearl*[10] that took place in 1980 is the "belt buckle case", which established copyright protection to certain design elements.[11] *Equal Employment Opportunity Commission v. Abercrombie & Fitch*[12] from 2015 highlights discriminatory employment, serving as an example for brands of what can happen (and how much it can cost) to engage in discriminatory activities. In the 2013 case, *Christian Louboutin S.A. v. Yves Saint Laurent America, Inc.,*[13] the court discusses the intellectual property issue of granting trademark to elements that possessed "aesthetic functionality."[14] These are just some of the famous cases related to fashion law, as there are many other landmark cases.[15]

With this, we can see that issues that have impacted our lives in many aspects are also present in the fashion industry. Whether we are talking about employment – like the 2013

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[9] Wood v. Lucy, Lady Duff Gordon, 118 N.E. 214, 214 (N.Y. 1917). (Lady Duff-Gordon agreed to provide the exclusive right to Wood regarding endorsements to other's products and exclusive right to market and sell her designs. Lady Duff-Gordon would receive a percentage in exchange. Wood sued Lady Duff-Gordon when she entered on an agreement with someone else. The case is studied in contracts law as a discussion on consideration and reasonable effort.)

[10] *See generally* Kieselstein-Cord v. Accessories by Pearl, Inc., 632 F.2d 989 (2d Cir. 1980) (Case about the copying of two handcrafted belt buckles. While the court reminds that useful articles are not copyrightable, the court discusses separability as well as other requirements for copyrightable work as present in the buckles. Court holds that these handcrafted belt buckles are copyrightable.)

[11] JIMENEZ & KOLSUN, *supra* note 7, at 17.

[12] *See* E.E.O.C. v. Abercrombie & Fitch Stores, Inc., 575 U.S. 768, 768(2015) (Lawsuit followed Abercrombie refusal to hire a girl due to use of her religious headscarf. The case raised a question regarding Title VII of the Civil Rights Act of 1964, and the court holds that candidate cannot be denied the position just because the employer is trying to avoid making religious accommodations, independently of whether candidate informed them or not of the need for such accommodations.)

[13] Christian Louboutin S.A. v. Yves Saint Laurent America, Inc., 709 F.3d 140, 140 (2d Cir. 2013) (Louboutin, that is famous for their red sole shoes, sued Yves Saint Laurent for trademark infringement after the brand released their all-red shoe design with a red sole. The court discusses the ineligibility of an aesthetical functional mark for trademark, as well as the possibility of color being protected under trademark in the case of acquiring secondary meaning.)

[14] *See,* Jimenez, *supra* note 7, at 14; *see generally* Paula Caraffa Morando, *Position Trademarks: Protecting Distinctive Designs in a Visual World*, THE FASHION LAW JOURNAL (Jan. 26, 2024), https://www.thefashionlaw.com/position-trademarks-protecting-distinctive-designs-in-a-visual-world/.

[15] *See* Jimenez, *supra* note 7, at 17.

Bangladesh textile factory tragedy[16] –, environmental – cotton used in the fashion industry is one of the most polluting crops[17] –, or technological concerns – such as piracy and counterfeiting –, the fashion industry serves as a valuable "case study" on how to approach or how not to approach these concerns. In particular, this Note intends to investigate intellectual property issues, which have greatly impacted many industries, including fashion, and that continue to evolve with emerging technologies.

1. Intellectual Property

Intellectual property, or "IP", refers to "the creations of the mind," meaning designs, artistic and literary works, symbols, names, brand identifiers, and more.[18] There are different types of IP, including trademark, patent (design and utility), copyright, and trade secret.[19] The goal of IP, in general, is to provide financial benefits to inventors in exchange for promoting new and improved works that will benefit society.[20] Nevertheless, each type of IP protection has specific conditions related to it. Here, there will be a long discussion about trademark law, which is why it is important to highlight that, as opposed to copyright, trademark is not founded on constitutional mandate and must be applied with caution. In addition, trademark law is different from the other protections, as it is "not intended to protect the owner's right in a creative product simply to encourage creative output."[21] While the different IP protections have their own peculiarities, it is also worth mentioning, that all IP is territorial, and products may receive different protections in different places. For example, the European Union offers more IP protection for fashion designs than the

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[16] *Id.* at 9.
[17] *See* Thomas, *supra* note 3, at 2.
[18] WIPO, What is Intellectual Property?, https://www.wipo.int/about-ip/en/ (last visited Nov. 19, 2023).
[19] *Id.*
[20] *See id.; see also* Peter S. Menell, Mark A Lemley, Robert P. Mergers, Shyamkrishna Balganesh, *Intellectual Property in the New Technological Age* 19 (2023).
[21] Hermès Int'l v. Rothschild, No. 22-cv-384, 2023 U.S. Dist. LEXIS 17669, at *277 (S.D.N.Y. Feb. 2, 2023).

United States, even though similar legislation has been proposed in the latter.[22] In the fashion industry, we can find applications for patents for all types of IP. These include design patents for Fendi's bag clasp,[23] copyrights of, original fabric patterns,[24] and trade secrets.[25] Nonetheless, "trademarks are perhaps the most widely recognized form of IP in the fashion industry."[26]

Trademark includes "any word, name, symbol, or device, or any combination thereof" used by someone to "identify and distinguish his or her goods, including a unique product, from those manufactured or sold by others and to indicate the source of the goods, even if that source is unknown."[27] Meaning, it is a way to identify a product's origin, it is a mark of its source. The use of marks for identification have actually been present in human history, and we can find evidence of this practice, as long as 4,000 years ago.[28] Thus, "[t]rademark law primarily protects against use that confuses consumers as to the source of the good or service."[29] By preventing confusion, trademark benefits consumers in the sense that it allows them to shop efficiently, and also benefits companies because it allows them to develop a reputation and goodwill which will be perceived in their products and services.[30] It is interesting to see that, different from other intellectual property protections, "trademark protection is awarded to those who were the first to use a distinctive mark in commerce" and is not awarded as a reward and/or protection of something new, creative or inventive.[31] This strong relationship between commerce and trademark could explain

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[22] *See* Jimenez, *supra* note 7, at 28.
[23] US Patent D761687 (Jul.19, 2016).
[24] *See* Jimenez, *supra* note 7, at 46.
[25] *See id.* at 64.
[26] *Id.* at 26.
[27] 15 U.S.C. §1127
[28] PETER S. MENELL, MARK A. LEMLEY, ROBERT P. MERGES & SHYAMKRISHNA BALGANESH, INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE: 2023, 931 (Clause 8 Publ'g, 2023).
[29] JESSICA SILBEY, THE EUREKA MYTH: CREATORS, INNOVATORS, AND EVERYDAY INTELLECTUAL PROPERTY, 22 (Stanford Univ. Press, 2015).
[29] *Id.*
[31] MENELL ET AL., *supra* note 28, at 933.

why this protection has been constantly used by the fashion industry, which is evident in the several cases involving trademark and fashion.

Even after understanding what trademark is, we must still ask: why is trademark important for this industry and what is the scope of protection that trademark provides for the fashion industry? To understand this, first we need to comprehend that trademark has the benefit of not having an expiration date and may accumulate value over time, strengthening the brand.[32] For example, Louis Vuitton, one of the most valuable luxury goods brands today, was founded in 1854 and sought trademark protection for its "LV" monogram in 1896, which is still protected under trademark law today, as well as the company's name.[33] Second, it is important to remember that it is very hard for brands to receive any other type of protection for their designs, even if they are innovative and unusual.[34] The reason for this is that copyright cannot apply to the physical useful good and design patents can be expensive and time-consuming investments in an industry that is known to be very fast paced as pieces can go "out of style" in a matter of months. Due to the difficulty in getting the other types of protection and the efficacy that trademark has provided, even when we are discussing the "quiet luxury trend," we see brands applying several different trademark strategies (including color, packaging design, and shaping) that directs the consumers to the appropriate source.[35] Fashion brands make use of both trademark and trade dresses as source

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Error! Bookmark not defined. *See* JIMENEZ, *supra* note 8, at 13.

[32] *Id.*

Error! Bookmark not defined. JIMENEZ, *supra* note 8, at 28.

[35] *See* TFL, *What Does Quiet Luxury Mean from a Trademark Perspective?*, THE FASHION LAW JOURNAL (Apr. 26, 2023), https://www.thefashionlaw.com/what-does-quiet-luxury-mean-from-a-trademark-perspective/ (article presents a behavioral science research conducted in collaboration with a law firm that provides an "hierarchy" of indicators in the consumers' mind when relating to trademark and luxury. The article shows how color and product shape are valuable trademarks when a brand wants to avoid using their logos as source indicators. The article shares as examples, the Hermès Birkin bag shape, the Tiffany & Co.'s blue, Valentino's Pink PP, and Dior's Saddle bag. The article is valuable because it explains that brands that do not use logos as source identifiers found other successful ways to define a clear source identifier to their target audience, and invest in trademarks that we don't necessarily think as traditional marks).

identifiers – for example, Hermès has valid trademark and trade dress registration related to the Birkin bag. The difference between these protections is that trademarks refer to words, logos, designs, symbols, or combinations of those that serve as a source identifier, while trade dresses protect the design choices and commercial looks that are also source identifiers.[36] Thus, introducing trademarked elements to one's design or by having trade dresses related to certain design choices facilitates IP protection in relation to goods that would not usually be awarded patent or copyright protections. This explains the reason why trademark law is valuable for fashion companies and designers. Interesting enough, it is this type of protection that the courts have already discussed as possible protection for goods not only in the real world but also in the virtual world, as we can see with the case *Hermès Int'l v. Rothschild*[37] that this Note intends to analyze.

1. The Metaverse

Discussing the metaverse today is like discussing the Internet in the 1960s – we can only imagine how the future will be.[38] Some view the metaverse as a natural development from the Internet, but what is certain is that there has been plenty of effort to develop it.[39] The most famous effort is being made by Meta, that changed its company name from Facebook to fit its vision of the future. However, other famous metaverse platforms are Fortnite, Roblox, Axie Infinity, and Second Life.[40] To summarize, the metaverse is a virtual space in which you have the ability to engage in real life activities. The metaverse is "characterized by its ability to allow individuals to

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[36] *See Trade Dress Under the Law,* JUSTIA (Oct. 2023), https://www.justia.com/intellectual-property/trademarks/trade-dress/; *see also* Brandon Selinsky, *What is the Difference Between Trademark and Trade Dress,* JDSUPRA (June 16, 2023), https://www.jdsupra.com/legalnews/what-is-the-difference-between-4652097/.
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[38] *See* Tom Ara, Mark Radcliffe, Michael Fluhr & Katherine Imp, *Exploring the Metaverse: What Laws Will Apply?,* DLA PIPER BLOG (Feb. 22, 2022), https://www.dlapiper.com/en-us/insights/publications/2022/02/exploring-the-metaverse.

[39] *See id.*

[40] *See, id.*; *see also,* Global Advertising Lawyers Alliance (GALA), *Welcome to the Metaverse: Legal Issues Marketers Need to Consider,* LEXOLOGY (June 15, 2022), https://www.lexology.com/library/detail.aspx?g=75628f2a-82a8-436a-9938-037f62cb6fbe.

immerse themselves into a given platform, interact with others and participate in consumer activities in a way that more closely resembles the physical world than any other technology to date."[41] The idea is to have this virtual 3-D world in which we can create an avatar and perform activities that will facilitate our daily tasks, like decreasing the need to travel for a meeting.[42] Right now, there are several platforms that do not communicate with each other and each one has a distinct purpose, but as the general idea is to create a virtual world that integrates users, their connectivity may increase in the future.

What is extremely interesting, though, is that companies are already entering in the metaverse and developing their brands in this new reality. We have big sporting brands like Nike, Puma, and Adidas already present in some of the metaverse platforms as well as luxury brands such as Louis Vuitton, Givenchy, Burberry, and Dolce & Gabbana.[43] Some brands, like Valentino, are exploring the intersection of technology and fashion by developing entire collections in the metaverse that can be worn by the avatars.[44] Balenciaga was considered a pioneer in this space when it partnered with Fortnite.[45]

It is clear that, as these luxury brands have already made their impact in the real world, they are now investing in the emerging virtual space. While is not a surprise that brands are entering this space because it is profitable for them,[46] it is important to consider what the appeal is for consumer to purchase these goods in a virtual world. As described before, an important feature

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[41] Global Advertising Lawyers Alliance, *supra* note 30.
[42] *See* Oleg Fonarov, *What is the Role of NFTs In The Metaverse?,* FORBES: FORBES TECHNOLOGY COUNCIL (March 11, 2022), https://www.forbes.com/sites/forbestechcouncil/2022/03/11/what-is-the-role-of-nfts-in-the-metaverse/?sh=4b3ce7ad6bb8.
[43] *See* Wazarat Ali Hussain, *15 Fashion Brands Investing in The Metaverse*, DIGITAL TWIN INSIDER (Oct. 8, 2022), https://digitaltwininsider.com/2022/10/08/fashion-in-the-metaverse/
[44] *See Valentino Launches Digital Fashion Pieces to Dress Meta Avatars*, RETAILBOSS (July 17, 2023), https://retailboss.co/valentino-launches-digital-fashion-pieces-to-dress-meta-avatars/.
[45] Rachel Tashjian, *Why is Fashion SO Obsessed With the Metaverse*?, GQ (Dec. 2, 2021), https://www.gq.com/story/metaverse-fashion-explainer.
[46] *Supra* note 45.

of the metaverse is the ability to develop avatars and perform activities in a virtual reality. Being in a virtual reality means that there are less constrains on creating who you want to be. In this sense, people enjoy and invest in virtual fashion because it is a way to unleash creativity.[47] This characteristic is not only interesting to users who want to create their virtual image, but to designers as well who can transform the virtual world into a fantasy runway.[48] The fashion designers have been interested in placing their work in the metaverse as it provides them with "the possibility of selling their more ridiculous creations,"[49] even if only in a digital realm and not the real world.

With many creative possibilities open both to users and companies, many legal issues may appear in the next few years as laws start to be applied to this new reality. Nevertheless, before we move on to the legal analysis of the *Hermès Int'l v. Rothschild*[50] and trademark law in this new reality, it is important to define one more term: NFTs. With the luxury fashion brands' expansion into the digital realm, their strategy has included officially licensing NFTs[51], which are one of the main forms of virtual goods, and thus important to be defined properly.

1. Non-Fungible Tokens (NFTs)

The non-fungible token or "NFT" "is a virtual token created and recorded on blockchain, and is intended to establish the provenance on an item, including purely digital creations."[52] The NFTs may be used for "any artwork, digital or physical – in fact, for anything that can be owned."[53]

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[47] *See, id.*
[48] *See id.*
[49] *Id.*
[50] *Supra* note 1.
[51] Danielle N. Garno and Krithika Rajkumar, *A Victory for Brands: Hermes Wins U.S. Trademark Trial Over "MetaBirkins" NFT*, FASHION & LAW JOURNAL (February 11, 2023), https://fashionlawjournal.com/a-victory-for-brands-hermes-wins-u-s-trademark-trial-over-metabirkins-nft/.
[52] EDWARD LEE, CREATORS TAKE CONTROL, xi (Harper Business, Kindle ed., 2023). Blockchain is a type of database that stores the information and is distributed among a computers network's nodes. There is no way to chain the information in the block. Blockchains are best known for cryptocurrency, by they can take other formats too. Adam Hayes, *Blockchain Facts: What Is It, How It Works, and How It Can Be Used*, INVESTOPEDIA (Dec. 15, 2023), https://www.investopedia.com/terms/b/blockchain.asp.
[53] LEE, *supra* note 52, at xi.

Some examples of NFTs are Decentraland's use of the technology to record and sell virtual properties and Gucci's purse, which is valued at approximately $4,115.[54] Still, why would one purchase an NFT? Reasons to invest in NFTs depend on whether one is a collector, buyer, or even a creator.[55] However, a common explanation regards the NFT's uniqueness. One of the most important traits of an NFT is that it is a one-of-a-kind item: because they are non-fungible tokens on blockchain, there is only one of them that cannot be modified.[56] "The scarcity aspect makes an NFT an appealing asset," increasing its value as it can be collected as a rare and exclusive item.[57]

As this technology and its monetary value develop, many legal issues have arisen, including ones related to copyright, trademark, fair use, and even first amendment rights.[58] Additionally, there is still discussion on whether NFTs are expressive works instead of commercial works, and when they should be considered one or the other.[59] While there are many open questions regarding NFTs, the first cases are starting to come out and provide us with conclusions that may define how NFTs and the metaverse will be understood in the near future. One of the cases is the *Hermès Int'l v. Rothschild,*[60] which takes place in the metaverse. The virtual good in question in the case was the MetaBirkin NFTs. These NFTs are evidence of the value that this

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54 Mark Radcliffe and Katherine Imp, *Intellectual Property Disputes in the Non-fungible Token Marketplace* (Apr. 12, 2022), https://plus.lexis.com/api/permalink/e9aa21d2-40b0-43f5-a7a8-eb169e0403e0/?context=1530671.

55 *NFTs, explained*, THE VERGE, https://www.theverge.com/22310188/nft-explainer-what-is-blockchain-crypto-art-faq [https://perma.cc/8KFK-DW62].

56 *See* LEE, *supra* note 52, at 29.

57 Pentas IO, *Top 5 Reasons to Buy an NFT*, LINKEDIN (Sept. 25, 2022), https://www.linkedin.com/pulse/top-5-reasons-buy-nft-pentas-io/ [https://perma.cc/YVP7-RGHJ].

58 LEE, *supra* note 52, at xi.

59 *See* Michelle R. Norris, *Note: Furry Non-Fungible Tokens: Hermes International and the Fuzzy Standard Governing Trademark and NFTs*, 59 CAL. W. L. REV. 285 (2023).

60 *Supra* note 1.

technology has, as the "MetaBirkins reached about $1.1 million in total sales volume" and the defendant (Mason Rothschild) made approximately $125,000 from the NFTs.[61]

A. THE METABIRKIN CASE

1. The Parties

Before looking at the case and the innovation in question it is important to understand who the parties are and the value that the Birkin bag has in the real world. The case involves two parties: Hermès International ("Hermès") and Mason Rothschild ("Rothschild"). Hermès was founded in 1837, and is considered one of the oldest luxury brands in the world.[62] The brand back then made harnesses, and in 1880 started to gain a prestigious reputation by making harnesses and saddles to measure.[63] In the first half of the twentieth century the brand expanded to clothes and accessories, producing jewelry, ties, jackets, scarfs, and more.[64] In the second half of the century, they started producing ready-to-wear collections and created the two iconic bags, the *Kelly Bag* and the *Birkin Bag.*[65] The brand continues to maintain a positive reputation of quality and luxury, and keeps expanding their reach with new products and locations.[66]

The other party of the case is Mason Rothschild. Rothschild is a digital artist from Los Angeles who is also the current creative director of the brand Terminal27.[67] He has worked previously for fashion brands, including Dior and Saint Laurent.[68] Rothschild has also gotten into

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[61] Zachary Small, *Hermès Wins MetaBirkins Lawsuit; Jurors Not Convinced NFTs Are Art*, N.Y. TIMES (Feb. 8, 2023), https://www.nytimes.com/2023/02/08/arts/hermes-metabirkins-lawsuit-verdict.html.
[62] *See Six Generations of Artisans*, HERMÈS, https://www.hermes.com/us/en/content/271366-six-generations-of-artisans/ (Accessed on Jan. 30, 2024).
[63] *See id.*
[64] *See id.*
[65] *See id.*
[66] *See id.*
[67] *See Hermès Just Sued This Digital Artist Over His MetaBirkin NFTs*, STYLE (Feb 3., 2023), https://www.scmp.com/magazines/style/luxury/article/3208951/hermes-just-sued-digital-artist-over-his-metabirkin-nfts-mason-rothschild-previously-worked.
[68] *See id.*

legal trouble before by creating a t-shirt collection that contained universities' logos, which led to one of the universities sending a cease-and-desist letter.[69] The artist has been open that he values fashion and art, arguing that he wanted to create the MetaBirkin collection as a social commentary regarding the luxury consumer culture.[70] Rothschild describes himself as a "lone wolf entrepreneur."[71]

Beyond these two parties, the case also involves the iconic Birkin Bag ("Birkin"). The Birkin was created in 1984 when the executive chairman of Hermès at the time sat by the side of actress Jane Birkin during a flight and designed a bag that could fit all that the actress desired.[72] The company then decided to name the bag after the woman that inspired it.[73] Throughout the years the bag has gained a reputation of being exclusive, catching the eyes of many celebrities and even appearing on movies and TV shows.[74] The Birkin is one of the most expensive bags in the world, this is showcased by the fact that one of the crocodile-skin versions was sold for $390,000 in 2021.[75] This bag is not easy to purchase and has gained a reputation of being a long-term investment piece.[76] While there are Birkin bags that have embroidery, the Birkin bag is made of leather and not another material.[77] Due its reputation, the Birkin Mark is registered in the USPTO, in its full force and effect, under Registration No. 2991927, which is owned by Hermès.[78] Hermès also owns the Birkin Trade Dress registration in the USPTO under Registration

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[69] *See id.*
[70] *See id.*
[71] *Mason Rothschild*, LINKEDIN https://www.linkedin.com/in/mason-rothschild/ (Accessed on Jan. 30, 2024).
[72] *All about the Hermès Birkin Bag Collection*, HERMÈS https://www.hermes.com/us/en/content/106191-birkin/ (Accessed on Jan. 30, 2024).
[73] Jacqui Palumbo, *The Hermès Birkin Bag: Everything You Need To Know About The World's Most Coveted Tote*, CNN (July 18, 2023 02:18 PM), https://www.cnn.com/style/hermes-birkin-bag-origins-cost/index.html.
[74] *Id.*
[75] *Id.*
[76] *Id.*
[77] *All about the Hermès Birkin Bag Collection, supra* note 72.
[78] Complaint at 8, Hermes International et al v. Rothschild, 654 F. Supp. 3d 268 (S.D.N.Y. 2023), (No. 1:22-cv-00384) (noting difference between two registrations. No. 2991927, refers to trademark, meaning that "consists of

No. 3936105[79]. Both the mark and the trade dress have been in use by Hermès throughout the world since their original registration date.

1. The Case

With that in mind, what happened that caused Hermès to sue Rothschild regarding a virtual good? In November 2021, Rothschild released 100 NFTs linked to a virtual image of the Hermès Birkin bag (MetaBirkin) which had several different patterns and looked like they were made with different materials, including fur.[80] Together with the release, Rothschild registered the website <www.metabirkin.com> and social media handles @metabirkin, with the purpose of promoting the NFTs.[81] The first MetaBirkin NFT was sold the same month (on December 3rd), costing $42,000.[82] The case itself gained attention even before complaints were filed, when, in December 2021, the artist Mason Rothschild (defendant) shared on his Instagram the cease-and-desist letter from Hermès (plaintiff) regarding a possible trademark violation with the selling of Rothschild's NFTs collection known as the MetaBirkin.[83] Rothschild answered by claiming First Amendment protection, as the creation was inspired by the real world and a "tribute" to the iconic Birkin bag.[84] By January of 2022, Rothschild had made more than $1 million with the MetaBirkin NFTs.[85] As

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standard characters without claim to any particular font style, size, or color" in relation to the mark BIRKIN as applicable to leather or leather imitation goods, particularly handbags and other types of bags.).

[79] *Id. (showing* No. 3936105 refers to Birkin trade dress, meaning that registration "consists of the configuration of a handbag, having rectangular sides a rectangular bottom, and a dimpled triangular profile. The top of the bag consists of a rectangular flap having three protruding lobes, between which are two keyhole-shaped openings that surround the base of the handles. Over the flap is a horizontal rectangular strap having an opening to receive a padlock eye. A lock in the shape of a padlock forms the clasp for the bag at the center of the strap. The broken lines in the drawing represent the location of the handles and are not part of the mark." The trade dress registration focuses on appearance of the good, explaining why the visual aspect is relevant for the infringement argument).

[80] Felicia J. Boyd, *Hermès Challenge of "MetaBirkin" NFTs to Continue*, NORTON ROSE FULBRIGHT (July 2022), https://www.nortonrosefulbright.com/en/knowledge/publications/844123f5/hermes-challenge-of-metabirkins-nfts-to-continue

[81] *Id.*

[82] *See* TFL, *Hermès v. Rothschild: A Timeline of Developments in a Case Over Trademarks, NFTs*, THE FASHION LAW (Oct. 23, 2024), https://www.thefashionlaw.com/hermes-v-rothschild-a-timeline-of-developments-in-a-case-over-trademarks-nfts/.

[83] *See id.*

[84] *Id.*

[85] *See* TFL, *supra* note 80.

Rothschild showed no willingness to comply with Hermès request, the luxury brand filed suit against the artist on January 14th, 2022, alleging "federal and common law trademark infringement, false designation of origin, trademark dilution, cybersquatting, and injury to business reputation and dilution under New York General Business Law."[86] Both parties agreed that the Birkin bag has "come to occupy a place of cultural importance as a symbol of wealth and exclusivity," which led Hermès to sell more than $1 billion worth of the bag in the United States since 1986.[87] The jury trial took place in February 2023 where they found for Hermès, awarding the plaintiff $133,000 in damages and the trial judge upheld the jury's findings.[88] The defendant appealed the judge's decision.[89]

By understanding the facts, we can move into the arguments of the case which are the most relevant parts of our case analysis. First, the defendant relied on the First Amendment, which led the court to apply *Rogers v. Grimaldi* test. This test determines that "the First Amendment requires dismissal of an infringement claim brought against a work containing some degree of 'artistic expression' unless the challenged use of the mark 'has no artistic relevance to the underlying work' or 'explicitly mislead as to the source of or the content of the work.'"[90] This is not the first time that the courts have used the *Rogers* test in cases related to virtual goods, as we can see in cases

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[86] Nicolette Shamsian, *A Bag Worth Fighting For: The MetaBirkin NFT Trademark Dispute*, ABOVE THE LAW, (Apr. 11, 2023, 12:49 PM), https://abovethelaw.com/2023/04/a-bag-worth-fighting-for-the-metabirkin-nft-trademark-dispute/ [https://perma.cc/3RX2-P9RX]; *see generally* Complaint at 4, *Hermes Int'l v. Rothschild*, 654 F. Supp. 3d 268 (S.D.N.Y. 2023) (No. 22-cv-00384).
[87] *See Hermes Int'l v. Rothschild*, 654 F. Supp. 3d 268, 273 (S.D.N.Y. 2023).
[88] *Hermès Int'l v. Rothschild*, 678 F.Supp.3d 475, 481 (S.D.N.Y. 2023) (reviewing conclusion of jury trial).
[89] *Hermès Int'l v. Rothschild*, 678 F.Supp.3d 475, 481 (S.D.N.Y. 2023), *appeal pending*, No. 23-1081 (docketed Jul. 28, 2023).
[90] *Hermès Int'l*, 678 F.Supp.3d at 484 (citing *Rogers v. Grimaldi*, 875 F.2d 994, 999 (2d Cir. 1989)).

such as *E.S.S. Entm't 2000, Inc. v. Rock Star Videos*[91] and *Destefani v. Ubisoft Ent.*[92]. As opposed to the MetaBirkin case, in these cases we can see that the courts are willing to give First Amendment protection if the infringement had a clear artistic purpose – in videogames, the goal of achieving realism is considered artistic purpose – that does not promote consumer confusion. These cases combined with the MetaBirkin case show us that the courts are willing to treat the virtual world as a place where freedom of expression and artistic works can and should be protected, but also as a place where intellectual property rights must be protected to promote a fair marketplace and protect consumers from unnecessary confusion.

1. The Arguments of The Case

On February 2nd, 2023, six days before the jury trial, the court provided an opinion addressing the question of which test should be applied to determine trademark infringement and denying the cross motions for summary judgement which led to the trial.[93] Each party proposed a different test. While the plaintiff wanted to apply the *Gruner + Jahr* test as it is applicable to general trademark, the defendant argued for the *Rogers v. Grimaldi* test because the digital image associate with the NFT should be considered a creative work.[94]

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[91] *See generally* E.S.S. Ent. 2000, Inc. v. Rock Star Videos, Inc., 547 F.3d 1095, 1096-1101 (9th Cir. 2008) (case about trademark and trade dress infringement of an adult entertainment establishment as the likeness was included on the videogame *Grand Theft Auto: San Andreas*. Court held no infringement due to videogame's artistic relevance as including a likeness of the place – not an exact copy nor the exact mark – after applying the Rogers test and determined that there would be no likelihood of consumer confusion between a virtual and a real-life adult entertainment establishment).

[92] *See generally* Destefani v. Ubisoft Ent., No. 2:20-cv-10126-FLA (AFMx), 2022 U.S. Dist. LEXIS 20182 at *6-12 (C.D. Cal. Jan. 10, 2022) (case about trademark infringement due to non-authorized inclusion of plaintiff's mark on the videogame *The Crew 2*. Court holds under the Rogers test that defendant did not infringe the plaintiff's mark due to the expressive nature of the work. The likelihood of consumer confusion or mistaken endorsement was also considered low).

[93] *See* Hermes Int'l v. Rothschild, 654 F. Supp. 3d at 272.

[94] *See id.* at 275. It is noteworthy that the *Gruner + Jahr* test has the primary intention of being applied to works that serve a commercial purpose, which can explain the plaintiff's interest in applying this test.

The *Gruner + Jahr*[95] test assesses whether the defendant's use of the plaintiff's trademark created consumer confusion as to the source of the product.[96] Still, to apply this test and not *Rogers* the court must determine that the infringed work is not a work of artistic expression.[97] Here, the court explains what works are artistic and decide to apply the *Rogers v. Grimaldi* test after its analysis. The court highlights that the *Rogers* test is appropriate when the use of the trademark was plausibly expressive without the intention of misleading the consumer.[98] Nonetheless, while the court in its February 2nd, 2023 opinion[99] presents and makes some analysis of the *Rogers v. Grimaldi* test, it determines that there are many elements in dispute and summary judgment would not be appropriate, moving the case to a jury trial. Particularly, the court determines that reasonable individuals can reach different conclusions of whether the MetaBirkin NFTs were artistically relevant and whether the defendant explicitly mislead the consumers.

The trial took place in February 8th 2023, and, after nine days the jury came back with a unanimous verdict finding Rothschild liable for trademark infringement and awarding the damages to the plaintiff.[100] While we do not know the reasoning behind the jury's decision, the victory for Hermès means that they were successful in proving to the jury that the defendant purposely sought to create consumer confusion, which is why Rothschild would not be entitled to First Amendment protection. As post-trial motions, the defendant requested a judgment of law in his favor or for a new trial and to interview the jury, while the plaintiff requested a permanent injunction against certain actions of the defendant.[101] The court upheld its prior decision.[102] To address such motions,

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[95] *See generally* Gruner + Jhar USA Pub., a Div. of Gruner + Jhar Printing & Pub. Co. v. Meredith Corp., 991 F.2d 1072 (2d Cir. 1993) (case establishing a test for commercial use of a trademark)
[96] *See* Hermes Int'l v. Rothschild, 654 F. Supp. 3d at 275.
[97] *See id.* at 275-76.
[98] *See id.* at *4.
[99] *See id.*
[100] *Supra* note 1.
[101] *See id.* at *1.
[102] *See id.* at *15.

the District Court published an opinion explaining that the trial judge properly instructed the jury on the required elements and stated that if the plaintiff failed in proving any of the elements, the defendant would be entitled to the First Amendment Protection.[103]

The District Court explained why the jury instruction (both structure and substance) was proper and that there was no reason to overturn the judgement.[104] It is worth noting that the court highlights that the First Amendment does not "eliminate liability for intentional fraud," and, as the jury found that Rothschild intentionally mislead the consumers, the trial court's decision was appropriate.[105] The court also denied Rothschild's request to interview the jury, highlighting the harms that may come from such interviews including jury harassment and uncertainty in the jury verdicts.[106] The plaintiff's motion for permanent injunction was approved as the court considered the jury's decision and lack of evidence that Hermès was acting in bad faith with their request.[107]

After the permanent injunction was granted in the post-motions trials, the matter came up earlier this year when the artist asked for the court's clarification on whether it would violate the injunction if the MetaBirkins in a museum exposition, which was denied.[108] The "court held that based on the evidence before it, it 'cannot conclude' that Rothschild's request 'steers clear of the injunction's prohibitions.'"[109] A clear concern of the court was that the consumer confusion created by these NFTs would perpetuate if they were part of the exposition.[110]

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[103] *See id.* at *3.
[104] *See id.* at *2-5.
[105] *Id.* at *4, *7.
[106] *See id.* at *33-34.
[107] *See id.* at *34.
[108] *See* Hermès Int'l v. "Mason Rothschild", No. 22-cv-384, 2024 U.S. Dist. LEXIS 45240, (S.D.N.Y. Mar. 13, 2024); *see also* TFL, *Court Says No Art Exhibition for MetaBirkins-Maker in Hermès Case*, THE FASHION L. (Mar. 15, 2024) https://www.thefashionlaw.com/court-says-no-art-exhibition-for-metabirkins-maker-in-hermes-case/.
[109] TFL, *supra* note 108.
[110] *Id.*

However, despite the District Court decision, the case is still "alive" as the defendant appealed to the Second Circuit. In the Brief for Defendant-Appellant from June 11, 2023, Rothschild's attorneys raised the issues that the court erred in denying both his motion to dismiss and motion for summary judgement, the jury instructions were contrary to *Rogers*, the court abused its discretion by not allowing the expert testimony of Dr. Gopnik, and the court erred in denying Rothschild's post-trial motions.[111] While we will need to wait for the Second Circuit decision to see how these matters will be understood, the brief argues that the MetaBirkin had artistic value and the use of the mark "Birkin" was for artistic purposes[112] – it was not used as a trademark[113] – and that Rothschild was clear that he was the creator of the virtual good.[114] The brief also argues that the *Rogers* test not properly applied as intention to mislead the consumers should have not been analyzed, and, even if it were, there was no explicit evidence of such.[115] Lastly, the brief discusses that the Lanham Act would not be actionable in this case as the good in question is not a tangible good.[116] The brief uses the concepts "intangible content" and "intangible goods" interchangeably to justify their argument,[117] but the case that they cited to discusses only "intangible content" and not "intangible good". While there is an argument to be made that these are distinct concepts, especially when we consider how the virtual goods and market have evolved in recent years – there is a 20-year difference between the cases –, it will be interesting to see

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[111] *See* Brief for Defendant-Appellant at iii, Hermès Int'l v. "Mason Rothschild, No.23-1081 (2d Cir. June 23, 2023).
[112] *See id.* at 36-38.
[113] *See id.* at 28-29.
[114] *See id.* at 53.
[115] *See id.* at 29.
[116] *See id* at 30, 48; *see also* Dastar Corp. v. Twentieth Century Fox Film Corp., 539 U.S. 23 2041 (2003) (plaintiff sued defendant for violation the Lanham Act as defendant made a video based on a piece of a television series in the public domain originally owned by the plaintiff. Plaintiff's argued lack of proper recognition. Court held the ideas owned by the plaintiff – intangible concept – that the video was based was not protected under as §1225 of Lanham referred only to tangible/physical goods, in this case the video, not the plaintiff's idea that based the video).
[117] *See* TFL, *supra* note 108, at 48-51.

whether the court will make a distinction of the concepts, as this can affect the virtual environment as a whole.

So far, the District Court held that Rothschild committed trademark infringement and granted Hermès permanent injunction. Still, as the case goes to the Second Circuit, the matters described in the brief for the defendant-appellant are still to be decided. This decision will be an impactful one for understanding the application of intellectual property protections on virtual goods. Actually, even though it is a recent case which is under appeal, the *Hermès v. Rothschild* decision has already been cited in other cases to address issues like tangibility of the work as requirement for the Lanham Act (specifically about NFTs), how to apply the *Rogers* test, and when to grant injunctive relief.[118]

1. What Can We Learn from The Case?

This case highlights two important points that we should have in mind when discussing trademark infringement in the virtual world: (1) NFTs can be considered artistic work; and (2) consumer confusion is a main concern for the court. With this, we can see that certain artistic aspects related to fashion designs may raise First Amendment concerns, but in the end, when dealing with trademark and trade dress the consumer confusion aspect of the analysis remains a powerful tool against trademark infringement both in the real and the virtual world. Additionally, regarding the NFTs as artistic work, this case provides an interesting analysis by reflecting that, while digital images are not permanent, the consumer made the NFT purchase considering not just the term "MetaBirkin," but also the digital image associated with the digital deed they were purchasing.[119] The consumer's reaction to this NFT is evidence that the defendant's work

[118] *See* Yuga Labs Inc. v. Ripps, No. 22-4355, 2023 U.S. Dist. LEXIS 71336 (C.D. Cal., Apr. 21, 2023); *see also* JTH Tax LLC v. AMC Networks Inc., 2023 U.S. Dist. LEXIS 170363 (S.D.N.Y., Sep 25, 2023); Glob. Refin. Grp., Inc. v. PMD Analysis Inc. No. 21-CV-0532, 2023 WL 5733968 (Dist. Ct. N.Y., Aug. 15, 2023).
[119] *See* Hermès*, supra* note 21, at 6.

originated as a form of artistic expression.[120] This showcases that there is a great opportunity for artists to develop works of art that could receive protection under the First Amendment, in a completely new medium, which would open up new discussions about what can be considered as art as well as what would be the laws applicable to these new types of works. Of course, as the court reminds, the *Rogers* test does not give "unfettered license to infringe another's trademark" just because the work is seen as an artistic expression.[121] As the case showed, "in certain instances, the public's interest in avoiding competitive exploitation or consumer confusion as to the source of a good outweighs whatever First Amendment concerns may be at stake."[122]

The case also showcases how much the court and trademark infringement are concerned about avoiding consumer confusion. The *Rogers* test itself approach this matter in its second element when the plaintiff must show that "the trademark use is used to 'explicitly mislead' the public as to the source or content of the underlying work."[123] The case reminds us of the Polaroid factors[124] and applies it to the situation at hand, showcasing why a reasonable jury could find a likelihood of consumer confusion.[125] We can also see the concern for consumer confusion in the court's decision to not allow the artist to share the NFTs at a museum exposition as it could propagate consumer confusion.[126] What we can learn from this is that even if NFTs can be considered a work of artistic expression, their protectability under the First Amendment will be analyzed the same as real world art, and consumer confusion will be at the center of the discussion.

2. The Jack Daniel's Consideration

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[120] *Id* at 278.
[121] *Id* at 280.
[122] *Id.*
[123] *Id.*
[124] *See* Polaroid Corp. v. Polarad Elecs. Corp., 287 F.2d 492 (2d Cir. 1961) (case about trademark infringement held eight factors that should be analyzed when determine likelihood of consumer confusion due to alleged infringement).
[125] Hermès, *supra* note 21, at 273.
[126] TFL, *supra* note 108.

It is also worth mentioning that the MetaBirkin jury trial took place prior to the U.S. Supreme Court decision in *Jack Daniel's Properties, Inc. v. VIP Products LLC*,[127] which held that "without deciding whether *Rogers* has merits in other contexts, we hold that it does not when an alleged infringer uses a trademark in the way Lanham Act most cares about: as a designation of source for the infringer's own good."[128] This case determined that the *Rogers* test would not be applicable if the alleged infringer had used the other party's trademark as a trademark of their own goods.[129] Here, there would have been an argument that Rothschild used the Birkin trademark in his mark for the MetaBirkin. Thus, we could see that there is a likelihood that the *Rogers* test would not have been available in these circumstances if the case had been decided a couple of months later. Additionally, the District Court commented on this case in its opinion saying that, although *Jack Daniel's Properties* had yet to be decided when the jury trial took place, the reasoning provided by a juror following the trial that "digital artists would have 'no need to hide under the cloak of the 1st amendment' so long as they kept in mind 'the goodwill of the brand and the consumer in mind,'" was spot on with the later Supreme Court decision.[130] More precisely, the District Court was clear that, as defined by *Jack Daniel's Property*, the *Rogers* test do not apply when one uses the trademark of another to identify one's goods, and this "is precisely what the defendant with his 'MetaBirkins' NFTs and 'MetaBirkins' website, did here."[131] Thus, even though we did not see the application of *Jack Daniel's Property* in the MetaBirkin case, it is clear that the conclusion of the MetaBirkin case is not in conflict with the Supreme Court's opinion.

1. The Other MetaBirkin Issue: Cybersquatting

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[127] 599 U.S. 140, (2023) (trademark infringement case as mark of the whiskey bottle was used in a dog toy parody. Court held that the inferior court erred in its Rogers test application as the test should not be applied when accused infringer had used "trademark to designate source of its own goods").
[128] *Id.*
[129] *Id.* at 1592.
[130] *Hermès Int'l v. Rothschild*, 678 F. Supp. 3d 475, 483 (S.D.N.Y. 2023). .
[131] *Id.* at 484.

While this Note is concerned with the trademark issue surrounding the image of the Birkin bag in the NFT, it is worth having a brief discussion about the cybersquatting claim. "Cybersquatting occurs when a person other than the owner of a well-known trademark registers that trademark as an Internet domain name and then attempts to profit from it either by ransoming the domain name back to the trademark owner or by using the domain name to divert business from the trademark owner to the owner of the domain name."[132] This practice has proved to be a problem, which is why the Uniform Domain Name Dispute Resolution Policy (UDRP) and the Anti-Cybersquatting Consumer Protection Act (ACPA) were created.[133] Under both of these regulations, the remedies available include transfer or cancellation of domain name.[134] Also, "under ACPA courts may award damages," while under UDRP they may not.[135]

In this case the plaintiff claimed cybersquatting due to the use, and registration, by the defendant of the domain <https://metabirkins.com>. The plaintiff argued that, by using that domain, defendant was creating a "likelihood of confusion as to the source, sponsorship, affiliation or endorsement" of his website and the MetaBirkins NFTs by Hermès.[136] This was a matter of fact that needed to be decided by the jury. Here, the jury was instructed "that Hermès was to prove '(1) that the Birkin mark was distinctive at the time the domain name <https://metabirkins.com> was registered; (2) that the <https://metabirkins.com> domain name is identical to, or confusingly similar to, Hermès's Birkin mark; and (3) that Mason Rothschild had a bad faith intent to profit from the Birkin mark.'"[137] The jury found for the plaintiff. While we cannot really know the

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[132] *Cybersquatting,* LEGAL INFO. INSTITUTE, https://www.law.cornell.edu/wex/cybersquatting (last visited Jan. 30, 2024)
[133] *Supra* note 7, at 41.
[134] *Id.*
[135] *Id.*
[136] *Hermès Int'l v. Rothschild*, 654 F. Supp. 3d 268, 275 (S.D.N.Y. 2023)..
[137] Moish E. Peltz, *Hermès v. Rothschild: A Landmark Decision for Trademarks and NFTs*, FALCON RAPPAPORT & BERKMAN (Feb. 10, 2023), https://frblaw.com/hermes-v-rothschild-a-landmark-decision-for-trademarks-and-nfts/.

reasoning behind the jury's decision on the matter, the court suggests that there was similar reasoning to other trademark infringement claims as "it would be entirely reasonable for that same jury to also find that Rothschild knew using the domain was unlawful."[138]

C. METAVERSE AND INTELLECTUAL PROPERTY

The relationship between IP and the metaverse still holds many uncertainties, including regarding how each type of virtual good will be categorized in the IP context. While we can see that companies are starting to explore this space, there are aspects related to the types of protections that are not trademark that could – or not – be applicable to virtual goods in the metaverse. Thus, while we do not have as much information on their applicability, it is worth pondering about the doors that they may open and how they may provide protection to the virtual goods.

1. What About Copyright?

While the MetaBirkin case, as well as this Note, focuses on trademark, there may be another type of protection that may prove very valuable for fashion brands – and other companies – in the context of the metaverse: copyright. Copyright is awarded to "original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."[139] An original work can include a variety of categories, including literary works, musical works, pictorial and graphic works, motion pictures, and more.[140] The purpose of awarding copyright protection is to "stimulate creativity for the general public good."[141] The idea

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[138] *Hermès Int'l v. Rothschild*, 678 F. Supp. 3d 475, 487 (S.D.N.Y. 2023).
[139] 17 U.S.C. § 102(a).
[140] *Id.*
[141] MENELL ET AL., *supra,* note 28, at 527–28.

is that "creative work is to be encourage and rewarded, put private motivation must ultimately serve the cause of promoting broad public availability of literature, music, and other arts."[142]

Still, why is this relevant for the protection of virtual goods? Well, the relationship between fashion and copyright law has existed for some time. While copyright does not protect fashion designs, meaning it does not protect the physical piece such as a dress or pants, it may protect "photographs, jewelry, editorial content, and design software."[143] It may also protect components (for example, a pattern) of a useful article (such as clothes).[144] The main point to have in mind is that copyright will not protect a useful article, but it will protect a work of artistic relevance. However, these doctrines stem from precedent in the real world. What about the articles in the virtual world? Do they have the same functionality as the ones in real life? In this sense, why couldn't a virtual shirt be considered a graphic or pictorial work that could be protectable under copyright? Could the virtual shirt be considered a useful article if it is not used in real life? Would there be a reason to consider virtual fashion designs useful articles as in real-life fashion designs?

Also, software is protected by copyright, and in their basic form, virtual goods are coded sources. Thus, why couldn't virtual goods be copyrighted due to their "coded nature"? There is an argument that by allowing virtual goods to be treated as software and, therefore, be copyrightable works, it would provide the owners of virtual designs "with an additional, though likely limited, claim against unauthorized source code copycats."[145] This would certainly be an interesting argument to make. Nonetheless, we have no cases that have argued this so far. Hence, while

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[142] *Id.* at 527.
[143] JIMENEZ & KOLSUN, *supra* note 7, at 45.
[144] *Id.* at 46; *see also* Star Athletica, L.L.C. v. Varsity Brands, Inc., 137 S. Ct. 1002, 1007 (2017) (holding graphic elements of a design may be protected under the Copyright Act even if they cannot be physically separated from the useful design).
[145] Kasey Boucher Pierter & Shannon Vittengl, *IP Rights in Virtual Fashion: Lessons Learned in 2022 and Unanswered Questions*, JDSUPRA (Jan. 11, 2023), https://www.jdsupra.com/legalnews/ip-rights-in-virtual-fashion-lessons-7104734/ [https://perma.cc/UC8C-LJKN].

trademark has been the focus of recent litigation on virtual goods, there is a possibility of other forms of intellectual property being argued in the future.

Nevertheless, we should consider the possibility that a challenge for copyright and design patents to be as effective as trademark exists in the cross-medium context, meaning the comparison between real world good and virtual good. For example, in the case *P.S. Products, Inc. v. Activision Blizzard, Inc*, P.S. Products sued Activision for infringement of their design patent on a weapon.[146] By applying the standard for an ordinary observer, the court found there was no infringement because "no ordinary observer would be deceived into purchasing a video game believing it to be plaintiffs' patented stun gun."[147] Thus, while this case is from 2014 and technology has considerably evolved since then, we could reasonably assume that courts would not think that reasonable consumers or ordinary observers would mistake real with virtual goods, making it a barrier for enforcing design patents in the virtual world. With the same logic, copyright requires "actual copying," and it would likely be challenging to prove that there was actual copying of a real good in a completely new medium. With the uncertainty surrounding the court's current interpretation of the applicability of the copyright and design patent tests as it relates to real goods in the virtual realm, trademark seems to be a more reliable strategy for those who want to protect their virtual goods.

1. Looking to the Metaverse through Video Games

While the metaverse may still be in the future and the legal issues surrounding it are just starting to be discussed, it is important to look for industries that are similar and have already dealt with related issues. As previously noted, video games can serve as an analogous industry due to

[146] 140 F. Supp. 3d 795, 798 (E.D. Ark. 2014).
[147] *Id.* at 801.

their expansion into virtual realities.[148] Two noteworthy games that can be used as a study case are Fortnite and Roblox.[149] With these games, we can see an intersection between virtual realities, virtual goods, and the law, which is exactly what we should look for when discussing the metaverse. Due to their existence and evolution for more than half a century,[150] there has been more than enough space for legal issues involving video games to arise, including those related to intellectual property and virtual goods.

With this in mind, we have seen video game-related cases discussing matters of trademark,[151] design patent,[152] and copyright.[153] Trademark has some notoriety here as it seems to have more cases involving this type of protection than the other forms of IP, which leads us to some interesting cases. For example, in 2020 there was a dispute regarding the presence of Humvee military vehicles in a game from the Call of Duty series.[154] This case was beneficial to game developers as, after applying the *Rogers* test, the court determined that there was an artistic relevance for promoting realism, which justified the use of the Humvee mark.[155] In this case, the court thoroughly analyzed the situation by applying the *Rogers* test and the *Polaroid* factors. They concluded that video game users are astute consumers who would not assume sponsorship from a brand due to the mere presence of their goods in the videogame. The court also determined that the military vehicles and videogames were distinct enough for them to not compete with one

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[148] *See* Ara et al., *supra* note 38.
[149] *See id*.
[150] See History.com Editors, *Video Game History*, HISTORY (Oct. 17, 2022), https://www.history.com/topics/inventions/history-of-video-games [https://perma.cc/UM3Y-KALE].
[151] *See, e.g.*, Destefani v. Ubisoft Ent., No. 2:20-cv-10126-FLA, 2022 U.S. Dist. LEXIS 20182, at *2-3 (C.D. Cal. Jan. 10, 2022).
[152] *See, e.g.*, P.S. Prod., INC. v. Activision Blizzard, INC., 140 F.Supp.3d 795, 798-99 (E.D.Ark. 2014).
[153] *See, e.g.*, Abdin v. CBS Broad. Inc., 971 F.3d 57, 59-60 (2nd Cir. 2020); Frybarger v. Inter. Mach. Bus. Corp., 812 F.2d 525, 526-27 (9th Cir. 1987).
[154] *See* AM Gen. LLC v. Activision Blizzard, Inc, 450 F.Supp 3d 467, 474-75 (S.D.N.Y. 2020); *see also* Anna Piechówka**,** *When Videogames Meet IP* Law, WIPO MAGAZINE (Jun. 25, 2021), https://www.wipo.int/wipo_magazine/en/2021/02/article_0002.html [https://perma.cc/GE84-EFL9].
[155] *AM General LLC,* 450 F. Supp. 3d at 480.

another and for the consumers of one be different from the others.[156] This case shows how the court is willing to recognize artistic relevance and award First Amendment protection when the alleged infringement of the real-world good in the virtual environment has a greater artistic purpose than the risk of consumer confusion – which is not what happened in the MetaBirkin case. Beyond this case, there have been other ones that used the *Rogers* test to determine whether there was trademark infringement in the videogame context when discussing realism in the game.[157] Realism has been understood as artistically relevant in the videogame context,[158] justifying infringement with virtual goods, which may make us wonder if such understanding could be applied to the metaverse. For example, if a trademark of a bag is infringed in the metaverse to provide realism to the user, would this be understood as a situation just like *AM General LLC v. Activision Blizzard*? What is the line between a brand's right to protect its mark – and extend it to virtual reality – and the artistic relevance of creating realism in a virtual setting?

Hence, we could assume that courts may understand the metaverse as similar to video games in certain situations, while in other cases, they would extend "real world" protection to the metaverse – as we see in the MetaBirkin. Realism is likely to continue to be an important factor in the metaverse as it is intended to be an extension of the real world. Nonetheless, one difference between the videogames and the metaverse, so far, is that the metaverse provides a space for consumer confusion that was not present in the videogame field before due to the possibility of direct interaction with brands, which creates an actual market that is not dependent on the storyline or game experience. Thus, the expansion of consumer goods in the metaverse gives brands the possibility of expanding their consumer base to the users of such platforms, which can give rise to

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[156] *Id.*at 481, 484.
[157] *See* Mil–Spec Monkey, Inc. v. Activision Blizzard, Inc., 74 F. Supp. 3d 1134, 1142 (N.D. Cal. 2014); Novalogic, Inc. v. Activision Blizzard, 41 F. Supp. 3d 885, 900 (C.D. Cal 2013).
[158] *See Mil–Spec Monkey, Inc.*, 74 F. Supp. 3d at 1142.

consumer confusion, as seen in the MetaBirkin case argument. In a case addressing the possible confusion related to a design patent, the court stated "no ordinary observer would be deceived into purchasing a video game believing it to be plaintiffs' [product]."[159] Still, this understanding may change to consider not a confusion between the real versus the virtual good, but confusion as to the ownership of the virtual good as the real brand may be present in the virtual world as well. For example, in the metaverse, the consumer confusion could focus on the questions of whether AM General is selling the virtual Humvee for your metaverse character to use or is the platform that is selling the virtual good, and not whether the user is buying a real Humvee. It will be interesting to see whether the development of legal issues in the metaverse will follow "a videogame pattern" or create a new way to understand and approach these issues.

1. Why Fashion Should Keep Investing in Trademark

As we already established in the beginning, trademark, and fashion have a long relationship as this type of intellectual property protection is the way this industry protects their creative work, serving as "a business imperative for large fashion companies."[160] Trademarks are an important source identifier that allows consumers to know the origin, quality, and exclusivity of a product. Thus, this type of protection has been effective so far in the real world, especially considering that designs are not protected under copyright. Until we have a better understanding of how virtual goods are going to be interpreted by the law, the *Hermès v. Rothschild* case serves as an example of how brands can expand their trademarked and trade dress goods to their virtual fashion goods as well as protect them against alleged infringement. While a deeper understanding of the

[159] P.S. Products, Inc. v. Activision Blizzard, Inc., 140 F. Supp. 3d 795, 803 (E.D. Ark. 2014); *IP Rights in Virtual Fashion: Lessons Learned in 2022 and Unanswered Questions*, PIERCE ATWOOD LLP (Jan. 11, 2023), https://www.pierceatwood.com/alerts/ip-rights-virtual-fashion-lessons-learned-2022-and-unanswered-questions [https://perma.cc/LT8T-5YQ5]

[160] Jimenez, *supra* note **Error! Bookmark not defined.**, at 13.

metaverse and virtual goods may change our view on applicable law, for now, trademark is a great option when walking into this reality.

D. THE FUTURE

1. Fashion in the Metaverse

Throughout this Note, we talked about virtual fashion and virtual goods, as well as brands that are already entering this space. However, why should we pay attention to virtual goods? First, younger generations (starting with Gen Z) are willing to spend not only time online on a digital platform but also money to purchase the virtual goods that are available in this medium.[161] Second, virtual fashion mirrors real-life fashion in the sense that it allows individual expression of their personality, status, and aesthetic as an accurate virtual representation of the real person.[162] Nonetheless, the virtual goods allow for an easier personalization of a person's apparel, permitting an even deeper representation of who they are than what is possible in the real world.[163] As a third point, virtual fashion is expected to play a valuable role in the market growth of the fashion industry in the coming years.[164] Lastly, the combination of technology and fashion led to the development of tools dedicated to facilitating the creation of fashion, and we even have fashion shows entirely developed by artificial intelligences (AIs) (including the clothes and the models).[165]

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[161] *See* Anita Balchandani, Achim Berg, Saskia Hedricj, Jakob Ekelof Jensen, Leila Le Merle, Felix Rolkens & Imran Amed, *How the fashion industry can get into a metaverse mindset*, MCKINSEY & COMPANY (Apr. 7, 2022), https://www.mckinsey.com/industries/retail/our-insights/how-the-fashion-industry-can-get-into-a-metaverse-mindset [https://perma.cc/X5SL-DK3Q]; Martin Petkov, *Redefining value in fashion and retail with the Metaverse*, LINKEDIN (July 12, 2023), https://www.linkedin.com/pulse/redefining-value-fashion-retail-metaverse-martin-petkov/ [https://perma.cc/UJ2H-J9UU].

[162] Petkov, *supra* note 161.

[163] *See id.*

[164] *See* Nitin Kumar, *Web3 And Web 2.0: A Paradigm Shift For Digital Fashion Business Models*, FORBES (Mar. 28, 2023), https://www.forbes.com/sites/forbestechcouncil/2023/03/28/web3-and-web-20-a-paradigm-shift-for-digital-fashion-business-models/?sh=3007618b3438 [https://perma.cc/CB7S-J6NF].

[165] *See AI Fashion Week Season* 2, AI FASHION WEEK, https://fashionweek.ai/ [https://perma.cc/ED6D-WN62]; *see, e.g.*, Marc Bain, *These New Fashion Collections Were Designed By AI*, CNN STYLE (Nov. 7, 2023), https://www.cnn.com/style/revolve-collection-ai-fashion-week-clothes/index.html [https://perma.cc/NSG3-ZPQ6].

However, including AIs in the creation process raises some discussions about whether AI should play a role in design, and if so, how.[166]

Additionally, the metaverse proposes new ways that consumers can engage with fashion.[167] For example, while Ralph Lauren and Gucci are providing clothes – or skins – for users on different platforms, Louis Vuitton partnered with an artist to create a videogame for users to find collectible NFTs of the brand in celebration of their 200th anniversary.[168] The metaverse is expanding the possibilities for brands both in terms of goods' development and marketing strategies.[169] Supporters of virtual fashion in the metaverse also highlights how much greener this industry can be than "real world fashion."[170] Of course, the brands will not stop investing in the real world as well as the real need for clothes, but with the advances of technologies, mixed realities can serve as a way to facilitate consumer decisions when it comes to fashion.[171] The metaverse and the consumption of virtual goods is reshaping the retail industry and providing new opportunities for users, sellers, and creators.[172]

1. Related Cases

It is also worth noting that the *Hermès v. Rothschild* is not the only case in which we see an intersection between fashion and technology, and the U.S. is not the only place in which this

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[166] Maghan McDowell, *Does AI Belongs in Design? New York Fashion Week Weights In*, VOGUE BUSINESS (Feb. 13, 2024), https://www.voguebusiness.com/story/technology/does-ai-belong-in-design-new-york-fashion-week-weighs-in [https://perma.cc/83YR-WDWG].
[167] Balchandani, *supra* note **Error! Bookmark not defined.**.
[168] *Id.*
[169] *Id.*
[170] Bernard Marr, *The Metaverse, Digital Dressing Rooms And The Future Of Fashion Retail*, FORBES (July 1, 2022), https://www.forbes.com/sites/bernardmarr/2022/07/01/the-metaverse-digital-dressing-rooms-and-the-future-of-fashion-retail/?sh=20e4a94b6b90;Vishal Gupta**,** *How The Metaverse Will Revolutionize The Fashion Industry*, LINKEDIN (Sept. 8, 2023) https://www.linkedin.com/pulse/how-metaverse-revolutionize-fashion-industry-vishal-gupta/.
[171] Marr, *supra* note 170(describing that through virtual dressing rooms consumers can see what fits them best in several environment without the need to try the clothes, and the creation of "smart mirrors" connect the virtual store to the real-life store which gives consumers a quick access to the retailer's inventory); *see also* Gupta, *supra* note 170.
[172] Petkov, *supra* note **Error! Bookmark not defined.**.

issue is being debated. For example, a Spanish court recently ruled on a fashion-related NFT case.[173] This case is different than *Hermès v. Rothschild* in the sense that it is about copyright, and it is in another jurisdiction, governed by distinguishable law.[174] Something worth noting here is that the court was evaluating "[w]hether the digitization of physical paintings and storage online required the consent of the authors or rightsholders in such paintings."[175] In a certain sense we can interpret this question to address a similar question of First Amendment protection, as we could understand this to mean that courts are questioning the artistic relevance of digitalization of art and goods. Nonetheless, the existence of this case showcases how the issues related to NFTs and intellectual property in the fashion industry are not only a current matter but are being investigated in several different parts of the globe.

Moreover, while *Hermès v. Rothschild* may be the first of its kind, there are other cases related to our understanding of technology in a creative industry that are worth mentioning. For example, in 2023 the court decided in *Thaler v. Perlmutter* that work developed by AI cannot be copyrighted.[176] A decision like this one may impact several industries, including the fashion industry, in case the use of generative AI tools increases during artists' and designers' creative processes, especially in cases related to designs generated by AI which would raise an issue of authorship.[177] Lastly, fashion is interacting with technology not only in cases under the eyes of the law; there are legislative initiatives in place as well. For instance, models have historically been a

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[173] Alessandro Cerri, *Spanish Court Sides With Mango in Copyright Lawsuit Over NFT*, FASHION LAW, (Feb. 26, 2024) https://www.thefashionlaw.com/spanish-court-sides-with-mango-in-copyright-lawsuit-over-nfts/.
[174] *Id.*
[175] *See id.*
[176] *See* Robert W. Clarida & Thomas Kjellberg, *'Thaler v. Permut': AI Output Is Not Copyrightable*, BLOOMBERG LAW (Sept. 14, 2023), https://www.law.com/newyorklawjournal/2023/09/14/thaler-v-perlmutter-ai-output-is-not-copyrightable/.
[177] *See* Robert W. Clarida & Thomas Kjellberg, 'Thaler v. Permut': AI Output Is Not Copyrightable, Bloomberg Law (Sept. 14, 2023), https://www.law.com/newyorklawjournal/2023/09/14/thaler-v-perlmutter-ai-output-is-not-copyrightable/.

group with few rights under employment law and AI may pose a problem for them as it may serve as a substitute for real models under certain circumstances.[178] While trademark cases in the metaverse are ongoing, there are other legal issues related to the use of technology in creative industries that we should monitor.

E. CONCLUSION

The relationship between fashion and the law may be overlooked at times, but as we see here this industry is very connected not only with current legal issues but has also played a role in several different areas of the law throughout the years. Also, as a creative environment, it should not be a surprise that intellectual property has been an area of the law of particular interest to the fashion industry. Due to the intellectual property limitations governing some fashion products, the industry turned to trademark and trade dress as a way to provide some protection for their brands and iconic products. Thus, by understanding the *Hermès v. Rothschild* case and looking to this past relationship between fashion and the law it is not unreasonable to assume that trademark is a favorable protection for fashion brands looking to expand into the metaverse. Still, there is much to learn about how virtual goods will be categorized as our understanding of the metaverse's impact in our lives grows, which may lead to other intellectual property protections becoming more appropriate for use. Henceforth, while the use of new technologies, including NFTs and AIs, are raising very important legal – and moral – issues, they are also providing new opportunities and allowing us to explore creativity in new ways.

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[178] *See* Riddhi Setty, *AI Threatens To Push Human Fashion Models Out Of The Picture (1)*, BLOOMBERG LAW (Jan. 9, 2024), https://www.bloomberglaw.com/bloomberglawnews/daily-labor-report/XAG5CB6S000000?bna_news_filter=daily-labor-report#jcite; *see generally* FASHION WORKERS ACT, https://www.modelalliance.org/fashionworkersact (last visited Mar. 19, 2024) (describing the Model Alliance created the Fashion Workers Act with the goal of passing a legislation that would provide greater job security for models which includes concerns related to the rise in artificial intelligence use throughout their industry – especially as it relates to their image and likeness).

The ADVANCE Act: A Revival of Nuclear Power in the United States, or Too Little too Late

Daniel Smith

Introduction

Nuclear energy accounts for roughly 20% of U.S. energy production and is a form of reliable "clean" energy, produced by a total of 93 reactors at 53 power plants.[179] Experts estimate that these plants reduced U.S. carbon dioxide emissions by half a billion tons in 2022, and new nuclear energy plants are often considered necessary for the U.S. to reach its goals of net zero emissions by 2050.[180] In the past few months two new nuclear power plants, Vogtle 3 and 4, began operations becoming the second and third new nuclear reactors to go online in the U.S. in decades, following Watts Bar Unit 2 in 2016.[181] At a cost of $35 billion, they constitute one of the largest infrastructure projects in American history, opening seven years later than anticipated and costing nearly twice the initial budget.[182] The two reactors are emblematic of the problems typically associated with opening new nuclear plants, namely they are more expensive than their counterparts and take longer to construct.[183] All the while, old plants are being retired faster than any increases in production from new reactors will replace them, with six reactors going offline in a four year timespan between 2018-2022.[184]

The sorry state of the American nuclear industry has led Congress to take bipartisan action, passing several laws in the past few years on the subject.[185] These bills were primarily concerned with providing funding and not with tackling the underlying issues plaguing the industry. Congress then began to draft a large modernization act, starting with the House of

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[179] Nuclear Energy Inst., *U.S. Nuclear Plants* (2024), https://www.nei.org/resources/fact-sheets/u-s-nuclear-plants#:~:text=Across%20the%20United%20States%2C%2093,nuclear%20energy%20benefits%20your%20community.

[180] *Countries urge tripling of nuclear energy to hit net-zero emissions by 2050*, RFI (Feb. 12, 2023), https://www.rfi.fr/en/environment/20231202-nations-urge-tripling-of-nuclear-energy-to-hit-net-zero-emissions-by-2050.

[181] Tenn. Valley Auth., *Watts Bar Unit 2 Complete and Commercial* (Oct. 19, 2016), https://www.tva.com/newsroom/watts-bar-2-project; Gautama Mehta, *Georgia's Vogtle plant could herald the beginning — or end — of a new nuclear era*, Grist (Apr. 8, 2024), https://grist.org/energy/plant-vogtle-georgia-nuclear/; Kamen Kraev, *Vogtle-4 / US Nuclear Power Plant Reaches Maximum Output As Commissioning Gathers Pace*, Nucnet (Apr. 8, 2024), https://www.nucnet.org/news/us-nuclear-power-plant-reaches-maximum-output-as-commissioning-gathers-pace-4-1-2024.

[182] Mehta, *supra*.

[183] Drew Kann, *Georgia Power rates: Public to pay bulk of Plant Vogtle* costs, ATLANTA J. CONST. (2023) (reporting on testimony that Vogtle's cost overruns eliminated ratepayer benefits); Brad Plumer, *Why America abandoned nuclear power (and what we can learn from South Korea)*, VOX (Feb. 29, 2016), https://www.vox.com/2016/2/29/11132930/nuclear-power-costs-us-france-korea (noting that had nuclear power cost five times more per kilowatt than natural gas in 2014).

[184] U.S. Energy Info. Admin., *U.S. Nuclear Electricity Generation Continues to Decline as More Reactor Retire* (Apr. 8, 2022), https://www.eia.gov/todayinenergy/detail.php?id=51978.

[185] S. 512, 115th Cong. (2019); S. 97, 115th Cong. (2019); U.S. Energy Info. Admin., *supra* note 6 (noting that the bipartisan infrastructure bill setting aside billions to keep existing plants operating longer).

Representatives passing the Atomic Energy Advancement Act.[186] The bill's author, Jeff Duncan has said the bill would be "the most significant update to nuclear energy policy in the United States in over a generation" if passed.[187] This prompted the Senate to draft their own nuclear bill, the Advance Act, which differed from the House Bill.[188] After a conference committee merged the two proposals into a final bill it was signed into law by President Biden on July 9, 2024.[189] Sen. Shelley Moore Capito, the Ranking Member of the Senate Environment and Public Works (EPW) Committee said of the bill, "With the Advance Act being signed into law, we secured a landmark win for the future of nuclear energy here in America."[190] The Department of Energy's Office of Nuclear Energy said the Advance Act "will help us build new reactors at a clip that we haven't seen since the 1970s."[191] With the bill recently signed into law this paper seeks to ask two questions: 1) is it enough to save the nuclear industry; and 2) is the nuclear industry worth saving to begin with?

In order to evaluate the effectiveness of the bill, I will first lay out a short explanation of why the U.S. nuclear industry has struggled for the past several decades. I will then analyze the major statutory components of the bill, focusing on relevant issues such as licensing periods. With both the problems and Congress's enacted solutions laid out, I will address whether the bill lives up to its sponsors' claims of being the most significant pro-nuclear legislation in over a generation.

The Problems Plaguing Nuclear Energy:

In the early post-war era, America invested so substantially in nuclear energy that in the 1960's construction costs were lower than those of modern natural gas reactors when adjusted for inflation.[192] The Three Mile Island incident in March of 1979 marked a turning point, after which no new nuclear power plants would begin construction until 2013.[193] Fears over the risks posed by nuclear power as a result of the Three Mile Island incident, and later Chernobyl and Fukushima, made it all but certain any new nuclear project would have a motivated group eager to use any legal tools available to delay or kill new projects.[194] The Nuclear Regulatory Commission (NRC) oversees this process and holds exclusive regulatory authority over nuclear

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[186] H.R. 6544, 118th Cong. (2024); Rachel Frazin, *House approves bipartisan bill aimed at bolstering nuclear energy*, THE HILL (Feb. 28, 2024), https://thehill.com/policy/energy-environment/4495980-house-approves-bipartisan-bill-aimed-at-bolstering-nuclear-energy/.
[187] Frazin, *supra* note 8.
[188] S.870, 118th Cong. (2024). (reflecting a final version resulting from cross-chamber compromises, including the removal of a House-proposed power purchasing agreement that would have guaranteed profit margins for nuclear energy suppliers).
[189] Id.
[190] U.S. Senate Comm. on Env't & Pub. Works, *SIGNED: Bipartisan ADVANCE Act to Boost Nuclear Energy Now Law* (Jul. 9, 2024), https://www.epw.senate.gov/public/index.cfm/2024/7/signed-bipartisan-advance-act-to-boost-nuclear-energy-now-law.
[191] U.S. Dep't of Energy, *Newly Signed Bill Will Boost Nuclear Reactor Deployment in the United States*, (Jul. 9, 2024), https://www.energy.gov/ne/articles/newly-signed-bill-will-boost-nuclear-reactor-deployment-united-states.
[192] Plumer, *supra* note 5.
[193] *Id*.
[194] Esther Frances, *Outdated Regulations Stall Cutting-Edge Nuclear Plants,* MEDILL NEWS SERVICE (Feb. 22, 2024), https://dc.medill.northwestern.edu/blog/2024/02/22/outdated-regulations-stall-cutting-edge-nuclear-plants/#sthash.ZcOfKl6F.dpbs.

power plants and atomic materials.[195] Operators of a nuclear reactor must obtain an operating license from the NRC, processed through their Atomic Safety and Licensing Board (ASLB).[196] New applicants are also required to undergo a safety review and antitrust review to obtain a license before they can begin construction.[197]

Beyond the regulatory red tape largely responsible for high costs and delays, three other issues have been identified as major factors in the stagnation of the industry: perceived adverse safety, environmental, and health effects; high security risks from proliferation; and issues with long term storage and management of nuclear waste.[198] Although public perception is a valid component necessary for nuclear to succeed, it is beyond what can easily be changed by statute and will not be addressed in respects to the ADVANCE Act, alongside the concerns over nuclear proliferation.[199] While not a major cause of the sorry state of the nuclear industry, nuclear proliferation concerns are addressed in the act, particularly in Title I as discussed in the analysis of the ADVANCE Act.[200] The relationship between public feedback and delays are covered in section three, along with how Congress could further improve the viability of nuclear power without removing the public's ability to comment on such projects.[201]

Nuclear waste storage has posed challenges for decades, sparking extensive litigation over its location.[202] As of 2023 there was an estimated 88,000 metric tons of nuclear waste in casks on-site at U.S. power plants, with around 2,000 more metric tons being produced each year.[203] Further, according to a U.S. National Academies of Science, Engineering and Medicine report new and advanced reactor designs will not save the U.S. from its current waste problem.[204] New fuels could even exacerbate the problem by creating waste that costs more to manage or dispose of.[205]

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[195] DAVIES ET AL., ENERGY LAW AND POLICY, 815 (3d ed. 2022).
[196] *Id*.
[197] *Id*. at 816.
[198] *See MIT Releases Interdisciplinary Study on "The Future of Nuclear Energy"*, MIT ENERGY INITIATIVE (Jul. 29, 2003), https://energy.mit.edu/news/mit-releases-interdisciplinary-study-future-nuclear-energy/. MIT released an interdisciplinary study with potential solutions, with researchers including names such as Ernest Moniz who was the Secretary of Energy in the Obama administration.
[199] Nuclear proliferation is addressed in the bill, and will be briefly touched upon, but is such a complicated issue that I consider it beyond the scope of this note.
[200] *See infra* p. 13.
[201] *See infra* pp. 23-24.
[202] Some facilities have waste dating back to the 1940s still in "interim storage." *See* MITCH JACOBY, *As nuclear waste piles up, scientists seek the best long-term storage solutions*, C&EN (Mar. 30, 2020), https://cen.acs.org/environment/pollution/nuclear-waste-pilesscientists-seek-best/98/i12.
[203] ALLISON MACFARLANE & RODNEY C. EWING, Nuclear Waste Is Piling Up. Does the U.S. Have a Plan?, SCIENTIFIC AMERICAN (Mar. 6, 2023), https://www.scientificamerican.com/article/nuclear-waste-is-piling-up-does-the-u-s-have-a-plan/.
[204] NATIONAL ACADEMIES PRESS, *MERITS AND VIABILITY OF DIFFERENT NUCLEAR FUEL CYCLES AND TECHNOLOGY OPTIONS AND THE WASTE ASPECTS OF ADVANCED NUCLEAR REACTORS*, NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE. 2023. MERITS AND VIABILITY OF DIFFERENT NUCLEAR FUEL CYCLES AND TECHNOLOGY OPTIONS AND THE WASTE ASPECTS OF ADVANCED NUCLEAR REACTORS (SEP. 9, 2023), https://nap.nationalacademies.org/catalog/26500/merits-and-viability-of-different-nuclear-fuel-cycles-and-technology-options-and-the-waste-aspects-of-advanced-nuclear-reactors.
[205] *Id*.

I. Costs

The elephant in the room with regards to the problems facing investors in nuclear power, is that currently it is simply not economically viable to construct new nuclear reactors in the U.S.[206] This result is at odds with much of the rest of the world, where costs have stayed level or even come down in some instances, such as in South Korea.[207] The economics of nuclear energy are dependent on controlling capital costs required to construct a plant, where long term cheap, stable energy production pays for the steep initial investment costs.[208] Construction times significantly affect costs, and globally, developers have reduced median completion times over the last two decades.[209]

Ballooning prices for new nuclear reactors reflect a uniquely American problem, driven by the country's regulatory framework.[210] Perhaps the largest contributor to why prices in the U.S. skyrocketed while they remained stable abroad is due to the scale and bespoke nature of U.S. reactors.[211] The unique design of each reactor in turn means they require unique parts, design efforts, tailored regulatory oversight for safety systems, and specialized training for employees to meet the plant's operating standards.[212] The majority of American nuclear power plants were built prior to Three Mile Island, before the industry was able to properly standardize.[213] The industry grew in the sixties in an era where energy demand was expected to grow with no end in sight, before crashing to a halt by the 1980s.[214] Prior to the turn in public opinion in the aftermath of Three Mile Island and Chernobyl, the industry faced financial challenges that put a halt to the explosive growth in new plants that began in the 1960s.[215]

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[206] "Cost is nuclear's achilles heel." Plumber, *supra* note 5.
Costs are so high that it has led to numerous bankruptcies, cost overruns are the norm for nuclear power. TRACY ALLOWAY, JOE WEISENTHAL, & AASHNA SHAH, *Overcoming the Barriers to Nuclear Energy Revival*, BLOOMBERG (Oct. 24, 2023), https://archive.is/cilWI.
James Ashmore, *A New, Clear Demand: Necessary Changes to the Inflation Reduction Act to Prevent the Current Fallout in the Nuclear Industry*, 56 TEX. TECH L. REV. 481 (2024) (Regulatory costs alone are substantial enough to make nuclear uncompetitive).
[207] WORLD NUCLEAR ASSOCIATION, ECONOMICS OF NUCLEAR POWER (Aug. 2022), https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx.
[208] *See Id*.
[209] *See Id*.
[210] Plumber, *supra* note 5.
[211] Margaret Cooney, *A Comparative Study of Nuclear Reactor Standardization Policy in the United States and France*, 2020 B.C. INTELL. PROP. & TECH. F. 1, 1, 11 (2022).
[212] *Id*; ANGELA DEWAN, ELLA NILSEN, & LOU ROBINSON, *New-wave Reactor Technology Could Kick-Start a Nuclear Renaissance – and the US is Banking on it,* CNN (Apr. 26, 2024), https://www.cnn.com/2024/02/01/climate/nuclear-small-modular-reactors-us-russia-china-climate-solution-intl/index.html.
[213] See N.L. Char & B.J. Csik, Nuclear Power Development: History and Outlook, 3 BULLETIN OF THE INTERNATIONAL ATOMIC ENERGY AGENCY [IAEA] 19, 20 (Sept. 1987), https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull29-3/29304781925.pdf (describing impact of the Three Mile Island incident on the nuclear energy development); James Conca, Can't All Nuclear Just Get on the Same Page?, FORBES (Mar. 12, 2015), https://www.forbes.com/sites/jamesconca/2015/03/12/cant-all-nuclear-just-get-on-the-same-page/ (discussing standardization); Cooney, supra note 33 at 9-10 (describing lack of standardization in the U.S. relative to France).
[214] See Char & Csik, supra note 35, at 19-20.
[215] See id. at 19.

The sharp increase in oil prices led to a hard to overcome combination of higher prices in the materials necessary to construct new plants, while also facing a decrease in energy demand as energy prices shrunk in response to growing prices.[216] The 1974 Energy Reorganization Act, which established the NRC, added higher regulatory costs which increased the price to build a new reactor dramatically.[217] The additional safety measures implemented following the 1979 Three Mile Island incident resulted in a 187% increase in the cost to build a new reactor by 1980.[218] This confluence of factors, combined with higher labor costs over longer construction periods, resulted in a dramatic slowdown in construction, preserving the industry in a state of stasis, never able to evolve or grow enough to face the pressure to standardize.[219]

An example of how the lack of standardization has led to numerous plants being retired earlier than expected can be found in the costs associated with replacing steam generators used in around two-thirds of U.S. nuclear plants.[220] Generators typically last 20-30 years, requiring at least one replacement for a plant to operate over a full forty-year licensing period.[221] These replacements cost hundreds of millions of dollars per reactor, and require major construction work, as the size of the components require the creation of large temporary holes into the reactor containment to install the new generators.[222] High replacement costs may lead operators to shut down reactors instead of replacing steam generators.[223]

Further, the federal government historically refused to step in and provide funding to perform the expensive maintenance required by such a diverse nuclear fleet of reactors, leaving the costs of maintaining aging reactors largely to the states.[224] This was in part addressed recently in the Inflation Reduction Act (IRA) which set aside money to maintain our existing nuclear fleet.[225] The Act provides both a production tax credit of up to $15 per megawatt-hour for existing plants, and loan guarantees to help reactors remain competitive with other forms of energy production.[226] The IRA also provides production tax credits or investment tax credits for new nuclear projects, provided they go online after 2025.[227] While these are valuable measures, they do little to address the source of the higher costs in the U.S., and are not geared towards encouraging a standardization of the industry going forward. No private enterprise or state

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[216] See id.
[217] See Cooney, supra note 33 at 8, 14.
[218] See id. at 14.
[219] See id.; Reactor Construction Starts, WORLD NUCLEAR INDUSTRY STATUS REPORT, https://www.worldnuclearreport.org/reactors.html#tab=iso;iso=USA (last visited Mar. 9, 2025) (scroll down, then filter for "North America," then "United States").
[220] CONG. RSCH. SERV., R44715, FINANCIAL CHALLENGES OF OPERATING NUCLEAR POWER PLANTS IN THE UNITED STATES 9 (2016), https://www.everycrsreport.com/files/20161214_R44715_e13f9da7116c0368451dd56ac6f1c729b593d21c.pdf.
[221] Id.
[222] Id.
[223] Id.
[224] See id. at 25.
[225] Press Release, New York State, New York Receives Significant Federal Assistance to Reduce Energy Costs for New Yorkers (Aug. 1, 2023), https://www.nyserda.ny.gov/About/Newsroom/2023-Announcements/2023-08-01-Governor-Hochul-Announces-Significant-Federal-Assistance-to-Reduce-Clean-Energy-Costs.
[226] Joseph C. Unger, The Inflation Reduction Act's Investment in Nuclear Energy, ENERGY & MIN. L. FOUND. (2023), https://emlf.org/the-inflation-reduction-acts-investment-in-nuclear-energy/.
[227] Id.

government would be eager to fund a costly program that requires extensive federal aid to merely continue existing operations.

France took the opposite approach to reactor designs, and only authorizes new reactors that use one of three approved designs, leading to the industry becoming highly standardized.[228] France has one of the largest nuclear fleets in the world, and in 2021 over two-thirds of its energy production came from nuclear power.[229] France, like many of its peers, also built anywhere from two to eight reactors at a single power plant site, unlike the U.S which often only built one to two.[230] Cooperation with France has also been a component in China's rapid buildup of nuclear power towards a goal of generating 150 gigawatts in fifteen years.[231] This involved purchases initially, and later coordinating in building its own homegrown reactor with French assistance.[232] China has focused on a standard reactor design, the CPR-1000, and is hoping to find a market for it beyond its borders.[233]

I. NRC Certification and Fees

Currently there are two types of licenses the NRC offers to applicants, those obtained under the two-step process under Part 50 of NRC regulations, and the combined process under Part 52. Part 50 received criticism for being too slow and cumbersome, leading to the adoption of Part 52 which sought to streamline the process.[234] The main innovation of Part 52 was to allow developers to resolve design and environmental licensing requirements before starting the construction process, and adapting to any hurdles that may arise in the process.[235] It grants developers early site permits if the applicant can address the "safety and environmental characteristics of the site and evaluate potential obstacles to developing an acceptable emergency plan."[236] This combined license (COL) is valid for 40 years from the date of the Commission finding, and can be renewed for an additional 20 years.[237]

Only 19 applications have been made for a COL license, of which one was denied, two suspended, and 8 withdrawn.[238] Part 52 has not transformed the industry however, and is ill

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[228] See Cooney, supra note 33, at 4-5.
[229] Elesia Fasching, Nuclear Power Plants Generated 68% of France's Electricity in 2021, U.S. ENERGY INFO. ADMIN. (Jan. 23, 2023), https://www.eia.gov/todayinenergy/detail.php?id=55259.
[230] Plumber, supra note 5.
[231] Catherine Clifford, How China Became the King of New Nuclear Power, and How the U.S. is Trying to Stage a Comeback, CNBC (Aug. 30, 2023), https://www.cnbc.com/2023/08/30/how-china-became-king-of-new-nuclear-power-how-us-could-catch-up.html.
[232] Id.
[233] Plumber, supra note 5.
[234] DAVIES, supra note 17 at 816-17.
[235] Arjun Prasad, *Forward-Looking Improvements to Licensing the Next Generation of Nuclear Reactors,* 2 AM. U. BUS. L. REV. 209, 213 (2012).
[236] NUCLEAR REGUL. COMM'N., BACKGROUNDER ON NUCLEAR POWER PLANT LICENSING PROCESS, 4 (Jul. 2020), https://www.nrc.gov/docs/ML0521/ML052170295.pdf.
[237] 10 C.F.R. § 52.103(g) (2024).
[238] NUCLEAR REGUL. COMM'N., COMBINED LICENSE APPLICATIONS FOR NEW REACTORS (Jul. 2023), https://www.nrc.gov/reactors/new-reactors/large-lwr/col.html.

suited for addressing the technical complexity of next generation reactors.[239] The NRC designed this framework decades ago, making it ill-suited for advanced and small modular reactors. As of May 2023, NRC staff were engaged in pre-application activities with eleven advanced reactor developers with non-light water reactor (LWR) designs and five developers with light-water small modular reactor (SMR) designs.[240] Modifications to the licensing process have better prepared the agency to review these reactors, but a years-long staffing shortage at the NRC has delayed timely license issuance.[241] The Government Accountability Office (GAO) has suggested the NRC needs to assess the effectiveness of its recruitment and retention efforts to handle the expected increase in licensing applications for advanced reactors in the coming years.[242] Understanding why the agency has staffing problems and what the best solutions are is unclear, as the GAO determined the "NRC does not know the extent to which its recruitment strategies and incentives have had a positive effect on hiring and retention because the agency does not have benchmarks to assess their effectiveness. Without measures and benchmarks to assess its recruitment, relocation, and retention incentives and recruitment strategies, NRC is unable to determine the effectiveness of its efforts to ensure that it has sufficient numbers of knowledgeable staff needed to conduct licensing reviews in the coming years."[243]

In response to these challenges, the NRC proposed Rule 53 to address issues that emerged under Rule 52, particularly the lack of flexibility for advanced reactors.[244] The Rule is a response to the inflexibility of Rule 52, and aims to have an adaptable framework that can change alongside advancements in reactor designs.[245] Congress directed the NRC to create Rule 53 in the 2018 Nuclear Energy Innovation and Modernization Act, and has a statutory deadline to have the Rule in place by December 31, 2027.[246] NRC Chairman Christopher Hanson plans to have the final rule published ahead of the statutory deadline, potentially as soon as September 2026.[247]

Additionally, the NRC imposes both hourly and yearly fees on nuclear reactor operators, which further reduce the profitability of new reactors.[248] This is because the NRC is required by law to recover 90% of their operating expenses through fees, in a cost recovery model of operation.[249] Typically when government agencies are required to raise money to fund their operations, it is

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[239] *Id*.
[240] U.S. GOV'T ACCOUNTABILITY OFF., GAO-23-105997, NUCLEAR POWER: NRC NEEDS TO TAKE ADDITIONAL ACTIONS TO PREPARE TO LICENSE ADVANCED REACTORS 12 (2023), https://www.gao.gov/assets/d23105997.pdf.
[241] *Id.* at 27.
[242] *Supra* note 60 at 31.
[243] *Supra* note 60 at 12; *supra* note 48 at i.
[244] NUCLEAR REGUL. COMM'N, PART 53 – RISK INFORMED, TECHNOLOGY-INCLUSIVE REGULATORY FRAMEWORK FOR ADVANCED REACTORS (Nov. 2023), https://www.nrc.gov/reactors/new-reactors/advanced/modernizing/rulemaking/part-53.html.
[245] Sonal Patel, *NRC Sets Stage for Advanced Nuclear with New Part 53 Rule*, POWER MAGAZINE (Mar. 4, 2024), https://www.powermag.com/nrc-sets-stage-for-advanced-nuclear-with-new-part-53-rule/.
[246] Brian Martucci, *NRC Commissioners Order Changes to Proposed Licensing Rules for Advanced Reactors*, UTILITY DIVE (Mar. 6, 2024), https://www.utilitydive.com/news/nrc-licensing-rules-advanced-nuclear-reactor-smr/709464/.
[247] Adam Stein, *Nuclear Regulatory Commission Charts a Path Forward on Part 53,* THE BREAKTHROUGH (Mar. 4, 2024), https://thebreakthrough.org/issues/energy/nuclear-regulatory-commission-charts-a-path-forward-on-part-53.
[248] NUCLEAR REGUL. COMM'N., GENERAL QUESTIONS ABOUT NRC FEES, https://www.nrc.gov/about-nrc/regulatory/licensing/general-fee-questions.pdf.
[249] *Id.*

done via fees on economic activity.[250] An example of this would be the FAA funding its operations via a fee charged on every airline ticket purchased by consumers.[251] However, unlike other agencies that are required to pay for the majority of their operating expenses, the NRC is deriving fees from licenses instead of economic activity.[252] The average nuclear power plant can be expected to pay $22 million in annual fees to the NRC, $8.6 million in regulatory costs, and $32.7 million in regulatory liabilities.[253] This is a very burdensome requirement imposed solely on nuclear power plants, when compared to solar and natural gas which have no such fees.

Requiring the nuclear industry to subsidize its own regulator is unique to nuclear power in U.S. energy law, and particularly burdensome in an era of low wholesale electricity prices and escalating costs.[254] High costs have exceeded profits in some plants, especially in competitive markets.[255] Even the plants making marginal profits face shutdowns in the event of costly repairs being needed, as many plants were built in an era when fees were lower, profits were higher, and massive unplanned expenses may result in a situation where decommissioning the reactor is less expensive than repairing it.[256] Unanticipated costs remain the second largest driving factor behind reactor shutdowns this millennia.[257] High fees increase the upfront cost of developing new nuclear plants since developers must pay them before construction begins.[258] When combined with the multi-billion upfront investment costs and the decades it takes for a reactor to turn a lifetime profit, the lack of assured profits makes the prospect of investing in new reactors a multi-billion dollar gamble.[259]

The history of the NRCs fees mirror the development of new plants, or more accurately the lack thereof. The fee structure can trace its roots to the Atomic Energy Commission which initially set modest fees that grew gradually with the industry.[260] Budgetary pressures in the 1980s led to Congress mandating the NRC recoup a third of its costs from fees, which was shortly thereafter

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[250] Aaron Larson, *Are NRC Fees Limiting Innovation in the Nuclear Industry?,* POWER MAGAZINE (May 20, 2021), https://www.powermag.com/are-nrc-fees-limiting-innovation-in-the-nuclear-industry/.
[251] *Id.*
[252] *Id*.
[253] Sam Batkins & Philip Rossetti, *Putting Nuclear Regulatory Costs in Context*, AMERICAN ACTION FORUM (Jul. 12, 2017), https://www.americanactionforum.org/research/putting-nuclear-regulatory-costs-context/ (explaining that annual fees are for operating nuclear plant, regulatory costs cover expenses from compliance with regulations, and regulatory liabilities are result of plants being saddled with spent fuel that incurs liability expenses).
[254] *Id.*; CRS, *supra* note 29.
[255] CRS, *supra* note 29.
[256] Alex Gilbert, Judi Greenwald & Victor Ibarra, Jr., *Unlocking Advanced Nuclear Innovation: The Role of Fee Reform and Public Investment*, Nuclear Innovation Alliance (May 2021), https://www.nuclearinnovationalliance.org/sites/default/files/2021-08/NIA%20Unlocking%20Nuclear%20Innovation%20through%20NRC%20Fee%20Reform.pdf These plants were built in an era where fees were under 33%, and these expensive repairs would have not impeded a plant from operating at a profit. However, when profits are in the low millions a repair costing in the tens to hundreds of millions is simply not economically viable. See, note 33 on how unanticipated costs can result in the decommissioning of a previously profitable nuclear power plant.
[257] Id.
[258] See Batkins, *supra* note 73.
[259] Paul Day, *Investors are Turning Bullish on Nuclear,* REUTERS (Dec. 16, 2023, 11:47 AM), https://www.reuters.com/business/energy/investors-are-turning-bullish-nuclear-2023-11-16/.
[260] See Gilbert, *supra* note 76, at 6.

raised to 100% in 1990.[261] While the threshold was lowered to 90% in 2005, the result has been rising operating costs for nuclear power, reducing its economic viability relative to solar and natural gas which are not required to pay for their own regulatory and oversight fees.[262] Cheap solar and gas has further impacted the profitability of nuclear power by reducing the price of energy in most markets. The reactors in these competitive markets are only able to sell their power at a rate decided upon by their respective Independent System Operator/Regional Transmission Organizations (ISOs/RTOs), which can put nuclear reactors in a situation of facing losses selling power or having to reduce production.[263]

ISOs/RTOs determine prices by accepting bids from all producers, arranging the bids from highest to lowest, and using the bids combined with expected demand levels to construct a supply curve and setting the price where demand and supply intersect. Given the dominant role natural gas and coal play in our current energy market, the prices often are determined by price trends in gas and coal markets.[264] Natural gas prices have in many respects disrupted the market by lowering wholesale prices, as costs to operate a nuclear plant continue to increase.[265] Both gas and solar remain profitable when wholesale energy prices are low, as they are faster and cheaper to construct, have low operating costs, and do not have to fund their own regulation and oversight.[266] Both energy sources also benefit from government subsidies, which help to keep prices low for consumers.[267]

The long construction times have resulted in 40 planned nuclear plants being abandoned in the U.S. as investors are saddled with years of NRC fees before a single watt is generated, all while any loans accumulate interest for 10-20 years.[268] Traditionally nuclear power recouped these costs over the span of decades, and any investors would want to confidently predict that any new plant could sell power at a profit for decades to come. Without a reduction in regulatory fees or higher energy prices it is unlikely that investors choose to construct nuclear power plants over a less risky investment in solar or gas.

I. NEPA

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[261] Id.
[262] Id.
[263] CRS, *supra* note 29; Regional Transmission Organizations, 18 CFR §35.34 (1999) (FERC Order No. 2000 encouraged the voluntary formation of RTOs to administer the transmission grid).
[264] CRS, *supra* note 29, at 15.
[265] Id. at 17.
[266] Batkins, *supra* note 73. While nuclear energy plants can take up to 20 years to begin operations, other forms of energy are both federally subsidized and have a faster regulatory framework that allows for them to be constructed in 2-3 years.
[267] MIT Climate Lab, , *How Much do Government Subsidies Affect the Price of Fossil Fuel Energy? How About Renewable Energy?*, MIT Climate Lab (Apr. 17, 2024), https://climate.mit.edu/ask-mit/how-much-do-government-subsidies-affect-price-fossil-fuel-energy-how-about-renewable-energy [https://perma.cc/8B8B-8X8M]. Globally solar might be the cheapest energy source in the world without subsidies, as the technology continues to become more efficient. Luke Richardson, *Solar Energy vs Fossil Fuels: How do They Compare*, ENERGYSAGE (Dec. 6, 2023), https://www.energysage.com/about-clean-energy/solar/solar-energy-vs-fossil-fuels/, [**https://perma.cc/8VST-C9BP**].
[268] Batkins, *supra* note 73.

In order for the NRC to issue a COL it first requires a public hearing and a full environmental impact statement which must address any reasonably foreseeable environmental impacts.[269] While the mandatory hearing requires any contentions submitted in the public hearing to include support for their concerns with "sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact," it is not a substantial hurdle for opponents of nuclear energy to overcome.[270] These hearings are often the origin point of future litigation, adding what can amount to unnecessary costs and delays in the construction of new reactors.[271] Opponents of the now operational Vogtle 3 and 4 reactors used this step in the regulatory process to bog the project down in lawsuits, contributing in part to the delays and cost overruns the project faced in the nearly two decades between the application for an Early Site Permit (ESP) and producing commercial power.[272] Opponents often use this process to delay projects while rallying popular and political opposition.[273] NEPA delays average 4.5 years and last even longer for nuclear projects due to potential environmental risks.[274]

This is another realm where further standardization could prove helpful. One of the primary benefits of standardization is the designs are well vetted, and thoroughly tested to ensure the risk of an accident is low.[275] Despite having the second largest nuclear fleet, France has experienced no major accidents, in part due to the immense standardization of the French nuclear industry.[276] This allows them to prevent any legal intervention by outside groups once construction gets underway, and while standardization would not entirely solve the delays caused by NEPA it would likely help in speeding up the process.[277]

I. Storage of Nuclear Waste

One suggestion for tackling the subject of waste disposal is the creation of a new, independent organization with secure funding not dependent on yearly Congressional approval.[278] A 2012 presidential Blue Ribbon Commission suggested the creation of a corporation similar to the Tennessee Valley Authority to handle the task, as any government agency under the DOE would suffer the same problems as the existing system.[279] Crucially, a corporation would be more insulated from the constant leadership and priority changes that occur with each new administration, and would not be subject to the same political pressures facing the government.[280]

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[269] DAVIES, *supra* note 17, at 820.
[270] Id.
[271] Frances, *supra* note 14.
[272] Blue Ridge Env't. Def. League v. NRC, 668 F.3d 747 (D.C. Cir. 2011).
[273] Denis Binder, *NEPA, NIMBYs and New Technology,* 25 LAND & WATER REV. 11, 17 (1990).
[274] Aidan Mackenzie & Santi Ruiz, *No, NEPA Really Is a Problem for Clean Energy*, INSTITUTE FOR PROGRESS (Aug. 17, 2023), https://ifp.org/no-nepa-really-is-a-problem-for-clean-energy/ [https://perma.cc/2HKC-JNYX]. (The NRC is listed as one of the departments with the longest review times).
[275] Cooney, *supra* note 32, at 11.
[276] *Id* at 15.
[277] Plumber, *supra* note 5.
[278] MacFarlane, *supra* note 25.
[279] BLUE RIBBON COMM'N ON AM.'S NUCLEAR FUTURE, REPORT TO THE SECRETARY OF ENERGY, at xi (2012), https://www.energy.gov/ne/articles/blue-ribbon-commission-americas-nuclear-future-report-secretary-energy.
[280] *Id*. at 6.

In a post-Chevron legal environment, this seems like a dubious solution to the problem. Injunctions and court cases could delay action for years, only for the agency to lose in court. It also seems unlikely that a unified Republican Washington will approve the creation of a new agency in the next four years, as opposed to solving the problem with a proper long term storage site.

The Advance Act:

The Advance Act has five major statutory components, each focused on tackling a specific problem faced by American nuclear energy projects. Title I is focused on elevating American leadership in overseas markets, aiming particularlyto improve the approval process for exporting American nuclear technology.[281] Title II addresses the high regulatory costs facing the industry, incentivizes innovation, and directs the NRC to create an expedited path for new nuclear projects under certain circumstances.[282] Title III aims to modernize outdated rules that have restricted international investment in the American nuclear industry.[283] Title IV requires the NRC to evaluate new fuels and manufacturing techniques.[284] Title V seeks to address staffing issues at the NRC, modernize the agency, change the NRC's mission statement, and require the NRC to streamline the licensing and NEPA processes.[285]

Perhaps the most controversial change is under Section 501, which adds the following to the mission statement of the NRC:

> "Not later than 1 year after the date of the enactment of this Act, the Commission shall… update the mission statement of the Commission to include that licensing and regulation of the civilian use of radioactive materials and nuclear energy activities be conducted in a manner that is efficient and does not unnecessarily limit—
>
> > (1) the civilian use of radioactive materials and deployment of nuclear energy; or
> > (2)the benefits of civilian use of radioactive materials and nuclear energy technology to society."[286]

The pushback to this change stems from concerns over the NRC's role transitioning from a primary focuse on safety and accident prevention to promotion of the very industry it is intended to regulate.[287] Sen. Ed Markey expressed concern for how the House tacked a merged version of

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[281] U.S. Senate Comm. on Env't & Pub. Works, *SIGNED: Bipartisan ADVANCE Act to Boost Nuclear Energy Now Law* (Jul. 9, 2024), https://www.epw.senate.gov/public/index.cfm/2024/7/signed-bipartisan-advance-act-to-boost-nuclear-energy-now-law.
[282] *Id.*
[283] *Id.*
[284] *Id.*
[285] *Id.*
[286] S. 870, 118th Cong. § 501(a) (2024).
[287]Jessica Corbett, *88-2: Only Markey, Sanders Oppose 'Expensive, Risky' Nuclear Expansion*, OFFICE OF SEN. BERNIE SANDERS (Jun. 19, 2024), https://www.sanders.senate.gov/in-the-news/88-2-only-markey-sanders-oppose-expensive-risky-nuclear-power-expansion/.

the House Atomic Energy Advancement Act and the Senate Advance Act onto a non-controversial appropriations bill for the U.S. Fire Administration.[288] During the debate over the earlier House-passed version of the bill, the vote was largely bipartisan, with only 36 progressive Democrats voting against it due to concerns it would undermine reactor safety.[289] Only two progressive senators, Bernie Sanders and Ed Markey opposed the final bill, with Sanders' statement quoting a critique of the bill by Johanna Neumann, the senior director of the Campaign for 100% Renewable Energy. The cited critique stated

> "[I]t is disappointing that the Senate chose to promote nuclear power when America is flush with energy options that are better for the people and the planet. … Nuclear is, at best, a waste of resources. At worst, it's a meltdown. … Why are we choosing to split atoms when it's cheaper, faster, and better for the environment to cut energy waste and power our lives with wind and solar?"[290]

Proponents say it will make the NRC more closely resemble other regulatory agencies such as the Food and Drug Administration.[291] Section 501 also requires the NRC to submit a report that describes the updated mission statement and the guidance the Commission will provide to staff to ensure effective performance of the mission of the NRC to Congress. [292]

TITLE I:

Title I is primarily focused on bolstering international collaboration in the nuclear sector and providing a better framework to export American nuclear technology. Section 101 allows the NRC to establish a branch within the Office of International Programs to coordinate the agency's mission abroad.[293] It further allows for the NRC to work with international partners to establish better regulatory frameworks and licensing programs and to provide assistance to foreign nations in designing, constructing, and operating nuclear reactors.[294] The remainder of Title I is focused on national security and proliferation concerns, which are beyond the scope of this note.[295] This section of the Advance Act is primarily geared towards making the nuclear industry more profitable, by allowing the private sector to invest in new nuclear facilities abroad. In 2021, Russia had $133 billion in foreign orders for nuclear reactors and China was in the process of constructing four foreign reactors with plans for 16 more.[296] The Department of Energy had previously suggested the need for the U.S. to compete with Russia and China in these markets in

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[288] *Id,*
[289] Thomas Catenacci, *36 Progressive House Dems Vote Against Bipartisan Green Energy Bill*, FOX NEWS (Feb. 29, 2024), https://www.foxnews.com/politics/36-progressive-house-dems-vote-against-bipartisan-green-energy-bill (https://web.archive.org/web/20240415130436/https://www.foxnews.com/politics/36-progressive-house-dems-vote-against-bipartisan-green-energy-bill).
[290] Corbett, *supra* note 107.
[291] Brad Plumer, *U.S. Seeks to Boost Nuclear Power After Decades of Inertia,* N.Y. TIMES (Mar. 1, 2024), https://www.nytimes.com/2024/03/01/climate/nuclear-power-legislation-congress.html.
[292] S. 870, 118th Cong. § 501(b) (2024).
[293] *Id.*§ 101(b).
[294] *Id.* § 101(a)(1)(B).
[295] *See id,*§§ 102–105.
[296] Kyle Sallee, *Regaining American Competitiveness in the Global Nuclear Power Market*, AM. U.(Feb. 5, 2021), https://www.american.edu/sis/centers/security-technology/regaining-american-competitiveness-in-the-global-nuclear-power-market.cfm.

order to promote strong non-proliferation standards, and that failing to lead the international nuclear industry ceded the ability to promote U.S. national security interests.[297]

TITLE II:

Title II aims to address the high costs in opening and operating a nuclear power plant. Section 201 aims to reduce the costs of agency support through the regulatory process, by capping the hourly rate charged at the hourly rate for mission-direct program salaries and benefits.[298] Further, mission indirect support may not be included in the hourly rate charged.[299] These benefits only apply to advanced reactor applicants, and only until they sunset on September 30, 2030.[300] To further help offset the costs of developing advanced reactors, Congress has authorized prizes for the first reactors that accomplish certain feats such as being fueled by spent nuclear fuel, or for a reactor that flexibly operates to generate heat or electricity for nonelectric applications.[301] These prizes are limited to the amount spent on licensing the reactor, excluding any expenditures made with federal funds.[302]

Section 203 requires the Commission to submit to Congress a report addressing any unique licensing issues or requirements for advanced reactors, and to seek input from various groups such as the nuclear energy industry, NGOs, and the industrial, chemical, and medical sectors.[303] This report is to include cost estimates, budgets, and timeframes.[304] Section 204 aims to reduce the costs for early site permits for advanced reactors by allowing the NRC to be exempt from Congress's usual requirement mandating 90% of their costs be recouped through fees.[305] The Commission is also required to study the risks associated with "mass-manufactured fusion machines" which is beyond the scope of this note, given mass-produced nuclear fusion would upend the energy sector as we know it if accomplished in the near future.[306]

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[297] U.S. DEP'T OF ENERGY, RESTORING AMERICA'S COMPETITIVE NUCLEAR ENERGY ADVANTAGE 6 (2020), https://www.energy.gov/articles/restoring-americas-competitive-nuclear-energy-advantage.
[298] S. 870, 118th Cong. § 201(c) (2024).
[299] *Id.* § 201(b).
[300] *Id.* § 201(d).
[301] *Id.* § 202. The award for heat or electricity for nonelectric applications is intended to incentivize flexible nuclear power for industrial purposes, such as producing hydrogen or various chemicals, desalinating water, or producing medical or industrial isotopes. The Commission is required to seek input on any licensing issues for this purpose under Section 203(c)(1)(A).
[302] *Id*.
[303] *Id.* § 203. The Commission has 270 from the date of enactment to submit its report to Congress. This gives them a deadline of April 5, 2024 to complete their report.
[304] *Id.* § 203(c)(2).
[305] *Id.* § 204. A site for critical national security infrastructure is defined as "any site or installation that the Secretary of Energy or the Secretary of Defense determines supports critical mission functions of the national security enterprise." John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115–232, § 326(d)(1), 132 Stat. 1636, 1722 (2018).
[306] Fire Grants and Safety Act of 2023, Pub. L. No. 118-67, § 205, 138 Stat. 1447, 1461-62 (2024).

Congress further requires the NRC to investigate brownfield sites or those that previously operated as fossil fuel power facilities as a location for new nuclear power plants.[307] This section is multifaceted, with goals beyond just encouraging nuclear development. This section is intended to make the process of licensing a nuclear plant easier in sites that have been abandoned that either have existing infrastructure that could be reused, sites that might be costly to clean up, or both. These sites likely would have already completed costly environmental impact statements, have existing emergency preparedness organizations or planning, and contain existing infrastructure that could be reused. The NRC needs to consider how the existing infrastructure could be reused and if previous reports such as EISs and emergency preparedness plans could be reused in order to cut through many of the procedural and legal hurdles that new plants face before generating any power whatsoever.[308] Given how expensive and time consuming an environmental impact statement can be, a shortcut would both make nuclear more financially feasible and ensure unused industrial land is given a new purpose as opposed to undeveloped or non-industrial land being developed for advanced nuclear sites.

Section 207 is another push by Congress to ensure new nuclear developments can be brought online faster and not be stuck in a decades long licensing purgatory. It requires the NRC establish an expedited procedures for new nuclear reactors that: reference a design for which the Commission has issued a design certification; has a design substantially similar to an already licensed reactor; are situated on a site where nuclear reactors currently or previously operated; are situated adjacent to a site where a nuclear reactor operates or previously operated and has characteristics substantially similar to such a site.[309] Crucially, it sets a cap of twenty-five months for the NRC to make a final decision on whether to issue a combined license.[310] This includes elements that currently can delay new nuclear developments for years, such as the issuance of a final environmental impact statement.[311]

The Commission is also required to consider the unique characteristics of micro reactors, and create a unique licensing and regulatory framework by January of 2026.[312] Microreactors are 100 to 1,000 times smaller than conventional nuclear reactors, in theory offering a combination of reliability and operational flexibility that no other small generator could match.[313] A microreactor could be pulled by a semi tractor-trailer, and operate for years without refueling.[314] This would allow for power generation in remote locations, such as in an area impacted by a natural disaster.[315] Microreactors are also well suited to provide heat for industrial purposes such as hydrogen production or water desalination.[316]

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[307] *Id.* § 206. Brownfield sites are those in which the land was previously developed or occupied by a permanent structure which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. 42 U.S.C. 9601(39)(A).
[308] Fire Grants and Safety Act of 2023 § 206(c).
[309] *Id*. § 207(a)(b).
[310] *Id.* § 207(c).
[311] *Id.*
[312] *Id.* § 208(a)(b).
[313] *Microreactors*, IDAHO NATIONAL LABORATORY (last visited Mar. 21, 2025), https://inl.gov/trending-topics/microreactors/ [https://perma.cc/58H5-FJRH].
[314] *Id.*
[315] *Id.*
[316] *Id.*

TITLE III:

The shortest section of the Advance Act seeks to introduce new spending on American nuclear products by reducing some of the restrictions on international investment. Section 301 allows for nation members of the Organisation for Economic Co-operation and Development and the Republic of India, or a corporation/resident of those nations to invest in our nuclear industry, provided such investment would not be injurious to American citizens, or America's national security interests.[317] Further, these exceptions would not apply to any adversaries under Section 301(b)(2).[318]

TITLE IV:

Title IV would address numerous key problems facing the nuclear industry such as the shortage of workers at the NRC and rebuilding the supply chains necessary to reduce the cost of new nuclear projects. Section 401 would require the NRC to create a report examining any unique licensing issues or requirements for advanced nuclear reactors, and to examine several components of the supply chain such as the need for new codes and standards for new materials that do not yet have applicable codes and standards.[319] The NRC is also tasked with identifying segments of the industry in need of new codes or standards for which the existing ones are insufficient, and to describe to Congress the extent to which the NRC needs to act in order to implement any matter described in the report.[320]

Section 402 is geared towards alleviating the NRC's staffing problems by creating a nuclear energy traineeship program, awarding traineeships that provide focused training to meet critical mission needs of the NRC and nuclear workforce. The NRC will need to evaluate the workforce needs annually, in order to inform what traineeships are needed to fulfill the workforce needs of the nuclear energy community.[321]

The primary focus of section 403 is having the Secretary of Energy submit a report to Congress by January 1, 2026 focused on the problems created by spent nuclear fuel and radioactive waste. This includes both past and future expenses as a result of violating contractual obligations under the Nuclear Waste Policy Act of 1982, and costs the Dept. of Energy incurs to store, manage, and dispose of spent nuclear fuel and high-level radioactive waste. The report is also required to detail better mechanisms for accounting of liabilities for the lifecycle costs of nuclear waste, and any potential actions the Department could take to enhance the safe transportation and storage of nuclear waste.

Section 404 focuses on modernizing the NRC and Dept. of Energy, in order to more efficiently perform their duties. This includes provisions such as operating a database to store and share data and knowledge relevant to nuclear science and engineering between Federal agencies and the

[317] S. 870 § 301.
[318] S. 870 § 301(b)(2).
[319] S. 870 § 401(c)(1).
[320] S. 870 § 401(c)(1, 2).
[321] S. 870 § 402.

private sector.[322] The Commission is also required to assess the preparedness of the NRC to review and qualify for use: accident tolerant fuel, ceramic cladding materials; fuels containing silicon carbide; high-assay, low-enriched uranium fuels; molten-salt based liquid fuels; fuels derived from spent fuel or depleted uranium; and other related fuel concepts, as determined by the Commission.[323]

TITLE V:

Section 501 includes the controversial change to the mission statement of the NRC, to require their mission be conducted in a manner that is efficient and does not unnecessarily limit civilian use of radioactive materials and deployment of nuclear energy.[324] This change was a primary concern of Progressives in Congress, who worried it would turn the NRC into an agency working for industry as opposed to a regulatory body to ensure the safety of the American people from such dangerous materials.[325]

The staffing problems at the Commission are addressed in Section 502, so that the NRC can better meet the efficiency requirement mandated in its mission statement.[326] This would allow the Chairman to appoint up to 20 well qualified individuals to term-limited positions each fiscal year, with terms not exceeding four years and the total number of such positions not exceeding 210 at any one time.[327] Their pay would be capped to that of a level III employee of the executive schedule, which is around $204,000 in 2024.[328] The Chairman is also to consider the future needs of the NRC, and ensure the workforce will be able to carry out the responsibilities of the Commission in a timely, efficient, and effective manner.[329] Congress also gave the Chairman authority to fix the compensation of employees, likely in an effort to improve retention rates at the NRC.[330] The Commissioner is also authorized to give various bonuses, such as a one time hiring bonus not to exceed $25,000 or a bonus for exceptional performance similarly capped at $25,000.[331] Any performance based bonuses would preclude an employee from receiving another one for 5 years.[332]

Congress further tasks the Commission to review and assess the performance metrics and milestone schedules every three years, and update and improve those metrics and milestone schedules to provide the most efficient metrics and schedules as are reasonably achievable.[333]

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[322] S. 870 § 401(b)(1)(B).
[323] S. 870 § 401(c)(1)(A).
[324] S. 870 § 501(a).
[325] Catenacci, *supra* note 91.
[326] S. 870 § 502.
[327] S. 870 § 502(a)(1)(2).
[328] S. 870 § 502(a)(2)(B)(i); Federal Register, *January 2024 Pay Schedules* (Jul. 17, 2024), https://www.federalregister.gov/documents/2024/07/17/2024-15653/january-2024-pay-schedules#:~:text=Executive%20Order%2014113%20establishes%20the%202024%20range%20of%20rates%20of,SL/ST%20performance%20appraisal%20system.
[329] S. 870 § 502(a)(4).
[330] S. 870 § 502(b).
[331] S. 870 § 502(c).
[332] S. 870 § 502(C)(2)(C)(i).
[333] S. 870 § 504.

The NRC is directed to ensure licensing reviews are completed in a timely and efficient manner via the establishment of techniques and guidance for applicants to obtain their licenses.[334] The NRC is also directed to streamline the environmental review process, which should be more efficient, timely, and predictable while also reducing the burdens on licensees and applicants.[335] The Commission is to create a report on how it plans to accomplish this directive from Congress by January 5, 2025.[336]

TITLE VI:

The final Title of the ADVANCE Act is focused on technical revisions to the Atomic Energy Act and tasks the NRC to author a report to Congress describing any engagement between the NRC and the Government of Canada with respect to nuclear waste issues in the Great Lakes Basin.

Effectiveness of the ADVANCE Act:

Overall the ADVANCE Act may just live up to Congressman Duncan's bold claim of being the most impactful change to the nuclear industry in a generation. While it does not address all of the particular issues facing the industry, such as the storage of nuclear waste, it is targeted at some of the largest issues facing the industry, namely the regulatory costs and construction hurdles facing any future developer of a nuclear plant.[337] Mirroring section two, I will lay out how the bill addresses: I. costs; II. NRC certifications and fees; III. NEPA; and IV. nuclear waste disposal.

I. Costs

While the Act in no way requires standardization, it would certainly push the industry in that direction. By allowing new applicants to use previous EIS statements, there will be a greater financial incentive for new developers to borrow from existing successful reactors instead of designing new reactors that will need a full EIS before a COL can be issued.[338] While the Act could go further in creating financial incentives to standardize the industry, the flexibility of this approach is also far more innovation friendly than the French framework.[339] Given the SMR and

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[334] S. 870 § 505.
[335] S. 870 § 506.
[336] S. 870 § 506(a).
[337] The only mentions of nuclear waste are for a requirement that reports be made to Congress on the subject. *See e.g.*, S. 870 § 403. Congress is or should be well aware of the current status of waste disposal, and it is unlikely any report is going to solve the issue. In the 2024 election cycle Republican Senate Candidate Sam Brown quickly backtracked on supporting the storage of nuclear waste in the Yucca Mountain project, after facing intense backlash. Gabby Birenbaum, *Sam Brown backtracks on nuclear dump, says 'Yucca is dead' and shouldn't be revived*, NEV. INDEP. (May 30, 2024, 2:00 AM), https://thenevadaindependent.com/article/sam-brown-backtracks-on-nuclear-dump-says-yucca-is-dead-and-shouldnt-be-revived[https://perma.cc/4PL6-E5CA].
[338] S. 870, 118th Cong., *supra* notes 118-19.
[339] Cooney, *supra* note 33 at 10.

advanced reactor industry is still in its infancy, with no reactor having even begun construction, this is a sensible approach Congress can take to simultaneously support the free market whilst simultaneously encouraging a more standardized fleet.[340]

Section 201 covers Micro-reactor licensing, requiring the NRC to produce a regulatory framework for micro-reactors.[341] Micro-reactors have unique traits including their physical size, design simplicity, and the ease in which they can be produced in large numbers.[342] Borrowing from our peer nations who situate 2+ reactors at one site, micro-reactors would be scalable based on growth of the energy needs of a market.[343] The costs to expand a 4-reactor plant to a 6-reactor plant due to growing demand, or a phasing out of fossil fuels would be much cheaper than opening an entirely new plant.

Section 207 also expedites the process for issuing combined licenses to reactors using a previously licensed design, or for a new reactor on or adjacent to an already operating or previously operated nuclear reactor.[344] These provisions further create incentive for industry to standardize and build more reactors at a given location. This framework moves the U.S. more towards a regulatory framework of our peer nations, without unnecessarily hindering future innovation in the nuclear industry.

The financial rewards are built upon incentives provided by previous attempts at bolstering the industry, such as those in the IRA, to get new reactors up and running.[345] One of the main selling points of SMRs in particular is a form of standardization and modularity, which would lower costs as production scales up.[346] These reactors rely on having multiple units at a single plant location, similar to how most foreign nuclear power plants have more than two reactors.[347] The allowance for prior documents to be reused in the regulatory process will also allow existing sites using SMRs to more easily add more reactors should demand increase.[348]

The ADVANCE Act also has a myriad of other cost reducing measures that should collectively help spur growth in the industry including: capping hourly costs,[349] preventing the NRC from charging for mission indirect support,[350] and allowing international investment.[351] One notable omission from the original House bill is the lack of a pilot program in which at least one long-

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[340] NUCLEAR REGULATORY COMMISSION, COMBINED LICENSE APPLICATIONS FOR NEW REACTORS (Jul. 3, 2023), https://www.nrc.gov/reactors/new-reactors/large-lwr/col.html[https://perma.cc/8QPH-V686].
[341] H.R. 6544,118th Cong. § 201(b)(1)(A) (2024).
[342] Idaho National Laboratory, *supra* note 133; GOV. ACC. OFFICE, GAO-20-380SP, NUCLEAR MICROREACTORS (2020), https://www.gao.gov/assets/gao-20-380sp.pdf [https://perma.cc/EMV2-SNN4].
[343] Cooney, *supra* note 33 at 20.
[344] S. 870, 118th Cong., *supra* notes 129.
[345] S. 870, 118th Cong., *supra* notes 163-64.(the notes numbers seem incorrect)
[346] Chris Vlahoplus & Sean Lawrie, *Small Modular Reactors - A Viable Option for a Clean Energy Future?*, U.N.C. KENAN-FLAGLER BUS. SCH. ENE. CENTER 1, 4 (Aug. 2021), https://www.kenan-flagler.unc.edu/wp-content/uploads/2021/08/SMRs-A-Viable-Option-for-Clean-Energy-Future_2021.07.19_Final.pdf. [https://perma.cc/76A8-48VB]
[347] *Id*. at 3.
[348] *Id. at 6;* S. 870,118th Cong., *supra* notes 113-14.
[349] S. 870, 118th Cong., *supra* note 118-19.
[350] S. 870, 118th Cong., § 201(a) (2024).
[351] S. 870, 118th Cong., § 104(b) (2024).

term power purchase agreement is issued to a commercial reactor after the NRC issues an initial operating license.[352] The provision would have helped reduce some of the risks for investors in new reactors, ensuring that the power produced by first-of–a-kind or early deployment reactors provides at least some returns on investment.[353] Making the multibillion-dollar gamble on new reactors less risky would have made the calculus of investing in advanced reactors more attractive for investors than it is at the present.

This however could be provided by the private sector, as already companies are signing agreements to pay a fixed, above market premium for nuclear energy to power AI facilities.[354] The vast power demands necessary for AI coupled with corporate desires to be carbon neutral could be the key to solving the revenue issues facing nuclear power. The ADVANCE Act itself does little to incentivize such a synergistic collaboration, however, it does provide AI companies with an economic avenue to address a key critique of companies investing in large energy intensive AI facilities. Critics do not believe even green AI powered facilities are acceptable, as they are still consuming an immense amount of green energy that otherwise could be used to reduce our reliance on fossil fuels to power homes and businesses.[355] If instead AI companies were to pay an above market fixed rate for power, they could meaningfully address this concern by making a substantial energy surplus economical, when it otherwise would not have been.

Congress however has *potentially* laid the groundwork for an American nuclear renaissance, should tech companies invest in nuclear. Section 207's cutting of regulatory red tape presents nuclear companies with an opportunity to quickly ramp up domestic production. This would begin with power purchasing agreements with large tech companies investing in AI, such as Microsoft which has already made such agreements.[356] This removes the element of risk based on fluctuating energy prices for the utility, and once the first reactors are online they could quickly expand to power the surrounding area, as the major regulatory hurdles will have already been overcome. AI in essence would be paying for all of the regulatory and construction costs holding nuclear back, and allowing for cheap (relatively) expansion thereafter. Multiple agreements for small modular reactors, such as those by Microsoft, would also help standardize the industry, driving down the costs of each subsequent SMR purchase.[357] These reactors could also be built near saltwater sources, using SMRs to desalinate the water needed to cool the AI facilities, addressing the other main criticism such facilities face.[358] The first reactor used for this purpose will even receive a financial reward from Congress under Section 202.

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[352] H.R. 6544,118th Cong. § 201(d) (2024).
[353] *Id*.
[354] *See* Martucci, *infra* note 203 .
[355] Ben Payton, *Power mad: AI's massive energy demand risks causing major environmental headaches*, REUTERS (Dec. 4, 2023, 8:14 AM), https://www.reuters.com/sustainability/climate-energy/power-mad-ais-massive-energy-demand-risks-causing-major-environmental-headaches-2023-12-04/[https://perma.cc/ANX5-66ST]. ("Alex de Vries, a Dutch data scientist who recently published an academic paper that raised concerns over the environmental consequences of AI and data centres. De Vries argues that data centre expansion will inevitably lead to increased use of fossil fuels. While noting that many data centre customers prioritise green electricity, he says 'if they manage to take those renewable energy sources, it just means you have to power something else with fossil fuels.'").
[356] *Id*.
[357] *See* Paul Day, *Tech giants take US nuclear industry to next level*, THOMSON REUTERS: REUTERS EVENTS (Nov. 5, 2024), https://www.reuters.com/business/energy/tech-giants-take-us-nuclear-industry-next-level-2024-11-05/.
[358]

This natural synergy between the two industries could be further bolstered by additional Congressional action. AI facilities powered in earthquake-safe west coast areas could be expanded upon with dozens of additional reactors, funded by Congress, to alleviate the troubling water shortages across the western United States. Small and medium-sized nuclear reactors are well suited for desalination and can even generate electricity in the process.[359] With a complicated battle for freshwater between the states in the Southwest, nuclear power *could* provide the most cost-effective and politically feasible solution to the water shortage, without reducing the region's agricultural output.

I. NRC Certifications and Fees

Reforming the NRC regulatory structure is a major component of the ADVANCE Act, captured in Section V, which requires a revision of the mission statement to include efficiency in its work.[360] It requires the Administrator to efficiently, timely, and predictably review all applications, while still conducting a thorough safety review.[361] The ADVANCE Act also grants greater hiring authority and incentive powers to the Administrator to better address the staffing issues the GAO identified.[362] In order to meet the anticipated growing demand for licenses, the NRC will need to address the current staffing shortage.[363] Section 502 requires the Chairman to begin analyzing data trends in hiring and retention, in an effort to better understand the reasons why the NRC is currently facing staffing shortages.[364] This combined with their authority to increase pay or issue bonuses will potentially allow the Chairman to collect data relevant to solving the question of why the NRC has such a retention problem.[365]

The Act also aims to reduce many of the fees paid to the NRC, in an effort to address the current stresses placed on the nuclear industry in an era of cheap energy rates buoyed by abundant natural gas.[366] Section 201 sets up several fee exemptions for advanced reactor applicants, sunsetting in 2030, in an effort to boost investment in advanced reactors.[367] These incentives are added to by Section 202, which allows the Secretary of Energy to award prizes to the first generation of advanced reactors.[368] The first entity to successfully operate a reactor in several categories will be eligible for a prize, such as the first reactor to generate power from spent nuclear fuel or the first to produce heat for industrial purposes, should the Secretary have the funds.[369]

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[359] *Desalination*, WORLD NUCLEAR ASS'N, https://world-nuclear.org/information-library/non-power-nuclear-applications/industry/nuclear-desalination (last updated May 2, 2024) [https://perma.cc/3Y8R-C6NB].
[360] ADVANCE Act of 2024, Pub. L. No. 118-67, div. B, § 501, 138 Stat. 1447, 1471 (2024).
[361] *Id.* § 505.
[362] *Id.* § 502.
[363] U.S. GOV'T ACCOUNTABILITY OFF., GAO-23-105997, NUCLEAR POWER: NRC NEEDS TO TAKE ADDITIONAL ACTIONS TO PREPARE TO LICENSE ADVANCED REACTORS (2023).
[364] ADVANCE Act § 502.
[365] *See Id.*
[366] ADVANCE Act of 2024, Pub. L. No. 118-67, div. B, § 201, 138 Stat. 1447, 1456 (2024).
[367] *Id.* § 201.
[368] *Id.* § 202.
[369] *Id.*

As discussed previously, Section 207 features numerous components geared at speeding up the regulatory process and allowing for expedited procedures for issuing licenses in certain circumstances.[370] The longer construction times in the U.S. mean accruing more interest expenses before income can be obtained, and any reduction created by Section 207 will have at least some impact in making investments in advanced reactors less expensive and risky.

II. NEPA

Section 506 addresses the delay caused by NEPA, and requires the NRC to submit a report to Congress on how it plans to facilitate "efficient, timely, and predictable environmental reviews of nuclear reactor applications . . . including through expanded use of categorical exclusions, environmental assessments, and generic environmental impact statements."[371] The NRC is directed to look into using previously prepared studies or analyses, along with coordinating the environmental assessment and EIS processes with other federal agencies to avoid duplicative environmental reviews.[372] It would also allow the NRC to use an applicant's EIS as a draft of their own, allowing the private sector to speed up the process by reducing the time it takes for the government to fulfill its regulatory burden.[373]

Congress also directs the NRC to consider existing brownfield sites, which should make the environment review process faster through the use of existing data and reports on these sites.[374] These sites could make prime locations for new reactors for a number of reasons, as outlined in Section 206(b)(2).[375] Existing site infrastructure, pre-existing emergency preparedness plans, and previously completed environmental reviews are some of several key benefits these sites may have that could allow applicants to get their reactors operational sooner.[376] Brownfield sites that are former coal power plants are especially well suited for SMRs, as many of the systems used for running the coal-fired plant can be repurposed for use with an SMR.[377] "These include plant make-up water and water storage systems; desalination plants; compressed air systems; chemical stores; technical gasses storage system[s]; wastewater treatment systems; mobile lifting equipment; and cooling towers."[378]

The NRC will likely have to address the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in regard to using brownfield sites for new nuclear

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[370] *Id.* § 207.
[371] *Id.* § 506.
[372] ADVANCE Act of 2024, Pub. L. No. 118-67, div. B, § 506(b)(2), 138 Stat. 1447, 1478-1479 (2024).
[373] *Id.* § 506(b)(2)(J).
[374] *Id.* § 206.
[375] *Id.* § 206(b)(2).
[376] *Id.* § 206(c)(2).
[377] Nicholas Watson & Nikoleta Morelova, *Repurposing Fossil Fuel Power Plant Sites with SMRs to Ease Clean Energy Transition*, INTERNATIONAL ATOMIC ENERGY AGENCY (Jun. 16, 2022), https://www.iaea.org/newscenter/news/repurposing-fossil-fuel-power-plant-sites-with-smrs-to-ease-clean-energy-transition [https://perma.cc/99UM-QCCV].
[378] *Id*.

developments.[379] Under the 2002 amendments to CERCLA, it is likely any investment would fall under the bona fide prospective purchaser provision (BFPP), which would require the purchasers to meet certain threshold criteria to avoid CERCLA liability.[380] This would require meeting continuing obligations after the purchase, and that the purchaser take active "reasonable steps" to stop any continuing release and prevent any threatened future releases of any chemicals that would trigger CERCLA liability.[381]

Section 206 will more than likely fail to make nuclear energy more economically viable, as even reopening a recently decommissioned nuclear power plant is an expensive and years long process.[382] Although three decommissioned plants are currently expected to be recommissioned this decade, it is unlikely that more than five plants are in a position to be recommissioned according to Keith Drudy, a nuclear industry consultant.[383] The two plants currently undergoing the process of recommissioning, Palisades and Three Mile Island, have unique conditions that make them prime targets for reopening.[384] Both were recently decommissioned, have maintained their hardware, and expect to have reliable profits going forward.[385] The AI boom has led Microsoft to agree to pay a substantial premium over market rates for clean power produced at Three Mile Island, making the expensive and time consuming process of bringing it back online a substantially safer investment.[386] These plants happened to be owned by Holtec International, which kept them in pristine shape after operations ceased, a unique circumstance leaving these reactors as the only realistic candidates for being recommissioned.[387]

It is unlikely that the provisions aiming to revitalize brownfield will save enough time or money to materially impact any investors decision to open a new plant. Even if companies such as Microsoft agree to pay a fixed above market rate for power from companies such as Terrapower, any savings from revitalizing a brownfield site are likely to be small compared to the billions of dollars necessary to open a plant. The expenses for reopening the Palisades plant alone are likely to exceed $1.5 billion, even with the owner maintaining the plant with the goal of reopening it.[388] In my opinion the real value in the brownfield provision is to encourage the use of land already scarred by industry, as opposed to developing new plants on undeveloped or non-industrial land. The provision is not aimed at reopening old plants, instead encouraging operators of advanced reactors to build new reactors in areas with some existing infrastructure fit for reuse.

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[379] *EPA Brownfields Grants, CERCLA Liability, and All Appropriate Inquiries,* EPA (Sept. 2023), https://www.epa.gov/system/files/documents/2023 09/Grants%2C%20CERCLA%2C%20Liabilities%2C%20and%20AAI_0.pdf.
[380] *Id*; *Bona Fide Prospective Purchasers*, EPA (Sept. 15, 2023), https://www.epa.gov/enforcement/bona-fide-prospective-purchasers.
[381] *Bona Fide Prospective Purchasers*, EPA (Sept. 15, 2023), https://www.epa.gov/enforcement/bona-fide-prospective-purchasers.
[382] Casey Crownhart, *How to reopen a nuclear power plant*, MIT TECH. REV. (Apr. 3, 2024), https://www.technologyreview.com/2024/04/03/1090603/how-to-reopen-a-nuclear-power-plant/.
[383] Brian Martucci, *With Palisades and Three Mile Island units set to restart, could more retired reactors follow?*, UTILITY DRIVE (Oct. 22, 2024), https://www.utilitydive.com/news/palisades-three-mile-island-duane-arnold-nuclear-reactor-restart-holtec-nextera-constellation-nrc/730393/.
[384] *Id*.
[385] *Id*.
[386] *Id*.
[387] *Id*.
[388] Crownhart, *supra* note 191.

The ADVANCE Act also does not address the public feedback component of NEPA, which in my view could be remedied by allowing for construction of the plant while it undergoes the environmental review and public comment. The current system of requiring industry to clear regulatory hurdles before breaking ground is inefficient, and Congress could have better tackled the issue in the ADVANCE Act.[389] I believe Congress could have both addressed this inefficiency and better encouraged the usage of brownfield sites by eliminating this requirement at brownfield sites. A new construction project in an area without an environmental impact statement could still lead to environmental harm occurring if construction is allowed to occur during this regulatory evaluation period, but sites already scarred by industry are only going to be made useful again by the preliminary construction of a new power plant.

Congress could also have limited the total time an EIS takes to a period of two years, as proposed by groups such as Columbia University's Center on Global Energy Policy.[390] This would still allow for a thorough review and public comment, without unnecessary delay. These environmental concerns should be open to public feedback and thorough review, but with a hard time limit on how long they can delay a project without a sufficient environmental concern to justify further delay. If the harm is not from the construction of the site itself, then construction should be allowed to begin while any concerns over the reactors and waste are addressed concurrently.

I. Nuclear Waste Disposal

The sole provision mentioning spent fuel and nuclear waste is under Section 202, which awards the costs relating to the issuance of the license as well as the costs related to the issuance of an associated construction permit to the first commercial reactor deriving power from spent nuclear fuel.[391] While the ADVANCE Act focuses on numerous problems facing the nuclear industry, it is reluctant to address the problem of storing our existing and future waste. This could in part be due to the current best solution which is storing the waste in the Yucca Mountain range facility in Nevada, which neither party wanted to address in a Presidential election year.[392] Nevada's swing state status and close margins make it unlikely that any such provision would have passed the Senate or been signed by President Biden given the electoral risks associated with doing so.[393]

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[389] Matt Bowen, Andrew Evans & Hamna Khan, *Reforming Nuclear Reactor Permitting and Environmental Reviews: Roundtable Report*, COLUM. U. CTR. ON GLOBAL ENERGY POL'Y (Jul. 3, 2024), https://www.energypolicy.columbia.edu/publications/reforming-nuclear-reactor-permitting-and-environmental-reviews-roundtable-report/.
[390] *Id*.
[391] S. 870 § 202.
[392] Seema Mehta, *Nuclear Waste Storage at Yucca Mountain Could Roil Nevada U.S. Senate Race*, L.A. TIMES (Apr. 30, 2023), https://www.latimes.com/politics/story/2024-04-30/nuclear-waste-storage-at-yucca-mountain-could-roil-nevada-u-s-senate-race (discussing the Senate race and not the Presidential race, the dynamics are similar and a political lightning rod in the state)(Given the importance of the state it is unlikely to change any time soon unless one party decides to abandon the state politically).
[393] *Id*.

This could conceivably change under President Trump, given he no longer needs Nevada to vote for him as a term-limited President, and no Nevada Senate seat will be up for election until the 2028 elections. With unified control in Washington, President Trump could do what his predecessors have failed to accomplish for decades, provided Senate Democrats do not filibuster the legislation. I believe it would be prudent for Democrats to work with Republicans to address this issue, as in my view doing so could be seen as a key victory by future historians in averting the worst of catastrophic climate change.

Beyond Yucca mountain, Congress could have better incentivized recycling nuclear waste, as done in France.[394] When recycled 96% of spent fuel can be reused, with the remaining 4% needing to be stored long term.[395] While recycling could certainly make some of the waste useful again, it would still leave countless tons of long-lived waste which would still need a permanent place to store it. France is addressing the long-lived waste by constructing their own version of the Yucca mountain storage facility, the Cigéo facility, which would similarly store the waste deep underground.[396] Whatever the solution to the waste disposal problem, Congress needs to act quickly if it plans to use an alternative method of disposal than the Yucca site, as any alternative would likely take years to decades to construct.

Conclusion:

Overall, the ADVANCE Act will likely spur new investment in the nuclear industry, but it is unclear if it will be enough to allow the industry to thrive. If the NRC is unable to perform reviews as quickly as Congress intends, sections of the bill may sunset before any reactors even begin operation, such as lowered NRC fees for advanced reactor applicants. Further, if companies continue to invest heavily into generative AI networks any green energy gains might be mitigated by a drastic increase in energy consumption over the next decade.[397] As previously discussed, I think this could provide secure funding for new plants to construct several SMRs which could then be expanded upon later to power the surrounding area. With Congress cutting much of the red tape for adding reactors to existing sites, tech companies eager for power to fuel their AI programs would ensure there is a profit to be made after all of the costly regulatory hurdles are completed, paving the way for further reactors to be built at a fraction of the price which could be sufficient for profitable power for the non-AI needs of the state.

Some economic models predict modern reactors will be as costly as the outdated reactors of the mid-twentieth century, at least in a pre-ADVANCE Act environment.[398] While Congress may

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[394] *All About Unpacking Nuclear Waste in France*, ORANO (2025), https://www.orano.group/en/unpacking-nuclear/all-about-radioactive-waste-in france#:~:text=The%20metal%20structures%20from%20fuel,to%20its%20country%20of%20origin.
[395] *Id*.
[396] *Cigeo*, ANDRA (2025), https://international.andra.fr/solutions-long-lived-waste/cigeo.
[397] Ivan Penn & Karen Weiss, *Hungry for Energy, Amazon, Google and Microsoft Turn to Nuclear Power*, N.Y.TIMES (Oct. 16, 2024), https://www.nytimes.com/2024/10/16/business/energy-environment/amazon-google-microsoft-nuclear-energy.html.
[398] Jessica R. Lovering & Jameson R. McBride, *Chasing Cheap Nuclear: Economic Trade-Offs for Small Modular Reactors*, 50 NAT'L ACAD. OF ENG'G 3 (Sep. 15, 2020), https://www.nae.edu/239267/Chasing-Cheap-Nuclear-Economic-TradeOffs-for-Small-Modular-Reactors.

have to pour more money into the industry in order to revitalize it, it is my view the ADVANCE Act meaningfully addresses **some** of the major concerns and reduces some of the excessive costs previously necessary to invest in nuclear energy. However, there is a good chance the cost benefit analysis of investing in nuclear will still not be high enough to encourage investment by the private sector without further action from Congress. This may require either cash infusions or cutting the regulatory hurdles towards opening new nuclear sites such as funding the NRC outright or allowing construction on brownfield sites to begin before completing the EIS.

Is this the best use of the taxpayer's money? Should the United States even be building nuclear plants in 2024 given that even with these changes it will still take years to build these facilities? With the results of the 2024 elections being a clean sweep for Republicans, I think in retrospect the value of this investment has substantially increased. Research has shown Republican-led climate initiatives are more likely to have broad support than Democratic ones, as rank and file Republicans are far more likely to support an identical policy sponsored by Republican leadership than one by Democratic leadership.[399] This coupled with the fact that Republicans are historically more friendly to nuclear power than Democrats, as a matter of energy security and reliability, poise nuclear energy to be a key component of advancing clean energy in a second Trump administration.[400]

To answer my question of if nuclear is worth saving, in an administration hostile to other forms of clean energy it seems nuclear might be our best chance of averting catastrophic climate change.[401] It is not clear if the ADVANCE Act will be sufficient to revive the industry, as that will fall largely on private industry to test. Numerous issues plaguing the industry such as where to store the waste are largely unaddressed, and it might be too little, too late.

That of course does not mean that Congress cannot act further to remedy the problems that remain. Any discussed shortcomings of the Act such as not clearing the usage of the Yucca mountain facility are hurdles that the nuclear industry could reasonably get Washington to address in the next two years. If President Trump is willing to spend political capital to push for more nuclear and natural gas power generation, his re-election could *potentially* result in an administration that has done more to combat climate change than many of his predecessors. With political capital to burn in a unified Washington and no concern for re-election, it is within President Trump's power to have a tremendous legacy in combating climate change. This is far from assured, and I would not place any bets on him investing enough political capital on the issue to begin a nuclear renaissance.

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[399] Leaf Van Boven & David Sherman, *Republicans Hold the Key to Depolarizing the Climate Issue*, THE HILL (Jan. 22, 2025), https://thehill.com/opinion/energy-environment/5098381-climate-solutions-republican-leadership/ ("Democratic and Republican voters both take cues from their party's political leaders. Although Democratic voters are somewhat less supportive of Republican-led climate solutions than Democratic-led solutions, they do not oppose them outright. Among Republican voters, however, Republican leadership can be transformative in driving support for solutions to climate change.").

[400] Matteo Wong, *A New Reckoning for Nuclear Energy*, THE ATLANTIC (Dec. 2, 2024), https://www.theatlantic.com/technology/archive/2024/12/america-nuclear-power-revival/680842/.

[401] At least as far as America's contribution to global greenhouse gasses, however even a fully net-zero emissions America could fail to avert the worst effects if other nations continue to pollute.

Nuclear power still faces substantial headwinds as market forces keep energy prices low, and it is not clear any future plants will be profitable while competing with abundant cheap solar and natural gas. **If** nuclear power is revived however, Congress has created a regulatory expressway for future reactors using pre-existing designs and at locations that currently or previously operated as a nuclear power plant. This in the long term might be the most impactful move by Congress, allowing a power plant to far more easily scale up power production once they have an operating plant. Nuclear also offers a stable base of energy production, unlike other green sources such as solar and wind power, while using substantially less land per kwH. Further, this change maintains the local population's right to comment on the construction of nuclear power near them, while largely preventing them from holding up expansions of existing plants. While the ADVANCE Act does provide an easier road and some incentives for the construction of new reactors, without federal investment it is hard to say if the ADVANCE Act will save a dying industry.

Perhaps the ADVANCE Act opening the gates to foreign businesses will help offset initial costs, allowing for further investment once the site is online. The rest of the world has demonstrated that economical nuclear power is certainly possible, and this bill is a good step in that direction. Given the power structure of the next four years, bipartisan investment in nuclear energy is **perhaps** the *only* federal action the public can expect to address the climate crisis. Even without further action by the Trump administration, this bill provides the U.S. with a meaningful pathway towards reducing its carbon footprint despite Washington being controlled by politicians actively hostile to the environment. It ultimately will fall to the industry itself to secure long term power purchasing agreements and secure the necessary funding to get past the hardest hurdles at the beginning of the process. Congress has cleared the road, but it is unclear if it has paved the road or if that burden will fall upon the industry itself.

Look Mom, You Made It: Navigating the Uncharted Waters of Social Media Labor Laws

> "Come closer, for the video, come closer! Come closer, put your head right here, come closer, act like you're crying." *"I am crying."* "Go like this." *"Mom, I'm actually seriously crying."* "No, I know, but go like this for the video, go like this, put one hand up, go like this. No go like this, but let them see your mouth, let them see your mouth." *"Mom, I'm actually crying."* "Look at me, look at me, look at the camera."

This was the conversation between Jordan Cheyenne and her 8-year-old son, Christian, after finding out their dog had a potentially deadly illness, but not before she hit record.

[1] Her success on social media allowed her to leave her real estate job to pursue content creation full-time.[2] Jordan is merely one participant in a growing trend. Jordan is one of many parents who have turned to social media as a source of income and used their children to help them do it.[3] She joins a cohort of parents who have harnessed the power of social media, leveraging their children as integral components of their income-generating endeavors.

Jordan is not the first parent to use her child for financial gain, and she certainly will not be the last. Consider, for example, the parents of Jackie Coogan,[4] Britney Spears,[5] Jennette McCurdy,[6] Ryan Kaji,[7] and many others. Though these parents may claim to have their child's best interest at heart, those exploited children might beg to differ. Certain states, such as California, have legal protections in place to protect working children's finances from their

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[1] Rachel Abrahamson, *Family YouTuber Deletes Account After Criticism Over Video Coaching Son to Cry*, TODAY (Sept. 15, 2021), https://www.nbcnewyork.com/news/national-international/family-youtuber-deletes-account-after-criticism-over-video-coaching-son-to-cry/3273358/ (updated Sept. 16, 2021, 11:30 AM) [https://perma.cc/BL92-EFDM].
[2] *Id.*
[3] *Id.*
[4] Daniel Johnson, *Parents of the Rich and Famous Who Tried to Extort Their Children*, GRUNGE ENT. (Jan. 6, 2021, 4:40 PM), https://www.grunge.com/308137/parents-of-the-rich-and-famous-who-tried-to-extort-their-children/ [https://perma.cc/TJ2F-WYUZ].
[5] Chantal Da Silva & Diana Dasrath, *Britney Spears Says Father Took Millions During Conservatorship*, NBC NEWS (Jan. 19, 2022), https://www.nbcnews.com/news/britney-spears-says-father-took-millions-conservatorship-rcna12694 [https://perma.cc/G96Q-62TJ].
[6] *See generally,* JENNETTE MCCURDY, I'M GLAD MY MOM DIED (2022).
[7] Jay Caspian Kang, *The Boy King of YouTube*, N.Y. TIMES MAG. (Jan. 5, 2022), https://www.nytimes.com/2022/01/05/magazine/ryan-kaji-youtube.html (last updated Jan. 8, 2022) [PERMALINK].

parents, including for example, "Coogan Laws."[8] These laws require parents to create a trust in their child's name and deposit some of their earnings so the child can access it when they turn eighteen.[9]

Unfortunately, the few states that have enacted these "Coogan laws" have all but stopped with the further inclusion of the expanding media platforms. The public is unknowingly relying on the children themselves to bring this problem to legislators in order to create the financial protections we desperately need.[10] One state has been successful in its endeavor – Illinois. Modeled after proposed legislation in Washington State, Illinois is the first state to successfully amend their child labor laws to include "vloggers" and other social media content creators who involve children in monetized videos.[11] Though the requirements to maintain some of the profits for the child still reflect the original Coogan Laws, many seem hopeful that including social media is a crucial step forward.

However, the movement is growing slowly, the initial bill in Washington is still sitting in the House, waiting to be discussed and passed.[12] Additionally, the governor of Pennsylvania has announced a plan to introduce legislation to protect children in social media,[13] but has yet to introduce any such legislation. Other states may start thinking about making similar

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[8] CAL. FAM. CODE § 6753 (West, Westlaw through 2004 Sess.); *see also* 29 U.S.C. § 213(c)(3) (requiring children working in movies, television, or radio to be paid)

[9] Denise Simon, *Work Permits and Coogan Accounts: What You Need to Know for Child Actors*, BACKSTAGE (Mar. 9, 2023), https://www.backstage.com/magazine/article/coogan-law-explained-child-actors-3978/ (last updated Apr. 22, 2024) [PERMALINK].

[10] *See generally,* Samantha Murphy Kelly, *Illinois Passes a Law that Requires Parents to Compensate Child Influencers*, CNN (Aug. 16, 2023), https://www.cnn.com/2023/08/16/tech/kid-influencer-law/index.html [https://perma.cc/4PCN-2D6K]; Natasha Bakirci, *Child Influencers Will Soon be Able to Sue Parents for Social Media Earnings in Illinois*, FINDLAW (Aug. 23, 2023), https://www.findlaw.com/legalblogs/law-and-life/child-influencers-will-soon-be-able-to-sue-parents-for-social-media-earnings-in-illinois/ [PERMALINK].

[11] S.B. 1782, 103d Gen. Assemb. (Ill. 2023) ; H.B. 1627, Reg. Sess. (Wash. 2024).

[12] *Id*.

[13] *Ecker to Introduce Legislation Regulating Child Influencers*, PA STATE REP TORREN ECKER (Aug. 17, 2023), https://www.repecker.com/News/32795/Latest-News/Ecker-to-Introduce-Legislation-Regulating-Child-Influencers [https://perma.cc/4T5W-4KSH].

amendments, but so far, the majority of activists pushing these bills forward are the children themselves.[14] Kids are recognizing the work they are doing and want to be paid for it.[15]

Despite these positive strides, there is a gap in the majority of child labor laws across the country. Children on social media are not required to be compensated for their work irrespective of the heightened monetization of content.[16] Closing this gap could draw inspiration from Illinois' model, expanding the existing financial protections, via trusts, to include "vloggers" and other social media content involving children. Though trusts are one way to financially protect children, they are faulty with parents still at the helm and there are other avenues to ensure children see the fruits of their labor.

While children actively contribute to the monetization of social media content, they currently lack adequate compensation for their work. There is a pressing need to expand financial protections, such as trusts, to encompass "vloggers" and other child-involved social media content. However, recognizing the limitations of trusts with parents still in control, alternative avenues must be explored to ensure children receive fair compensation for their labor in the digital realm.

This note will delve into the existing landscape of child labor laws in order to address the current gap in compensating children for their contributions to the monetization of social media content. Part I highlights the lack of compensation for children despite their active involvement in content creation. Part II advocates for the expansion of financial protections for children who are working on social media as the expansion of the monetization of social media has also

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[14] Claire Savage, *Child Social Media Stars Have Few Protections. Illinois Aims to Fix That*, THE ASSOCIATED PRESS (May 14, 2023, 9:02 AM), https://apnews.com/article/tiktok-influencer-child-social-media-illinois-law-65a837e2ba7151c91c17f69b08862022 (noting how 13-year-old Shreya Nallamothu raised her concerns about children younger than her in Social Media to her senator in Illinois, asking Illinois legislators to enact some protections).
[15] *Id.*
[16] 29 U.S.C. § 213(c)(3).

grown. Part III will discuss the need to explore alternative avenues that go beyond parental control, ensuring children receive just compensation for their labor in the evolving digital landscape.

Part I: Navigating Media Realms: From Traditional Work to Digital Frontiers

A. Traditional Media Work and Regulations: Origins and Development

Children in media and entertainment is not new. The first attempt at standardizing child labor was during Shirley Temple's rise to fame.[17] President Franklin Roosevelt signed into law the Fair Labor Standards Act (FLSA) of 1938,[18] which conveniently made an exemption for children in media,[19] most likely so he did not have to say goodbye to the beloved curly-haired Shirley. This exemption allowed children, like and including Shirley Temple, to continue working in media, specifically child actors or performers in motion pictures, theatrical productions, radio, or television productions.[20]

Shortly after the FLSA and child media exemptions, Jackie Coogan was the next child actor to gain the attention of lawmakers in 1939. Taking legal action against his mother and stepfather, Coogan challenged their appropriation of his hard-earned income for their personal use.[21] As a result, Jackie is often hailed as the catalyst for a broader movement aimed at

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[17] *Shirley Temple*, BIOGRAPHY.COM, https://www.biography.com/actors/shirley-temple [https://perma.cc/U55W-Y3K4] (last updated Apr. 20, 2021).

[18] Jonathan Grossman, *Fair Labor Standards Act of 1938: Maximum Struggle for a Minimum Wage, U.S. DEP'T OF LAB. (last visited Dec. 4, 2024) https://www.dol.gov/general/aboutdol/history/flsa1938#:~:text=Generally%2C%20the%20bill%20provided%20for, outside%20of%20mining%20and%20manufacturing. [https://perma.cc/R4LF-AF47]*.(explaining that the Fair Labor Standards Act was enacted after the Great Depression to control the maximum and minimum wage and hours of employees, among other labor regulations)

[19] 29 U.S.C. § 213(c)(3).

[20] Id.

[21] Maham Javaid, *Before Child Influencers, a 1920s Movie Star Sued His Mother for Wages*, WASH. POST (Aug. 25, 2023, 7:30 AM) https://www.washingtonpost.com/history/2023/08/25/illinois-child-influencer-earnings-law-history-jackie-coogan/.

protecting children in the media from financial exploitation by their parents.[22] California took a groundbreaking step by becoming the first state to implement legislation aimed at protecting child performers when it enacted the "Coogan Laws," requiring parents to start a blocked trust for their child.[23] Serving as a benchmark, California's regulations have influenced other states to make similar changes, leading to the formulation of more legislation. States such as New York,[24] Pennsylvania,[25] and Illinois,[26] have enacted their own "Coogan Laws," with similar requirements for parents to open a blocked trust account for their child. New York, in particular, requires this trust at the risk of the child losing their acting license.[27] Due to the harsh consequences of the child losing their job, parents are likely much less willing to risk not having a trust for their child.

Going beyond traditional regulations, states such as Washington and Illinois have taken their laws a step further than most by initiating the inclusion of children in Social Media. Washington pioneered discussions regarding protections of children working in Social Media, but their legislation has yet to pass.[28] Learning from Washington's experience, Illinois has successfully passed legislation that is a modified version of Washington's proposed bill.[29] Despite acknowledging the necessity of such laws, lawmakers have been sluggish in navigating the requisite legislative processes.

After Jackie Coogan, many children were protected, at least financially, from their parents. The government could indirectly regulate Warner Brothers and MGM from a distance

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[22] *Id.* ("At the time, a minor's wages belonged solely to their parents under California law.")
[23] CAL. FAM. CODE § 6753 (West 2004).
[24] N.Y. LAB. LAW. § 151(b) (LexisNexis 2003).
[25] H.B. 1548, 195th Gen. Assemb., Reg. Sess. (Pa. 2012).
[26] 820 ILL. COMP. STAT. 205/12.5 (2020).
[27] N.Y. LAB. § 151(d) (LexisNexis 2003).
[28] H.R. 1627, 68th Leg., Reg. Sess. (Wash. 2023).
[29] S.B. 1782, 103d Gen. Assemb., Reg. Sess. (Ill. 2023).

with these laws,[30] but parents were still entrusted to control their children's finances.[31] Blocked trusts help, but only require a small percentage – typically 15% – of the child's gross income to be deposited.[32] The rest of the child's earnings could be freely used by the parents at their discretion, so at least something was saved for the child, most of the time.

Coogan laws fail to protect children as there are still ways around them, and our most beloved child actors are still being exploited. A stark illustration of this unfortunate reality is seen in the case of Jennette McCurdy, a well-loved actress, known best for her portrayal of Samantha Puckett on iCarly and Sam and Cat.[33] Tragically, Jennette experienced pervasive control from her mother, extending into almost every aspect of her life, including her earnings.[34] Eventually, Jennette discovered her Coogan Account was not properly opened and, consequently, has yet to receive the earnings for her contributions as a child actor.[35] Even though she was employed in California where the allegedly protective laws are in place, the shortcomings of these laws became painfully evident as revealed by Jennette's challenges with the consequences of her financial exploitation.[36]

Of course, these laws only pertain to certain types of media, specifically movies, theater, radio, or television, as established by the FLSA.[37] While Social Media has been developing since the late 1960s, the first platform to resemble what we know today did not come to fruition until

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[30] N.Y. EST. POWERS & TRUSTS § 7-7.1(a)(2) (requiring the employer to transfer such earned money to the state comptroller for placement into the child performer's holding fund if no such child performer trust account has been established).
[31] N.Y. EST. POWERS & TRUSTS §7-7.2(b) (allowing a parent or legal guardian to serve as custodian until the trust account reaches $250,000 whereafter a trust company shall be appointed as custodian).
[32] *See e.g.,* CAL. FAM. CODE § 6752 (West 2004) and N.Y. EST. POWERS & TRUSTS § 7-7.1(a)(2).
[33] Dave Itzkoff, *Jennette McCurdy is Ready to Move Forward, and to Look Back*, N.Y. TIMES (Aug. 3, 2022) https://www.nytimes.com/2022/08/03/books/jennette-mccurdy-memoir-mother.html.
[34] McCurdy, *supra* note 6.
[35] *Id*. *See also,* Elisabeth McGowan, *Jennette McCurdy Has a High Net Worth after 'iCarly': See How Much Money the Filmmaker Makes Now*, INTOUCH (Aug. 10, 2022, 11:26 AM) https://www.intouchweekly.com/posts/jennette-mccurdy-net-worth-how-much-money-she-makes/.
[36] Itzkoff, *supra* note 33.
[37] 29 U.S.C. § 213(c)(3).

1997,[38] almost 60 years after the initial protections and exceptions for children in media. Social Media has since been developing at a steady pace. Starting in the 1980s, the early Social Media platforms included The Well and Genie.[39] Monetization of Social Media began in the 2000s with LunarStorm's use of commercial advertisements.[40] Shortly after emerged influential platforms such as Wikipedia, LinkedIn, MySpace, and YouTube in the early years of the 21st century.[41] YouTube, notably, became the pioneer in Social Media monetization by compensating creators for their advertisements and generating foot traffic to the site as a whole.[42] It was the start of influencing as a career,[43] but the legal framework failed to keep pace with the burgeoning industry. The playing field for media has continued to expand due to the further development of the internet and social platforms such as Facebook, Instagram, Snapchat, and TikTok, but little has been done to modernize the laws regulating *Social Media* earnings.

A. Social Media as a Career: Opportunities and Trends

Work can be defined as "exert[ing] oneself physically or mentally in sustained effort for a purpose or under compulsion or necessity."[44] When people work, they do it to earn a living; to pay their bills and other necessities to live. The work from home movement has encouraged people to look outside the regular 9-to-5 workday and gain flexibility, especially mothers and

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[38] *The Evolution of Social Media: How Did It Begin, and Where Could It Go Next?*, MARYVILLE UNIV. (May 28, 2020) https://online.maryville.edu/blog/evolution-social-media/.
[39] Christopher McFadden, *The Long and Short Chronological History of Social Media*, INTERESTING ENGINEERING, https://interestingengineering.com/lists/a-chronological-history-of-social-media (last updated Mar. 9. 2023).
[40] *Id.*
[41] *Id.*
[42] *See* Paige Leskin, *YouTube is Now a Money-Making Machine, But The Platform's Early Success Was Fueled by Group of 'Misfits' Who Wrote the Rulebook for Internet Fame*, BUS. INSIDER (Jun. 3, 2020, 2:15 PM) https://www.businessinsider.com/youtube-15-anniversary-early-creators-shaped-platform-viral-monetization-influencers-2020-6.
[43] *Id.*; *see also,* Yelena Dzhanova, *Forget Law School, These Kids Want to be a YouTube Star*, CNBC, https://www.cnbc.com/2019/08/02/forget-law-school-these-kids-want-to-be-a-youtube-star.html (Updated Aug. 3, 2019, 9:32 AM) (explaining how in a survey of thousands of kids, 29% in the U.S., 30% in the U.K. but only 18% in China, wanted to have a career in vlogging/YouTube).
[44] *Work*, MERRIAM-WEBSTER DICTIONARY, https://www.merriam-webster.com/dictionary/work.

young people.[45] Influencing and content creating has jumped up into the top 10 most sought-after careers for children.[46] Mothers have also moved to Social Media for work at a large rate,[47] and, in turn, often feature their children in their content.

The rise of Social Media has empowered many people to transition from traditional salaried jobs to home-based work, where they can create content, influence others to purchase certain goods, and engage in brand advertisements through sponsorships.[48] Aspiring content creators need to post a certain amount of images or videos, and their potential earning correlate with the popularity of their content.[49] Influencers play a pivotal role in the realm of Social Media, often encouraging others to purchase goods.[50] Influencers can review goods and evaluate their utility against their value and steer their audiences toward or away from particular products.[51]

Sponsorship arrangements come into play when external companies collaborate with the content creator to craft and share advertisements on various Social Media platforms.[52] These companies remunerate influencers for promoting their ads to a targeted audience, leveraging the influencers' persuasive ability to drive consumer interest and purchases for the endorsed

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[45] *See* Clarissa Sebag-Montefiore, *Honey, I Sold the Kids*, AEON, (Mar. 31, 2023), https://aeon.co/essays/why-arent-children-protected-from-their-parents-monetising-them.
[46] Dzhanova, *supra* note 43.
[47] Sebag-Montefiore, *supra* note 45.
[48] *See* Michelle Martin, *Instagram Monetization: A Complete Guide for Creators and Influencers*, HOOTSUITE (Mar. 23. 2023), https://blog.hootsuite.com/instagram-monetization/.
[49] *See* Colleen Christison, *How to Become a (Well-Paid) Content Creator in 2023*, HOOTSUITE (Aug. 16, 2022), https://blog.hootsuite.com/content-creator/#What_is_a_content_creator.
[50] *See* Werner Geyser, *What is an Influencer?*, INFLUENCER MKTG. HUB, https://influencermarketinghub.com/what-is-an-influencer/ (last updated Nov. 15, 2023). ("An influencer is someone who has the power to affect the purchasing decisions of others because of his or her authority, knowledge, position, or relationship with his or her audience.")
[51] *Id.*
[52] *See* Ron Sela, *What is Sponsorship Marketing? – Why You Should Start Leveraging It*, RON SILA, https://www.ronsela.com/sponsorship-marketing/#:~:text=Sponsorship%20marketing%20is%20an%20arrangement,sponsorship%20have%20become%20inseparable%20allies (last updated June 29, 2023).

products.[53] Nowadays, people take the words of other, everyday people, or these influencers, over celebrities.[54]

All of these methods of making money online result in the ability for people to earn enough to replace their jobs and support their families. When YouTube started to monetize their videos, people were excited about it, but quickly became burnt out with these one-man production shows.[55] It became more work than a hobby for some, as they were doing every aspect of the job by themselves.[56] Since content creation has become more than making silly videos or simple posts, and essentially becoming a replacement for typical 9-to-5 jobs, taking a step towards its regulation is especially necessary.

A. Legal Boundaries: Government Regulations and The Family Unit

The family unit is traditionally considered beyond the reach of government intervention, though there are two situations where the government has no problem reaching into the family: divorce and death. When a couple gets a divorce, one spouse will initiate it by filing paperwork with the court.[57] The forms vary from state to state, but each typically provides what the divorcing spouse is asking for in terms of assets, debts, child support, and custody.[58] This is an extremely legal process that involves the court from step one, filing, and does not end until the

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[53] *Id.*
[54] Geyser, *supra* note 50, at 8. [https://perma.cc/J86H-NSZJ]
[55] Leskin, *supra* note 42, at 7. [https://perma.cc/ZUG8-8U8Q] (Bryony Matthews, a YouTube star from the UK known as “paperlillies” had said "I was done with relying on this one-man production where I was the star and the producer and the editor and the lawyer.")
[56] *Id.*
[57] Kimberlee Leonard, *How to File for Divorce in 2023: A Simple Guide*, FORBES ADVISOR, https://www.forbes.com/advisor/legal/divorce/how-to-file-divorce/ (last updated Aug. 23, 2022, 11:37 AM) [https://perma.cc/ER6E-B4YN].
[58] *Id.*

judge legally ends the marriage.[59] Most people do not bat an eye when it comes to government involvement in dissolving a marriage, because marriage is a legally binding contract.[60]

Similarly, during the challenging time of a loved one's death, the emotional toll often overshadows the legal responsibilities that follow.[61] There are death certificates, taxes, life insurances, wills and trusts to administer, and several processes with which the court will often assist.[62] While the emotional weight of bereavement is at the forefront, individuals may not always recognize the extent of government intervention in these intimate moments. Despite providing essential assistance, the government remains a subtle presence in the background during these critical junctures of our lives.

B. Balancing the Digital Playground: Regulatory Measures for Children on Social Media

While the government seems to get involved in the later years of our lives, such as work, divorce, and death, the extent of its involvement in children's affairs is comparatively limited. When children begin to work, there are some regulations by the FLSA, limiting the kinds of jobs they can undertake.[63] Presently, there are no comprehensive regulations specifically addressing

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[59] Christy Bieber, *The Divorce Process: A Step by Step Guide*, FORBES ADVISOR, https://www.forbes.com/advisor/legal/divorce/divorce-process/ (last updated Jan. 2, 2023, 10:55 AM) [https://perma.cc/JRG4-QM5H].
[60] *Marriage*, LEGAL INFORMATION INSTITUTE, https://www.law.cornell.edu/wex/marriage [https://perma.cc/YKE7-JV6E].
[61] *See generally*, *Agencies to Notify When Someone Dies*, USA.GOV, https://www.usa.gov/report-a-death (last updated Oct. 24, 2023) [https://perma.cc/6HN4-HF8A].
[62] *See generally*, Catherine Hodder, *Do You Have to File a Will?*, FINDLAW, https://www.findlaw.com/forms/resources/estate-planning/last-will-and-testament/do-you-have-to-file-a-will.html (last updated Aug. 3, 2023).
[63] *See generally*, 29 U.S.C. § 201-219.

children's involvement in Social Media, other than the platforms themselves creating rules and guidelines for their users,[64] and states slowly creating laws to protect children financially.[65]

For instance, Instagram does not allow users under 13 to access the app, even with parent permission.[66] However, in practicethis is not true. While many kids' accounts are typically monitored or managed by their parents, many children can and will lie about their age when creating an account to utilize the platform. This information is not seen by anyone other than the user and the platform itself, so fact checking user's ages becomes incredibly difficult. This leads to miscommunication between the Social Media sites and the public at large. The public can see children in videos on Social Media, while the platforms claim otherwise.[67] Instagram is turning a blind eye to the reality that children want to become influencers and stars; they want to be famous and are using Instagram to do it.[68]

YouTube, on the other hand, has developed YouTube Kids, where the content is modified for child viewers, but creators of that content make significantly less than on mainstream YouTube.[69] While this is a turn in the right direction, holding a separate space for children, it does not curb the idea that children are using Social Media platforms to make a name for themselves, to become famous, and to earn a lot of money doing it.

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[64] *See e.g.*, *Terms of Service*, FACEBOOK, https://www.facebook.com/legal/terms (last revised July 26, 2022); *Terms of Service*, X, https://twitter.com/en/tos (effective Sept. 29, 2023); *Snap Inc. Terms of Service*, SNAP INC., https://snap.com/en-US/terms (effective Aug. 15, 2023).
[65] *See e.g.*, S.B. 1782, 103d Gen. Assemb. (Ill. 2023). Illinois is the first state to successfully pass this kind of legislation. It is followed by announcements from other states, but no other bills have passed.
[66] INSTAGRAM, *Instagram Community Terms of Use FAQs* (Apr. 19, 2018), https://about.instagram.com/blog/announcements/instagram-community-terms-of-use-faqs/ [https://perma.cc/T3X4-JA7F].
[67] *Id.; see also*, Natasha Singer, *At Meta, Millions of Underage Users Were an 'Open Secret,' States Say*, N.Y. TIMES (Nov. 25, 2023), https://www.nytimes.com/2023/11/25/technology/instagram-meta-children-privacy.html.
[68] Natasha Singer, *At Meta, Millions of Underage Users Were an 'Open Secret,' States Say*, N.Y. TIMES (Nov. 25, 2023), https://www.nytimes.com/2023/11/25/technology/instagram-meta-children-privacy.html.
[69] Lydia Sweatt, *YouTube Kids App: 6 Things Creators Should Know*, VIDIQ (Aug. 23, 2020), https://vidiq.com/blog/post/youtube-kids-app/ [https://perma.cc/FZ4X-RN3C].

Whether or not the Social Media platforms realize the influence they have on children, it is evident that younger audiences and users are increasingly interested in utilizing the platforms for fame. Children already view vlogging, content creation, and making ads as a job and want to fill the market themselves.[70] In fact, they already are filling that market.[71] Kids nowadays have had access to the internet basically since they were born, and because they are witnessing people making a career out of it, children are pushing their way in.

Part II: The Digital Age: Unveiling Child Contributions and Parental Control Dynamics

A. The Invisible Workforce: Children In the Social Media Content Realm

Social Media companies can pay their content creators, though a majority of income typically derives from other sources, such as sponsorships and advertisements.[72] When adults make money from Social Media, they are either financially compensated or able to keep the goods from their sponsorship.[73] However, when children are simply featured on Social Media, they often do not get anything in return other than the fame.[74]

Child influencers like Ryan Kaji[75] have as much power as their adult counterparts, if not more, particularly in persuading other kids to buy or want to buy certain toys.[76] Ryan has been a success due to his parent's support from the beginning. His mom would record Ryan opening

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[70] Dzhanova, *supra* note 43.
[71] Nadine Araksi, *How to Make Money on YouTube as a Kid*, MYDOH (June 27, 2022), https://www.mydoh.ca/learn/blog/career/how-to-make-money-on-youtube-as-a-kid/ [https://perma.cc/88DG-Y578].
[72] Alyssa Gagliardi, *11 Ways Influencers & Creators can Make Money in 2023*, LATER BLOG (Feb. 15, 2023), https://later.com/blog/how-content-creators-make-money/ [https://perma.cc/VS7A-4XCF].
[73] Chris Baylis, *The Complete Guide to Sponsorship for Influencers*, SPONSORSHIP COLLECTIVE (Oct. 19, 2021), https://sponsorshipcollective.com/the-complete-guide-to-sponsorship-for-influencers/ [https://perma.cc/ZP9N-QPEC].
[74] Jacob Shamsian, *Nearly 90% of Americans Think it's Wrong to Make Money from Photos for Children on Social Media*, BUS. INSIDER (Dec. 28, 2018), https://www.insider.com/poll-parents-profit-children-social-media-photos-instagram-youtube-2018-12.
[75] Shreyosi Chakraborty, *Top 10 Child YouTubers Who are Rocking the Cyberspace*, EDUCATIONWORLD, (July 14, 2021) https://www.educationworld.in/top-10-child-youtubers-who-are-rocking-the-cyberspace/ [https://perma.cc/SBK4-49JZ] (noting Ryan is one of the highest grossing child YouTube stars).
[76] Kang, *supra* note 7.

toys and upload them to YouTube.[77] At first it was simply that, cute videos to share with family, but it quickly turned into a toy review channel and later an "empire."[78] His parents view his videos and content creation as an actual job.[79] They hired animators and a production crew to help support their family and take the burden off of Ryan.[80] While his parents do set aside some funds for him in a trust account,[81] it is likely because they recognize that he is working, but they know they are not obligated to do so by law.

Parents are also encouraging their children to work as influencers by recording and instructing them on how to act and what to say.[82] For example, Taytum and Oakley Fisher are twin girls who have their own YouTube channel, which is monitored and regulated by their parents.[83] However, while the girls may perceive their online presence as a journey to fame, they are also performing a job—they are promoting goods and being featured in advertisements.[84]

The way in which their parents talk about their Social Media presence is also of concern. The children's parents should know that they are acting as managers on top of their parental duties, while their kids are the ones putting forth the effort and essentially working.[85] To think

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[77] *Id.*
[78] Belinda Luscombe, *How Ryan Kaji Became the Most Popular 10-Year-Old in the World*, TIME (Nov. 12, 2021, 7:00 AM), https://time.com/6116624/ryan-kaji-youtube/ [https://perma.cc/MV4X-2882].
[79] *See id.*
[80] *Id.*
[81] *See id.*
[82] *See* Abrahamson, *supra* note **Error! Bookmark not defined.**. *See also,* Ines Novacic, *"It's Kinda Crazy": Kid Influencers Make Big Money on Social Media and Few Rules Apply*, CBS NEWS (Aug. 23, 2019, 8:08 AM), https://www.cbsnews.com/news/kid-influencers-instagram-youtube-few-rules-big-money-cbsn-originals/ [https://perma.cc/5DYA-5XFZ].
[83] Ines Novacic, *"It's Kinda Crazy": Kid Influencers Make Big Money on Social Media and Few Rules Apply*, CBS NEWS (Aug. 23, 2019, 8:08 AM), https://www.cbsnews.com/news/kid-influencers-instagram-youtube-few-rules-big-money-cbsn-originals/ [https://perma.cc/5DYA-5XFZ].
[84] *See id.*
[85] *See id.*

otherwise would be to discount other jobs such as models, brand ambassadors, and actors, who perform similar tasks.[86]

i. Navigating Social Media Labor Laws: Pitfalls and Parental Oversight

The current FLSA and some Coogan laws only require children in movies, television, or radio to be paid.[87] Social Media has not been added to the list of protected media for child stars on a federal level, and only two states have attempted to close this gap, with one success story. [88] New York's current law reflects the typical Coogan Laws from California.[89] They require a child performer to have a permit and a trust along with it.[90] While New York does not have any pending amendments to include children on Social Media, their language can already be read to include such children. The statute defines a child performer as "any child under the age of eighteen who (a) resides in the state of New York and who agrees to render artistic or creative services; or (b) agrees to render artistic or creative services in the state of New York.[91]

This definition is not explicitly limited to performers of typical hard media in TV, radio, or movies. It can be interpreted broadly and could read to encompass all performers, including those in the realm of Social Media influencing and content creation, going forward.

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[86] *See Models*, U.S. BUREAU OF LAB. STAT.: OCCUPATIONAL OUTLOOK HANDBOOK, https://www.bls.gov/ooh/sales/models.htm [https://perma.cc/7E4S-XWXK] (last modified Aug. 29, 2024); Jessica Barker, *What is a Brand Ambassador? Here's Everything You Need to Know*, BRAFTON: BLOG (Oct. 16, 2023). https://www.brafton.com/blog/content-marketing/brand-ambassador/ [https://perma.cc/T7XA-3GGZ]; *Actors*, U.S. BUREAU OF LAB. STAT.: OCCUPATIONAL OUTLOOK HANDBOOK, https://www.bls.gov/ooh/entertainment-and-sports/actors.htm [https://perma.cc/VCP3-P3D7] (last modified Aug. 29, 2024).

[87] 29 U.S.C. § 213(c)(3).

[88] *See* H.B. 68-1627, 1st Sess., at 1-2 (Wash. 2023), https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/House%20Bills/1627.pdf?q=20241125135313 [https://perma.cc/Q9JP-S9DA]; S.B. 103-1782, 1st Sess., at 1-2, 4-5 (Ill. 2023), https://www.ilga.gov/legislation/103/SB/PDF/10300SB1782enr.pdf [https://perma.cc/GGY5-KM9W].

[89] *See* N.Y. LAB. LAW § 151(1)(b)-(d) (Consol. 2024); CAL. FAM. CODE § 6753, *supra* note **Error! Bookmark not defined.**.

[90] N.Y. LAB. LAW § 151(1)(b)-(d).

[91] N.Y. LAB. LAW § 150(2) (2014).

Washington's proposed amendment to their child labor laws included a section that focused on a child's ability to ask for their likeness, image, and other content of themselves to be removed from the internet.[92] This specific provision sparked a bit of controversy as it can be a difficult task to undertake, as parents can have several pictures and videos posted of their child. Nevertheless, proponents of this amendment firmly assert the necessity for retaining this section, emphasizing instances where parents frequently share embarrassing images or information about their children, which the children prefer not to have lingering online.[93] Due to lawmakers also not wanting to drop this point, Washington State has yet to pass the entire amendment to their child labor laws.

A Pennsylvania Representative has announced that he plans to propose an amendment to the Pennsylvania child labor laws to include children on Social Media.[94] Other states have been motivated by these changes and are beginning to announce or introduce their own legislation in order to protect children on Social Media.[95] However, the wait continues.

While attempts and announcements have been made, Illinois has been successful in their endeavors. Illinois' amendment to their child labor laws define what it means to work as a vlogger, but it has a separate requirement for minors under the age of 16.[96] Minors are considered engaging in the work of vlogging when two criteria are met within a year:

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[92] Wash. H.B. 1627, at 2-3.
[93] See generally, Morgan Sung, How One Teen is Urging Legislators in Washington State to Help Protect Kids from Being Exploited on Vlogs, NBC NEWS (Feb. 14, 2023), https://www.nbcnews.com/tech/social-media/child-influencers-exploitation-bill-hearing-washington-state-hb1627-rcna70479 [https://perma.cc/EAU9-X3EU]; N.Y. Times Op., Why Kids Are Confronting Their Parents About 'Sharenting', YOUTUBE (Aug. 7, 2019), https://www.youtube.com/watch?v=YRPUZ3pufAg [https://perma.cc/895X-KNGM].
[94] Ecker, supra note 13.
[95] See generally, State Progress, QUIT CLICKING KIDS, https://quitclickingkids.com/state-by-state-progress/ [https://perma.cc/V9ER-EYWD] (last visited Nov. 19, 2024).
[96] S.B. 1782, 103d Gen. Assemb. (Ill. 2023) ("'Vlog' means content shared on an online platform in exchange for compensation. 'Vlogger' means an individual or family that creates video content, performed in Illinois, in exchange for compensation, and includes any proprietorship, partnership, company, or other corporate entity assuming the name or identity of a particular individual or family for the purposes of that content creation. "Vlogger" does not include any person under the age of 16 who produces his or her own vlogs.").

> (1) at least 30% of the vlogger's compensated video content produced within a 30-day period included the likeness, name, or photograph of the minor. Content percentage is measured by the percentage of time the likeness, name or photograph of the minor visually appears or is the subject of an oral narrative in a video segment, as compared to the total length of the segment; and (2) The number of views received per video segment on any online platform met the online platform's threshold for the generation of compensation[97] or the vlogger received actual compensation for video content equal to or greater than $0.10 per view.[98]

This amendment is attempting to include Social Media as a form of child labor and attempts to compensate the child as such. Yet, despite meeting the specified criteria, these minors are still only being compensated via a trust account.[99] This is an improvement from prior regulations that only required minors on Social Media to be compensated for 15% of their gross earnings.[100]

While these may seem like innovative laws designed to protect children, they are still the typical Coogan Laws – a blocked trust account of funds set aside for the child. While Coogan Laws and blocked trusts are a great starting point in the financial protection of children, we have seen how they fail the children they are mean to protect.[101] Hopefully, the inclusion of children on Social Media will incite a change in these laws overall, redefining how children receive compensation for their work.

i. Parental Control Dilemma: The Active Role of Children in Content Creation

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[97] "The online platform's threshold for the generation of compensation" refers to the platform's own requirements that need to be met before they will monetize a video or an account—for example, YouTube's Partner Program and TikTok's creator fund requirements. See YouTube Partner Program Overview & Eligibility, YOUTUBE HELP, https://support.google.com/youtube/answer/72851 [https://perma.cc/G78T-23ZF] (last visited Nov. 21, 2024); See TikTok Creator Fund Terms: Eligibility, TIKTOK, https://www.tiktok.com/legal/page/global/tiktok-creator-fund-terms/en [https://perma.cc/AKN7-M7CJ] (last visited Nov. 21, 2024).

[98] Ill. S.B. 1782.

[99] Id.

[100] 820 ILL. COMP. STAT. 205/12.5 (2020).

[101] For example, Jackie Coogan and Jennette McCurdy both did not see the earnings they were supposed to as laid out in the law. See supra notes 21 & 35 and accompanying text.

While it may be easy to assume kids are just being kids by acting silly, how do we tell the difference between videos of a child who is playing around and being a kid, and a child who is performing for an income? It is easy for parents to pull out their phone and start recording their child when they are doing something cute or saying something funny. However, this blurs the line between playing and acting. Parents have argued that they are the ones doing the work, as they set up the meetings, the photoshoots, the brand deals, while all their child has to do is be in the picture.[102] This dichotomy, however, mirrors the responsibilities of traditional models. These two jobs are extremely similar and often one gets discounted more than the other simply because it is done by a child instead.[103] Unfortunately, child influencers may face greater scrutiny or diminished recognition simply due to their age.

Not all parents view influencing this way. Jaqi Clements, the mother of twins Leah and Ava Clements, does not get paid for managing her children on Social Media.[104] Ryan's parents claim to have a set aside money for him, but know it is not a requirement for children who are working on Social Media.[105] Nonetheless, there are parents who view child influencers as a parent's job and still others who do not view posting their children online, and making a profit off of them, as an issue.[106]

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[102] Novacic, supra note 83.
[103] The involvement of easy to use Social Media platforms and the internet in general should not dissuade people and parents from thinking that these kids are working. Cf. Marina A. Masterson, When Play Becomes Work: Child Labor Laws in the Era of "Kidfluencers", 169 U. Pa. L. Rev. 577, 579 (2021) (noting that "states have not formally recognized social media production as a form of labor or acting for adults or children, so these entertainers have no specific labor protections").
[104] Novacic, *supra* note 83, at 4.
[105] Harper Lambert, *Why Child Social Media Stars Need a Coogan Law to Protect Them from Parents*, HOLLYWOOD REP. (Aug. 20, 2019, 6:00 AM) https://www.hollywoodreporter.com/business/digital/why-child-social-media-stars-need-a-coogan-law-protect-parents-1230968/.
[106] *See generally*, N.Y. Times, *Why Kids Are Confronting Their Parents About 'Sharenting'*, YOUTUBE (Aug. 7, 2019), https://www.youtube.com/watch?v=YRPUZ3pufAg (discussing how children are challenging their parents over excessive sharing of their personal lives online).
[106] *See* Ecker, *supra* note 13.

In the ongoing debate, parents assert their role in negotiating deals, organizing photoshoots, and handling online content.[107] Simultaneously, children insist on their active involvement in the process.[108] The challenge therefore lies in determining when children comprehend the intricacies of Social Media and advertising. While young children might not fully grasp these concepts, as they grow older, many develop opinions about their participation, wanting a say in their work and compensation.[109]

A. Navigating Parental Control: Empowering Children in the Digital Economy

Social Media influencers can receive direct payments from platforms like TikTok's creator fund or YouTube's Partner Program, but the primary source of income is often derived from advertisement deals and sponsored video content. As Social Media platforms and other companies pay people to influence others to buy products, that money typically goes to the account that meets the requirements.[110] For minors, the funds still go to the account holder, but that will typically be the parents, as Social Media platforms do not allow users under the age of 13.[111]

When parents consider that their child is working, they get paid. Ryan Kaji has a trust account set up for him,[112] but he is one of the few with this privilege. Other parents are not as kind to their children and take advantage of the cuteness and slap-stick comedy.[113] One parent in particular

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[107] *See* Novacic, *supra* note 83.
[108] *Id.*
[109] *See generally,* Laura Kayali, *France aims to protect kids from parents oversharing pics online*, POLITICO (Feb. 28, 2023, 8:05 PM), https://www.politico.eu/article/emmanuel-macron-france-law-aims-to-protect-kids-against-oversharing-parents/.
[110] *See e.g., Creator Fund*, TIKTOK, https://www.tiktok.com/creators/creator-portal/en-us/getting-paid-to-create/creator-fund/ (last visited Nov. 20, 2023).
[111] *See supra* note 64.
[112] Chakraborty, *supra* note 75.
[113] *See* Belinda Luscombe, *The YouTube Parents Who are Turining Family Moments into Big Bucks*, TIME, May 18, 2017, https://time.com/4783215/growing-up-in-public/.

was caught in a stint of child abuse after her son ran away from home.[114] Ruby Franke ran a YouTube channel named "8 Passengers" which featured her family, but she had harsh parenting tactics which lead to the recent removal of the channel.[115] Her estranged daughter was almost delighted of this news because she was aware of her mother's control and abuse, but no one of authority would listen to her.[116] Instances of parental abuse for control, fame, and funds are not uncommon, reminiscent of high-profile cases like Britney Spears.[117] While she was a famous singer rather than a Social Media influencer, both fall under the umbrella of media entertainment, with the potential for parents of children on Social Media to pursue a conservatorship.

From the era of Shirley Temple up to the TikTok stars of today, parents have often leveraged their children's fame for personal gain. Along the way there have been champions of the law to push for change, such as Jackie Coogan, Jennette McCurdy, and Britney Spears. Although no child has yet to suffer from the consequences of losing their earnings on Social Media, they shouldn't have to in order for change to take place.

Part III: Transforming Digital Dynamics: Alternative Routes Towards Equity in Digital Labor

A. Advocating for Change: Extending Trusts to 'Vloggers' and Child-Generated Content

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[114] *See* Emily Olson, *YouTube Vlogger Ruby Franke Formally Charged with 6 Felony Counts of Child Abuse*, NPR (Sept. 6, 2023, 10:09 AM) https://www.npr.org/2023/09/06/1197833521/ruby-franke-charges-youtube-child-abuse. (noting that Ruby Franke's 12-year-old son climbed out a window and ran to a neighbor's house asking for food and water. The neighbor, noticing duct tape around the child's ankles and wrists, called the police).

[115] *Id.*

[116] David Chiu & Corin Cesaric, *All About Ruby Franke: Everything to Know About the Influencer Mom Convicted of Child Abuse*, PEOPLE , https://people.com/ruby-franke-everything-to-know-influencer-mom-accused-child-abuse-7965307 (Feb. 20, 2024, 3:44 PM), https://people.com/ruby-franke-everything-to-know-influencer-mom-accused-child-abuse-7965307 [https://perma.cc/58VF-PNQY].

[117] Zoey Christen Jones & Justin Bey, *Britney Spears' Conservatorship, Explained*, CBS NEWS (July 13, 2021, 6:06 PM), https://www.cbsnews.com/news/britney-spears-conservatorship-updates/ [https://perma.cc/3WCM-BWSN].

While trusts controlled by parents are not the most ideal form of financial protection for children, it is one commonly used tool already with Coogan Laws. Those states that already have Coogan Laws enacted would be able to take the small and feasible step to follow Illinois' example and amend those laws to include "vloggers" and children performing on Social Media sites. The requirements that Illinois has put in place for children to be paid for their work is a crucial step in the right direction and other states can follow suit.

However, other states may want to take a closer look at those requirements and decide what is best for them. Illinois only requires compensation where the child's likeness, name, or photograph "visually appears or is the subject of an oral narrative" for 30% of the entire paid video.[118] This means a child can appear in less and not get compensated even if the main part of the pay comes from the child's appearance. Again, take Ryan Kaji, where Ryan himself visually appears in only a small segment of a video "Ryan's World Learns to exercise like a real Pirate!"[119] Ryan visually appears in less than 30% of the entire video,[120] but viewers likely watch this video because it is on Ryan's channel. Under Illinois law, he would not need to be compensated for these kinds of videos. It is imperative to note that while Ryan may get paid for his work, not every parent is going to recognize that the effort and enticement to a video is the child.

B. Beyond Trusts: Novel Approaches to Secure Children's Earnings

States should be aware of limitations and loopholes in their laws when attempting to protect children's finances. One way to close this gap further would be to enact similar laws to Illinois but require compensation when the child is featured minimally, such as 5-10% of the

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[118] S.B. 1782, 103rd Gen. Assemb. (Ill. 2023).
[119] Ryan's World, *Ryan's World Learns to Exercise Like a Real Pirate!*, YOUTUBE (Oct. 15, 2023), https://www.youtube.com/watch?v=3O7zJhOCHwc&t=12s [https://perma.cc/C857-BWTN].
[120] *Id.*

video. Other methods could be to require minors to file taxes when they receive compensation on their own content, videos, sponsorships, and advertisements, or enact completely different laws that would require more government oversight, but not overreach.

i. Empowering Young Creators: Allowing Minors to File Taxes for Online Content Earnings

Influencers still have to pay their taxes once they meet the threshold of expected tax liability of around $1,000 or more each quarter.[121] Even children and dependents are not free from filing taxes.[122] Earned and unearned income by a child, even one claimed as a dependent, has to be filed with the IRS.[123] Taxes serve as a mechanism through which the government monitors employees' and individuals' compliance with tax laws, ensuring a systematic check on financial responsibilities. Even though children already have to file taxes if they earn over $12,550,[124] when parent's claim the income as their own, the child has no choice. However, if codified, tax laws could require children who are the subject of paid online content to declare an income, which would then be monitored by the government through the IRS. This way child influencers are able to make their own income, declare it as such, and be recognized with the same respect as adults in the same field.

ii. Digital Compensation Act: Fostering Fairness and Protection in Online Content Creation

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[121] David Chang, *Social Media Influencing Can be a Lucrative Career: But Don't Forget About Taxes*, MOTLEY FOOL MONEY(Mar. 17, 2023), https://www.fool.com/the-ascent/taxes/articles/social-media-influencing-can-be-a-lucrative-career-but-dont-forget-about-taxes/ [https://perma.cc/C974-FKXB].
[122] I.R.S. Pub. No. 929, Cat. No. 64349Y at page 4 (Dec. 29, 2021), https://www.irs.gov/pub/irs-pdf/p929.pdf. (Single dependents must file a return on unearned and earned income of more than roughly $13,000, a threshold which many child Social Media stars meet.)
[123] *Id.* at 7.
[124] *Id.*

Another approach could be to put more requirements and enforcements on parent vloggers in general, when including minors in their content. A suggestion of this legislation could be as follows:

Digital Compensation Act[125]

Section 1: Minimum Appearance Requirements and Compensation Criteria

(1) A vlogger shall compensate a minor when the vlogger prominently features, in at least [10%] of their compensated online content, the likeness, name, or photograph of the minor. The percentage of representation shall be determined by the visual presence or narrative focus on the minor's likeness, name, or photograph in comparison to the total length of the video segment.

(2) Minors shall be compensated half the value of the video or post for every appearance of at least [10%]. To meet the criteria for required compensation of minors under this law, vloggers must fulfill one of the following conditions:

> (a) Achieve views per video segment or engagement per post on any online platform meeting the platform's designated threshold for compensation, or
>
> (b) Receive actual compensation for video content or post equal to or greater than $0.10 per view.

Section 2: Compliance and Enforcement

(1) Vloggers obviously purposefully failing to meet the minimum representation requirements outlined in Section 1 to avoid payment to minors shall be subject to penalties as determined by regulatory authorities.

(2) Non-compliance with compensation criteria outlined in Section 1 may result in the forfeiture of compensation benefits for the respective video content or post.

Section 3: Monitoring and Reporting

(1) Online platforms hosting online content shall implement measures to monitor and report compliance with the provisions of this law.

(2) Vloggers shall maintain accurate records of content views, compensations, and the representation of minors, and shall provide such records upon request by regulatory authorities.

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[125] Inspired by the amendment to Illinois' child labor law, but created by the author.

Section 4: Implementation Dates

(1) This law shall come into effect on [Effective Date].

(2) Vloggers are granted a grace period of [Grace Period Duration] from the effective date for the adjustment of their content to meet the requirements outlined herein.

Under this suggested law, states should be able to choose the representation percentage requirement, but still require payment of half of the profits of the video or content to the child. This should warrant parents to contemplate the inclusion of their child in their content and hopefully either subside the amount children are appearing on Social Media or ensure their equitable compensation of labor.

Part IV: Charting the Future: Safeguarding Children in the Digital Realm

There are many hurdles for parents and their children to surmount in order to get paid on a Social Media platform. These restrictions and requirements for minor vloggers to pass a certain threshold in order to require parents to set aside some funds in a trust are well intended but misplaced. It would be far easier for parents to help their children declare an income and pay respective taxes or have their own separate bank accounts that can better hold and accrue interest for the child or implement other similar laws that require child influencers to earn an income.[126]

Since adults can work and get paid on Social Media, and children are also in this line of work, what is causing lawmakers to create all of these barriers for child earners? The FLSA already allows children to work for their parents in agriculture and provides exemptions from work requirements within media. The possibility of the government creating a new agency to oversee children in media would not be an overstep into the family unit – they are already there in other ways. Parents try their best to look out for their children, but at the end of the day, each

[126] *See infra* Part III.

child is their own person who deserves to be paid appropriately for their work and contribution to society.

The Case for Virtual Prison Games in the Fourth Industrial Revolution

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Abstract

This paper, a shortened version of an article which will be published in the Northern Illinois University Law Review in Fall 2024, aims to reframe the debate over how best to address the enormous financial and social costs of a criminal justice system which relies on traditional, brick-and-mortar prisons to control criminal behavior.

The first part of the paper presents a comparison of the current system of incarceration and the system of electronic monitoring that exists alongside it. It first evaluates the type of offenders any alternative solution would be appropriate for. It then compares the cost of the current system of incarceration and a system of electronic monitoring from the perspective of society and the individual offender.

The second part of the paper presents the authors' solution: a virtual prison system based upon technological solutions to increase efficiency, effectiveness, outcomes, and costs. It addresses concerns with how well such a model would further the traditional goals of incapacitation, deterrence, and retribution. The new methodology would allow evidence-based measurements on the progress of the offender, thus measuring the success of the intervention in real time.

In leaving the discussion there, the authors posit that this initial platform will serve to catapult further research and development, as well as further exploration of the ways in which a system predicated upon individual dignity, accountability, and technological innovation will help solve the cycle of crime and punishment.

Contents

1. Introduction

About two million people are currently incarcerated in brick-and-mortar jails or prisons in the United States, and nearly half a million of them have not been convicted of a crime.[1] In our brick-and-mortar system, there is no safe, efficient, cost-effective methodology to monitor and correct the pre- and post-conviction obligations imposed in our criminal justice system. However, technological innovations such as GPS tracking and virtual reality have created room for innovations in the criminal justice system, innovations which will provide real-time measurements of progress previously unavailable, as well as the ability to maintain offenders' ties to the society which they are expected to eventually rejoin.

The purpose of this Article is to explore through existing research and data the definitions currently used for prison detention in an effort to compare and contrast a virtual conceptualization of jail incarceration or detention. New and existing technologies will be evaluated, including electronic GPS monitoring and virtual reality, the combination of which is explored as a twenty-first century solution to brick-and-mortar incarceration for nonviolent offenders. This proposal replaces the traditional, high-security or, as termed in this paper, a "Shawshank" medieval prison model with a virtual prison model as a twenty-first century solution. The primary goal of using a virtual prison model is to reduce costs, improve outcomes, increase compliance in offender populations, eliminate the need for cash bail, and create a humane, safe, and sustainable criminal justice system. The Article demonstrates that our present "Shawshank" prison model exists not in law or due to the lack of a better alternative but because since its inception we have always visualized it in this way.

Twenty years ago, the word "Amazon" commonly referred to a river in Brazil; today, it is more readily understood as a global logistics superstore that has technologically transformed how goods and services are obtained and delivered. The meaning and definition of a word evolves as the world changes, and as sweeping technological advances transform our relationship to the world around us in fundamental ways, the very idea of what a prison is will have to be rethought in order to be sustainable during our present meteoric travels through a new world of virtual reality and artificial intelligence. In fact, it can be argued that our present antiquated system has ceased functioning for its intended purpose and is actually contributing to the frequency and continuing levels of crime.

The Article posits replacing the "Shawshank" model of incarceration which cannot stand if we are truly reliant on evidence and law in the new digital age. To remain relevant in the new digital age, courts, judges, prosecutors, and the public must apply the intellectual and legislative definitions of prison, detention, and incarceration, and it must be visualized virtually consistent with the changing paradigm of virtual reality; we must change our understanding and preconceived ideas of what a prison is. To quote Richard Lovelace, "stone walls do not a prison make, nor iron bars a cage."[2]

The present blatant disregard of evidence-based practices, as well as the "Shawshank" prison mentality, is culturally defined and driven by judges, prosecutors, and the prison industrial complex[3] with the presumption that incarceration in prison is the ultimate punishment, and

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[1] Steven Schwinn, *The Bail Bond System and Rule of Law*, AMERICAN BAR ASSOCIATION, (Jan. 27 2022), https://www.americanbar.org/groups/public_education/publications/insights-on-law-and-society/volume-21/issue-3/the-bail-bond-system-and-rule-of-law/.

[2] Richard Lovelace, *To Althea, From Prison*, POETRY FOUNDATION, https://www.poetryfoundation.org/poems/44657/to-althea-from-prison [https://perma.cc/4BQH-2K44] (last visited Apr 30, 2024).

[3] Sarah Payne, *The Economic Impact of Prison Labor for Incarcerated Individuals and Taxpayers,* 2 Princeton L.J. 14, 17 (2023). ("Private companies utilizing prison labor benefit from WOTC, cheap labor, and federal funding.

probation and community control are privileges.[4] Dissociation and dehumanization of criminals leads to a widespread association of prisons with just deserts and public security that ignores the dangers posed by the criminogenic effects of imprisonment.[5] Due to this cultural and economic blindness and our own acceptance of the prison industrial complex, judicial decisions that are without credibility and absurd in implementation are made. The resulting outcome of blind adherence to historical precedent and habit has led to a system of mass incarceration of mostly people of color with unsustainability, unfairness, and inhumanity at exorbitant cost. Although police and prison authorities have borne the brunt of public criticism in this systemic failure, judges and prosecutors are equally complicit if not solely responsible for the relentless incarceration of inmates unnecessarily, arbitrarily, and based on color or economic status.[6]

The Article argues for judicial decision-making that is based on evidence for what prevents recidivism, lowers costs, and ensures more equitable outcomes. Justice system stakeholders are the ones that define and conceptualize the idea of a prison. There is no legal requirement that it must be made of brick and mortar; this is only our historical reality that we have failed to reimagine.

Condemned to imprisonment in sixth century Rome, Boethius used his imprisonment to write *Consolation of Philosophy*.[7] Though not every person convicted of a crime can become a philosopher, the period after sentencing can be one marked by personal transformation and profound reflection. Modern sentencing can encourage this break with a criminal past by adopting new technologies, such as improved GPS tracking and virtual reality. This includes virtual environment treatment (VET), the combination of VR and psychotherapeutic approaches.

As Bobbie Ticknor and Sherry Tillinghast of the University of Cincinnati put it:

> A fundamental assumption of VET is that once immersion and presence have been achieved, people behave in virtual worlds as they would in real life. Recent studies have supported the notion that interactions in the virtual environment mimic patterns in the real world […]. Additionally, VET requires the user to have sufficient presence so behaviors learned in the virtual environment can translate to real life. Treatment with VR has been shown to be effective with many mental and behavioral disorders including anxiety, anger management,

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Incarcerated individuals within this system continuously labor; they do not receive the chance to rehabilitate or receive education, processes that are later illustrated in this paper as crucial to reducing recidivism. Thus, the legal structures surrounding prison labor not only allow the demand for prison labor but also perpetuate recidivism. The taxpayer, within this system, is left indirectly funding this cycle of exploitation by nature of the prisons receiving federal funding.").

[4] Frank Porporino, *Prison vs. Probation . . . Which Is More Effective?*, INT'L ASS. CORR. FORENSIC PSYCH. (Feb. 21, 2022), https://www.myiacfp.org/prison-vs-probationwhich-is-more-effective/ [https://perma.cc/R8RM-GUFW]. ("There is perhaps a valid argument to make that one of the aims of sentencing should be "just deserts" or retribution. But I would argue that we should be honest and not pretend that has anything to do with public safety. It has to do with public appeasement. Our CJS (and our political leaders) should do more than just appease the public and try to assuage their fears of crime. A more responsible and moral approach would be to work towards educating the public to accept what is ultimately in their best interest … much more limited use of imprisonment as only a last resort.") See also https://www.innocenceproject.org/wp-content/uploads/2016/04/IP-Prosecutorial-Oversight-Report_09.pdf

[5] Shirin Bakhshay, *The Dissociative Theory of Punishment*, 111 Georgetown L.J. 1251, 1290 (2023).

[6] Andy Wen, Noah R. Gubner, Michelle M. Garrison & Sarah C. Walker, *Racial Disparities in Youth Pretrial Detention: A Retrospective Cohort Study Grounded in Critical Race Theory*, 11 Health & Justice 1, 8 (2023).

[7] John Marenbon, *Anicius Manlius Severinus Boethius*, Stanford Encyclopedia of Philosophy (Sep. 21, 2021), https://plato.stanford.edu/Entries/boethius/#LifeWork [https://perma.cc/Y3MM-XHNH].

> conduct disorder (CD), oppositional defiant disorder (ODD), post traumatic stress disorder (PTSD), and substance abuse […].[8]

An offender can learn important job skills, engage in dialogue, and confront their past crimes in safe, healthy ways. A virtual reality prison is here defined as living conditions in which the offender is to follow a set schedule that allows them to go from home to work or other necessary locations while being electronically monitored, and while at home be required to undergo rehabilitation using a virtual reality game that is adapted to individuals with a similar psychological profile. The virtual reality games would involve a system in which progress is measured real-time by the offenders' choices as they relate to skill acquisition, emotional intelligence, socialization, impulse control, and self-image. By combining the power of role-playing and stories – including the ones we tell about ourselves – with the incentive structure of games, an offender's vision of who they are and who they can be will be elevated, and the gap between the two will not seem so impossibly distant. By helping to shape their understanding of their own story, what happened, how it could have happened differently, and where it is ultimately going, and enlisting their help in a transformation which is in the end self-transformation, we create an environment of secure home detention whereby the inmate can simulate role play to assist in obtaining measurable and desired rehabilitative goals utilizing gamification, virtual reality, and AI.

2. Comparison of Incarceration and Electronic Monitoring

In most modern legal systems, punishment for erring members of society is calibrated according to societal norms, the severity of the offense, and whether the individual is a first-time offender.[9] When the offense is of a very high level and violent, and the criminal becomes a threat to human society, the behavior necessitates confinement. From time immemorial, criminals have not gone free when they are caught. The United States is no exception among nations' practice of meting out punishment in the interest of lives and property. The United States is known for its promotion of individual freedoms and its aversion to governmental control. It is, by this standard, one the most liberal nations in the world. As such, the country constantly battles with criminal indigenous and foreign elements in its society and where to draw the line between individual determination and criminal conduct. The choice of the United States as a subject discourse of this submission is, therefore, justified since despite this struggle, it has the highest number of incarcerated people in the developed world.[10] These disparate positions present a contradiction of enormous proportions to the structural philosophy of its justice system.

2.1 Cost of Incarceration

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[8] Bobbie Ticknor & Sherry Tillinghast, *Virtual Reality and the Criminal Justice System: New Possibilities for Research, Training, and Rehabilitation*, J. 4 Virtual Worlds Research 1, 15 (2011).

[9] Judiciaries Worldwide, *Sentencing*, https://judiciariesworldwide.fjc.gov/sentencing (last visited Jan. 02, 2026).

[10] WORLD PRISON BRIEF, *Highest to Lowest - Prison Population Rate,* https://www.prisonstudies.org/highest-to-lowest/prison_population_rate?field_region_taxonomy_tid=All [https://perma.cc/V887-BNZB] (last visited Oct. 30, 2024). Though the US has the highest total prison population at 1,808,100, other countries which exceed the US in prison population rate are El Salvador, Cuba, Rwanda, and Turkmenistan.

According to the National Association of State Budget Office, total state spending on corrections in fiscal 2023 increased 10.2% over fiscal 2022 to $74.8 billion.[11] In 2022, California reported spending $106,000 per offender in one year.[12] In response to the difficulty in paying the financial costs of a mass incarceration system, some states have even authorized charging inmates and their families for services as well as room and board they receive while in prison. One analysis from the Brennan Center for Justice explains:

> As the number of people sentenced to jails and prisons has skyrocketed, government agencies have found themselves unable to pay for the associated costs. While the nation's incarcerated population peaked in 2009, decades of deepening mass incarceration's hold on the nation resulted in runaway costs. In fact, the Urban Institute estimates that states and local governments spent $82 billion on corrections in 2019. To offset these costs, policymakers have justified legislation authorizing an ever-growing body of fees to be charged to the people (and, as a result, often their families) in prison and jail by claiming some fees, such as medical fees, will deter unnecessary visits that overtax correctional medical systems. These policymakers and government officials also know that this captive population has no choice but to foot the bill for the government's own increasing costs of jail and prison administration and that if they can't be made to pay, their families can. In fact, a 2015 report led by the Ella Baker Center for Human Rights, Forward Together, and Research Action Design found that in 63 percent of cases, family members on the outside were primarily responsible for court-related costs associated with conviction; when broken down further into which family members were primarily responsible for the costs, 83 percent were women.[13]

The expenses included the building of infrastructures that could adequately house both prisoners and personnel. In most instances, the physical buildings have deteriorated, begging for major repairs or a new structure entirely. Recently the director of Bureau of Prisons spoke of the physical condition of the federal prison system.

> BOP Director Collette Peters recently testified that many facilities are in such poor shape that the agency is forced to prioritize repairs to only the life safety systems, leaving other needs unmet. She noted that BOP has a backlog for repairs totaling over $2 billion, some twenty times more than its annual appropriations for repairs of about $100 million. Obviously, this is unsustainable and places inmates, staff, and the public at risk.[14]

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[11] NAT'L ASS'N STATE BUDGET OFF.'S, *State Expenditure Report* (2023), https://www.nasbo.org/reports-data/state-expenditure-report/state-expenditure-archives [https://perma.cc/T94G-WSS4].
[12] LEGISLATIVE ANALYST'S OFFICE, *How Much Does It Cost to Incarcerate an Inmate?* (Jan. 2022), https://lao.ca.gov/PolicyAreas/CJ/6_cj_inmatecost [https://perma.cc/KE26-K597].
[13] Lauren-Brooke Eisen, *America's Dystopian Incarceration System of Pay to Stay Behind Bars*, BRENNAN CTR. FOR JUST., (Apr. 19, 2023), https://www.brennancenter.org/our-work/analysis-opinion/americas-dystopian-incarceration-system-pay-stay-behind-bars [https://perma.cc/8KYJ-QQTA].
[14] Hugh Hurwitz, *We Need a Well-Designed Plan to Repair or Replace Our Crumbling Federal Prisons*, THE HILL (Feb. 20, 2023), https://thehill.com/opinion/criminal-justice/3866946-we-need-a-well-designed-plan-to-repair-or-replace-our-crumbling-federal-prisons/.

Accomplishing all this is capital-intensive. It is little wonder the government has not paid much attention to building new prison structures. The government's inability to attend to this promptly also accounts for the congestion in many correctional centers.

There is also the need for regular maintenance of facilities. For example, there must always be adequate lighting in the facility for obvious security reasons. Fences surrounding the infrastructure must be kept firmly secured to prevent marauders. Maintaining personnel in terms of salaries is an essential factor. There is also the need for handcuffs, key clips, person-worn cameras, boots, flashlights, and uniforms, which are available kits for prison staff. Personnel also need special equipment such as light weapons, helmets with transparent face masks, and gas masks.

While the annual cost of corrections totals $80 billion, this figure does not include the social costs of incarceration, such as foregone wages, increased infant mortality, and increased criminality of children with incarcerated parents.[15] All this causes great stress on government spending and often frustrates the process of incarceration in the United States. This is because offenders keep coming back due to both inadequate and ineffective supervision due to lack of vital equipment and reasonable wages for highly professional personnel who end up changing jobs for lack of satisfaction. Thus, the correctional center's goal to monitor and mentor inmates so they do not come back is defeated, and expenses earlier incurred on them become wasted. The largest expenditures are on prison guards, staff, and administrative personnel, which comprise more than half percent of total spending on corrections.[16] The majority of these jobs would be eliminated in a domicile incarceration virtual environment.

These costs do not include the collateral costs to the child welfare system for needing to service children of incarcerated offenders or the long-term economic effects on families whose adult members cannot get adequate employment due to having criminal records among other collateral effects of incarceration. The process creates a continuing cycle of generational incarceration with the underlying causation of childhood trauma, post-traumatic stress, drug addiction and mental illness going unaddressed. The prison industrial complex operates as a self-reinforcing system in which economic, political, and institutional incentives perpetuate incarceration and extend its effects well beyond prison walls. [17]

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[15] MICHAEL MCLAUGHLIN ET AL., INSTITUTE FOR JUSTICE RESEARCH AND DEVELOPMENT, *The Economic Burden of Incarceration in the United States*, (2016), https://ijrd.csw.fsu.edu/sites/g/files/upcbnu1766/files/media/images/publication_pdfs/Economic_Burden_of_Incarceration_IJRD072016_0_0.pdf [https://perma.cc/9778-AMKZ].

[16] Peter Wagner & Bernadette Rabuy, *Following the Money of Mass Incarceration*, PRISON POLICY INITIATIVE, (Jan. 25, 2017), https://www.prisonpolicy.org/reports/money.html [https://perma.cc/B63V-C34A] ("Almost half of the money spent on running the correctional system goes to paying staff. This group is an influential lobby that sometimes prevents reform and whose influence is often protected even when prison populations drop.").

[17] Sarah Payne, *The Economic Impact of Prison Labor for Incarcerated Individuals and Taxpayers*, 2 Princeton L.J. 14, 19 (2023) ("Research suggests there is a strong correlation between poverty and incarceration. One study illustrates how men in the bottom ten percent of the United States' income distribution are twenty times more likely to be incarcerated between the age of thirty and forty than those in the top decile. Perhaps a more concerning revelation within this research, however, is the fact that within one year of release from prison, fewer than 20% of formerly incarcerated individuals earn more than $15,000. As a result, formerly incarcerated individuals are extremely at risk of poverty-related recidivism immediately following their reintegration into society. Overall, without the ability to receive both rehabilitative education and accrue savings, research suggests rates of recidivism starkly increase, posing another long-term financial burden upon the taxpayer yet again.").

3. Virtual Prison: Innovative Solutions to Old Problems

The present need for prison reform and the high cost of housing and managing our current system of brick-and-mortar incarceration[18] have created a need for real-time alternatives. The concept of improved and cost-effective technologies and tracking inmates, probationers, and employees, during the COVID-19 crisis has shed new light on society's attitudes toward tracking on a large scale for health, safety, and welfare objectives.

3.1 Virtual Reality and Theories of Punishment

The International Covenant on Civil and Political Rights in which the United States is a signatory is a seminal treaty on the treatment of prisoners both domestically and internationally. Article 10 of the Covenant provides that any person deprived of their liberty shall be treated with humanity and dignity. The Covenant also requires prisons to focus on rehabilitation rather than punishment. The Covenant applies to detainees in prisons, detention facilities, hospitals (especially psychiatric facilities), and any place individuals are denied their freedom.[19]

In order to address the incarceration crisis in the United States, it is necessary not only to reevaluate the prevailing notions of what a prison is, but to reconsider the paradigm through which we evaluate the success achieved by criminal sentencing. According to our prevailing notions, criminal sentencing exists to achieve four main goals: deterrence, incapacitation, retribution, and rehabilitation.[20] We consider here the utility of attempting to achieve such goals through confinement in a brick-and-mortar prison and how, in spite of its novelty, a combination of tracking technology and virtual reality will provide a far more cost-efficient, humane, and transformative means of controlling criminal behavior.

In evaluating the success of a sentence as a means to deter future criminal behavior, a basic question too often ignored is why individuals commit crimes in the first place. It is almost cliché to point out that crime is often driven by desperation. An individual who is destitute, impoverished, and despairing of his prospects is more likely to deviate from the straight and narrow path of good citizenship. Without a sense of hope for the future, the temptation of crime will remain unaddressed. Deterrence, then, involves more than temporary physical restraints in settings where a criminal psychology can be further molded, such as our typical brick-and-mortar prison; it involves addressing the root causes of criminal behavior – namely, a way of dealing with life's difficulties that does harm, both to oneself and one's community, rather than good.

If we accept that genuine deterrence requires changing the criminal mindset – in other words, rehabilitation, not just punishment or failure to commit another crime – then the question becomes how we can cause such change. One tool, utilized mainly in a small number of cases abroad,[21] is virtual reality.

If a primary cause of recidivism is the reality of a prison environment, the appropriate response would be to replace that environment with one that instead promotes good behavior and

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[18] EQUAL JUSTICE INITIATIVE, *Mass Incarceration Costs $182 Billion Every Year, Without Adding Much to Public Safety* (Feb. 6, 2017), https://eji.org/news/mass-incarceration-costs-182-billion-annually/ [https://perma.cc/45PC-2529].

[19] International Covenant on Civil and Political Rights art. 10, Dec. 16, 1966, 999 U.N.T.S. 171.

[20] Jose A. Moncada, Comment, Virtual Reality as Punishment, 8 Ind. J.L. & Soc. Equality 304, 313 (2020).

[21] INNOVATIVE PRISON SYSTEMS, *Virtual Reality Training in Prisons: Enhancing Inmate Education and Rehabilitation* (2023), https://prisonsystems.eu/virtual-reality-training-in-prisons-enhancing-inmate-education-and-rehabilitation/[https://perma.cc/V7FY-47BZ].

curbs bad behavior.[22] To this end, this paper proposes the use of virtual reality not only to teach job skills,[23] but to teach those convicted of crimes how to navigate the world successfully, identifying both opportunities for growth as well as pitfalls to avoid, and giving the offender the ability to address childhood trauma and his psychosocial tendencies. Gamification has already been applied to education, marketing, customer retention, physical health, mental health, and group workouts.[24] The application of virtual reality gaming is ideally suited for juvenile and young adults because immersive, experiential learning aligns with their developmental stage and has been shown to increase engagement and skill acquisition.[25] It is time to utilize the incentive structure of gamification to maximize the potential for successful reentry of those who have committed crimes and are in danger of doing so again.

The use of virtual reality as a game to assist in the unlearning of criminal behaviors seems to exist in tension with the other goal of criminal sentencing: retribution. Here it is necessary to once again ask a basic question which often goes unanswered in evaluating the success of a sentencing measure: what makes a victim of a crime feel whole again, or at least feel better? Emotional gratification on the part of a wronged party upon seeing the wrongdoer suffering for the harm he caused is natural, as is the desire for it. Anger is a universal human emotion, which Aristotle described as a response rooted in the desire for retribution against a perceived wrong.[26] However, we must now ask which provides the greater satisfaction to the victim: inflicting suffering or provoking repentance? If the greater healing for the victim lies in remorse and not vengeance, in witnessing the self-compelled penance that comes from self-knowledge and not the state-compelled punishment that comes from force, then retribution may not be an immovable guidepost to be adhered to at all costs. This is especially the case if the offender has themselves been victimized and suffers from trauma. In arguing for virtual reality exposure therapy (VRET), the combination of VR with exposure therapy techniques such as "revisiting the story of the trauma until habituation is achieved," Ticknor and Tillinghast write:

> Overall, PTSD increases the risk of involvement with the criminal justice system. The National Commission on Correctional Health Care's (2002) longitudinal study of U.S. jails and prisons demonstrated that 4-9% of inmates in federal prisons and 6-12% of inmates in state prisons suffer from PTSD. Individuals diagnosed with PTSD are at increased risk of alcohol and substance abuse. They also report increased aggression and violent acts, especially toward family members. The symptoms of PTSD can lead to behaviors such as drunk driving, possession of drugs, assault, child abuse, and domestic violence. With the success of VRET in treating PTSD, the criminal justice system can benefit from incorporating treatment programs directed toward this population. Once offenders are no longer diagnosed with PTSD, rehabilitative approaches can begin to address criminogenic characteristics. Not only will this type of treatment program have positive outcomes for offenders, but the families of this population will also benefit.

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[22] *Prison Reform: Reducing Recidivism by Strengthening the Federal Bureau of Prisons*, USDOJ (June 05, 2025), https://www.justice.gov/archives/prison-reform

[23] Id.

[24] GAMIFY, *What is Gamification?, Make a Video Game in Minutes Not Months*, https://www.gamify.com/what-is-gamification [https://perma.cc/TDJ2-G28J] (last visited May 3, 2024).

[25] *In Brief: Using a Cognitive-Behavioral Approach in Programs to Reduce Recidivism*, CSG JUST. CTR. (Jan 13, 2017), https://csgjusticecenter.org/2017/01/13/in-brief-using-a-cognitive-behavioral-approach-in-programs-to-reduce-recidivism/.

[26] ARISTOTLE & REEVE C D C., NICOMACHEAN ETHICS (2d. 2024).

> Improving the well-being of offenders and their families can translate into a more successful reintegration process.[27]

The conflict between a desire to see remorse for the crime, and yet pursuing punishment in a way that makes expressing remorse more difficult, is perhaps best described in a recent law review article:

> Criminal defendants are expressly told, and typically intuitively understand, that to express remorse is to admit guilt, which can be perilous and lead to unintended consequences. The rules of evidence typically do not allow testimony or documents that may speak to the defendants' motives and feelings but are deemed irrelevant to the crime at issue. The system disincentives admissions of guilt or responsibility for the most part. And there is no attempt to educate criminal defendants on how to effectively communicate their feelings or facilitation by the legal actors – attorneys or judges. Thus, the system deprives victimized parties and the public of the justice they crave.[28]

The justice that victimized parties and the public crave is possible, though perhaps not through the system of Shawshank prisons that have become fixtures of our criminal justice landscape. Instead, responsible parties can be coached into confronting their guilt using virtual reality. By placing themselves in the position of the victim they harmed in a controlled virtual environment, responsible parties can face the realities of action and consequence, of personal responsibility, and of shared humanity.[29] Indifference can be unlearned, and empathy learned.

3.2 The Prison as Game

A penal system that adopts a clear set of rules that invites participants to take certain actions and abstain from other actions, rewarding them for adhering to the rules and punishing them for violating the rules, having an end goal of victory and freedom, in significant ways, already resembles a game. That game as it is currently conceived necessarily involves separating families, depriving communities of workforce participants and taxpayers, burdening the state with exorbitant costs, placing offenders in humiliating or dangerous situations, and all too often molding the mentality for a different game – how to commit crimes and get away with it. This Article proposes changing the game by changing prisons into an actual game.

The global revenue of the video game industry is more than $180 billion.[30] In 2023, there was roughly 3.38 billion video game players worldwide.[31] Between 1.7% and 10% of Americans are affected by video game addiction.[32] The fun of games motivates billions around

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[27] Bobbie Ticknor & Sherry Tillinghast, *Virtual Reality and the Criminal Justice System: New Possibilities for Research, Training, and Rehabilitation*, 4 J. of Worlds Research 1, 22 (2011).
[28] Shirin Bakhshay, *The Dissociative Theory of Punishment* 111 GEORGETOWN L.J. 1251, 1312-13 (2023).
[29] Katie Bloch, *Virtual reality: Prospective catalyst for restorative justice*, 58 AMERICAN CRIMINAL LAW REVIEW 285, 313-14 (2021).
[30] Alessandro Mascellino, *70+ Video Game Statistics You Need to Know in 2024: Market Growth, Emerging Trends, and More*, TECHNOPEDIA, https://www.techopedia.com/video-game-statistics [https://perma.cc/G8BU-A5LE] (last visited May 3, 2024).
[31] Id.
[32] Id.

the world to play them: the same motivation that can be harnessed for the purpose of behavioral improvement. Nikita Verma of Axon Park, a company focused on incorporating new technology to improve education, writes of one study: "A majority of individuals who receive non-gamified training scored low in motivation (28%), found the training boring (49%), and unproductive (12%). However, when gamification elements are included in training, 83% of individuals reported feeling motivated, while only 13% reported feeling bored or unproductive."[33]

Virtual reality has already been used successfully to treat trauma, mental health, and substance abuse. Gamification can be used to motivate offenders to continue their program throughout sentencing, so that they do not stray from the lessons they learn as part of virtual environment treatment. Gamification, in short, provides the missing ingredient of many rehabilitation programs, whether drug-related or otherwise: intrinsic motivation – the desire to do something for its own sake.[34]

The demographics of video game players and criminal offenders are overlapping. Most criminal acts are committed by men; 72% of men ages 18 to 29 play video games.[35] As one investigations firm writes of the relationship between age and criminality: "A breadth of studies leveraging criminal data across continents and centuries, analyzing offense rates across different age groups, find a sharp spike of criminality in the teen years, peaking in the late teens and typically dropping off in the early 20s."[36] This correlation between populations with a propensity of playing video games and those with a higher likelihood of engaging in criminal behavior increases the likelihood that any virtual reality game, even one that did not offer a shortened sentence if it was played according to the rules, would further reinforce the immersion and presence provided by VR, enhancing its effectiveness in therapeutic settings.[37]

Through immersion and presence in a game that they may very well have played anyway, lessons and training can be internalized more easily. A study by the Federation of American scientists found that by hearing, students recalled 20% of what they learned; by a combination of hearing and visuals, 30%; by someone taking an action along with the explanation, 50%; by performing the job themselves with the use of gamification, they retained 90% of what they

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[33] Nikita Verma, *How Effective is Gamification in Education? 10 Case Studies and Examples*, AXON PARK (2023), https://axonpark.com/how-effective-is-gamification-in-education-10-case-studies-and-examples/#:~:text=It%20was%20found%20that%20challenge,the%20students%20increased%20by%2034.75%25 [https://perma.cc/N4AH-J23T] (last visited May 3, 2024).

[34] Stefano Di Domenico & Richard Ryan, *The Emerging Neuroscience of Intrinsic Motivation: A New frontier in Self-Determination Research*, 11 Front. Hum. Neurosci. 1, 4 (2017). ("Intrinsic motivation refers to people's spontaneous tendencies to be curious and interested, to seek out challenges and to exercise and develop their skills and knowledge, even in the absence of operationally separable rewards. Over the past four decades, experimental and field research guided by self-determination theory (SDT; Ryan and Deci, 2017) has found intrinsic motivation to predict enhanced learning, performance, creativity, optimal development and psychological wellness. Only recently, however, have studies begun to examine the neurobiological substrates of intrinsic motivation.")

[35] Andrew Perrin, *5 facts about Americans and video games,* PEW RESEARCH CENTER (2018), https://www.pewresearch.org/short-reads/2018/09/17/5-facts-about-americans-and-video-games/ [https://perma.cc/L3QD-YF9N] (last visited May 3, 2024).

[36] PINKERTON, *The Age-Crime Curve Perspectives in Crime: Is there a relationship between age and crime?*, (2022), https://pinkerton.com/our-insights/blog/age-crime-curve#:~:text=A%20breadth%20of%20studies%20leveraging,off%20in%20the%20early%2020s [https://perma.cc/X698-9X3U] (last visited May 3, 2024).

[37] Bobbie Ticknor & Sherry Tillinghast, *Virtual Reality and the Criminal Justice System: New Possibilities for Research, Training, and Rehabilitation*, 4 J. of Worlds Research 1, 16 (2011).

learned.[38] This ability to get participants to internalize lessons is a key component of any rehabilitation and job training program, helping to prevent them from becoming costly programs in which, despite the length and effort on the part of both participants and the program administrators, multiple failures and repeats are the norm, even the expectation.

There is much room for creativity in this space. Offenders can be grouped into teams and compete with one another to see which side can best help a stranger start up their car after it has broken down on the side of the road. They can have leaderboards in which completing the program objectives is rewarded with prestige and recognition among their peers. They can play with their parole or probation officer who will have an avatar of their own in the virtual reality environment, telling them to do the right thing, such as not steal the car with the open door and keys in the ignition. They can talk with their past self in virtual form, and instead of being a perpetrator, this time, be the sage who has words of wisdom about past, present, and future. Instead of thinking to themselves, "I tried so hard to be good, but something always got in the way," in a virtual reality game, nothing is going to get in the way.

Though games are often associated with childhood, in the case of a virtual reality game, this is not a disadvantage; many who are involved in the criminal justice system need a chance at a second childhood, the chance to be good and, to paraphrase Dostoevsky in *The Brothers Karamazov*, say to themselves, "Back there, at least, I was good."

4. Conclusion

The era of overreliance on brick-and-mortar, Shawshank-type prisons can be brought to an end by making full use of the innovations brought about by the advances of the Fourth Industrial Revolution, in which the physical, digital, and biological worlds are merging in new and unpredictable ways.[39] We are not condemned to a cycle in which a vast portion of our population are trapped in a pattern of crime, physical incarceration, worsening prospects, and more crime. There are solutions. We are trapped only by a lack of vision and boldness, and we ourselves hold the key to our imprisonment.

When we determine that the goals of a penal system are preventing further crime, while maintaining family cohesion and ensuring greater public resources, workforce participation and a broad taxpayer base – all necessary for economic vitality – we have at our disposal a means of achieving such goals: a virtual reality game that promotes rehabilitation and is driven by innate, positive characteristics, like the simple desire to have fun and learn to be better. When we use the technology already available to us, such as electronic monitoring and virtual reality, and combine it with the principles of psychology and gamification to address the long-standing, undeniable costs of maintaining our traditional incarceration system, we can get closer to creating a penal system that acts more like an artist making art out of discarded material, rather than a machine that processes human beings into more hardened versions of themselves. It is at the end of that long journey that the individuals involved in the criminal justice system, including

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[38] Nikita Verma, *How Effective is Gamification in Education? 10 Case Studies and Examples*, AXON PARK (2023), https://axonpark.com/how-effective-is-gamification-in-education-10-case-studies-and-examples/#:~:text=It%20was%20found%20that%20challenge,the%20students%20increased%20by%2034.75%25 [https://perma.cc/N4AH-J23T] (last visited May 3, 2024).

[39] WORLD ECONOMIC FORUM, *Fourth Industrial Revolution*, https://www.weforum.org/focus/fourth-industrial-revolution/ [https://perma.cc/L4FC-582S] (last visited May 3, 2024).

those tasked with upholding it, can look at themselves and each other, and say, finally, "We did it. We created something better from the debris. We won the game."

Let's level up and git gud.[40]

[40] DICTIONARY.COM, *Git Gud Meaning & Origin*, (April 5, 2018), https://www.dictionary.com/e/slang/git-gud/ [https://perma.cc/Q25B-PTZU]. ("*Git gud*, a slang rendering of *get good*, refers to getting better at a task or skill, used especially among video gamers online.")

QUANTUM LEAP IN THE LEGAL PARADIGM

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INTRODUCTION

Quantum mechanics has revolutionized our way of thinking of the Universe, and it has further paved the way to significant practical applications in our everyday life. Currently, we are experiencing the second technological revolution where a new wave of quantum resources, such as quantum computing, is beginning to integrate as part of our society. This evolution will have an influence on many areas, some of which are still unknown. However, it is vital that new technologies are brought into play in an interdisciplinary manner. Therefore one can learn from other fields of science within a dialogue to deduce the best practice solutions and approaches.

Although often considered to be rigid, the legal field will also undergo a reformation by the new technologies. A new legal framework is required to prepare the upcoming quantum leap, and to enable the possible benefits to all - and not just few. In fact, it is the duty of lawyers as well as policy makers, governments, and international regulatory and defense organizations to ensure that their awareness of current technology applications and implications is up to date.

Keeping in mind the rise of new quantum technologies, we aim to locate the common ground between the world of research and the legal arena. Although only the future will show us the full ramification of the second quantum revolution, we have identified a few near-future applications of quantum computers. In particular, this chapter will analyze the applications and implications of quantum computing from the perspective of law. How will the quantum leap of society affect the work description of lawyers, and the legal arena in general?

This chapter is organized as follows. After the introduction, in the first section, we will give a brief overview of quantum computing. In the second section, we will discuss some of the applications and implications of quantum computing from the point of view of law, economics, sustainability, and society. In the third section, we will address the legal design framework for

quantum technology. In the fourth section, we will introduce a novel approach to quantum computing within the law and economic framework with a twist of game theory. In the fifth, and last section of the chapter, we discuss policy making in international commerce.

I. QUANTUM COMPUTING 101

Before delving into the legal, ethical, and social impacts of quantum computing, we briefly introduce the basic idea behind quantum computers. In a nutshell, a quantum computer is a device that harnesses the properties of quantum mechanics to store data and to perform computational tasks.[3] Even though conventional computers have existed throughout the 20th century, the possibility of a computer operating exclusively with quantum mechanical principles was first put forth in the 1980s,[4] leading to the rise of the quantum computing field.[5]

Whereas classical computers, incorporated into devices such as modern laptops and smartphones, encode information in binary bits, which are either zeros or ones, the fundamental element of a quantum computer is a quantum bit (or qubit), which can be a zero and one at the same time.[6] These quantum bits can be realized in a number of physical set-ups.[7] A peculiar feature of a set of

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[3] There are a myriad of textbooks on quantum computing and information. KASIRAJAN VENKATESWARAN, FUNDAMENTALS OF QUANTUM COMPUTING: THEORY AND PRACTICE (Springer 2021); MIRCO A. MANNUCCI & NOSON S. YANOFSKY, QUANTUM COMPUTING FOR COMPUTER SCIENTISTS (Cambridge University Press 2008); DAVID MCMAHON, QUANTUM COMPUTING EXPLAINED (JOHN WILEY & SONS 2008); MARK M. WILDE, QUANTUM INFORMATION THEORY (Cambridge University Press 2013); JOHN WATROUS, THE THEORY OF QUANTUM INFORMATION (Cambridge University Press 2018); MASAHITO HAYASHI, QUANTUM INFORMATION THEORY: MATHEMATICAL FOUNDATION (Springer Nature 2d ed. 2017); ISAAC L. CHUANG & MICHAEL A. NIELSEN, QUANTUM COMPUTATION AND QUANTUM INFORMATION (Cambridge University Press 2000).

[4] *See* Richard P. Feynman, *Simulating Physics with Computers*, 21 INT'L J. THEORETICAL PHYSICS 467 (1982); *see also* Paul Benioff, *The Computer as a Physical System: A Microscopic Quantum Mechanical Hamiltonian Model of Computers as Represented by Turing Machines*, 22 J. STATISTICAL PHYSICS 563 (1980); *see also* David Deutsch, *Quantum Theory, the Church–Turing Principle and the Universal Quantum Computer*, 400 PROC. ROYAL SOC'Y LONDON A 97 (1985).

[5] *See* Thaddeus D. Ladd et al., *Quantum Computers*, 464 NATURE 45 (2010); *see also* Antonio Acín et al., *The Quantum Technologies Roadmap: A European Community View*, 20 NEW J. PHYSICS 080201 (2018).

[6] McMahon, supra note 1.

[7] *See* Thaddeus, *supra* note 3; *see also* Seth Lloyd, *A Potentially Realizable Quantum Computer*, 261 SCIENCE 1569 (1993); Colin D. Bruzewicz et al., *Trapped-Ion Quantum Computing: Progress and Challenges*, 6 APPLIED

qubits is their possibility to be in many different arrangements simultaneously. In addition to this superposition property, all of some of the qubits on a computer can be inextricably connected together. When done so, the qubits are referred to as entangled. It is the superposition and entanglement of qubits that give a quantum computer an edge to resolve some complex problems better than the best supercomputers.[8]

The quantum advantage[9], sometimes called quantum supremacy[10], stems from the ability of a qubit array to represent and analyze a huge set of information.[11] In fact, a few hundred entangled qubits are more than enough to describe atoms in the universe, whereas no classical computer has enough available memory for this task. More precisely, a quantum computer excels in computational tasks which require going through a myriad of possible combinations to find the solution. For instance, quantum computers have an advantage over classical computers in solving mathematical optimization issues such as the prime number factoring problem[12], which is closely linked to the of modern encryption methods, and the traveling salesman problem[13], which is related to the optimization of pack delivery routes. In addition to the computational speed-up, quantum computers are a natural platform to test the fundamental principles of nature[14] as well as to simulate

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PHYSICS REV., 021314, 021314 (2019); Sergei Slussarenko & Geoff J. Pryde, *Photonic Quantum Information Processing: A Concise Review*, 6 APPLIED PHYSICS REV., 041303, 041303 (2019); Morten Kjaergaard et al., *Superconducting Qubits: Current State of Play,* ANN. REV. CONDENSED MATTER PHYSICS, 369, 369 (2020).

[8] *See* Ethan Bernstein & Umesh Vazirani, *Quantum Complexity Theory*, 26 SIAM J. COMPUT., 1411, (1997); Daniel R. Simon, *On The Power of Quantum Computation*, 26 SIAM J. COMPUT., 369, 369 (1997); Peter W. Shor, *Polynomial-Time Algorithms for Prime Factorization and Discrete Logarithms on a Quantum Computer*, 41 SIAM J. COMPUT., 1474, 1474 (1999).

[9] Yulin Wu et al., *Strong Quantum Computational Advantage Using a Superconducting Quantum Processor*, 127 PHYSICAL REV. LETTERS, 180501, 180501 (2021); Han-Sen Zhong et al., *Quantum Computational Advantage Using Photons*, 370, SCIENCE, 1460, 1460 (2020).

[10] *See* Frank Arute et al., *Quantum Supremacy Using a Programmable Superconducting Processor*, 574 NATURE 505, 505 (2019); Aram W. Harrow & Ashley Montanaro, *Quantum Computational Supremacy*, 549 NATURE 203, 203 (2017). Adam Bouland et al., *On The Complexity and Verification of Quantum Random Circuit Sampling*, 15 NATURE PHYSICS, 159, 159 (2019).

[11] *See* Lov Grover, *Quantum Mechanics Helps in Searching for a Needle in a Haystack*, 79 PHYSICAL REV. LETTERS, 325, 325 (1997).

[12] *See* Shor, *supra* note 5, at 317.

[13] *See* Charles H. Bennett et al., *Strengths and Weaknesses of QuantumCcomputing,* 26 SIAM J. COMPUT., 1510, 1510 (1997); Grover, supra note 8.

[14] *See* Simanraj Sadana et al., *Testing Quantum Foundations With Quantum Computers*, 4 PHYSICAL REV. RSCH., L022001, L022001 (2022); Scott E. Smart et al., *Experimental Data From a Quantum Computer Verifies the Generalized Pauli Exclusion Principle,* 2 COMMC'NS. PHYSICS 11, 11 (2019); Shruti Dogra et al., *Quantum Simulation of Parity-Time Symmetry Breaking With a Superconducting Quantum Processor*, 4 COMMC'NS. PHYSICS, 26, 26 (2021).

the behavior of (complex) physical systems[15], which instead can yield a new stimulus to material science and chemistry.

Even though quantum computing has a great potential for a myriad of applications, there will also be plenty of situations where a quantum computer either plainly loses, or its computational boost is miniscule compared to a classical computer approach. Most likely, the supercomputers of tomorrow are hybrids[16]: quantum and classical computers collaborate together to tackle tedious problems more efficiently than we currently are able to. In other words, there will not be an extinction of conventional computers in the future.

The biggest roadblock for the triumph of the quantum booster is the fragile nature of qubits. Environmental factors, such as thermal noise, have a tendency to render a qubit into a boring, old-fashioned classical bit. These unwanted features, colloquially known as decoherence, kill the delicate quantum properties, like the superposition and entanglement of qubits on which the quantum advantage relies. Therefore, an optimally functional quantum computer should have an ability to shield its quantum states from decoherence, while still maintaining its operational simplicity. At the moment researchers are exploring multiple strategies to overcome the challenge

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[15] Richard P. Feynman, *Simulating Physics with Computers*, 21 INT. J. THEOR. PHYS., 467, 474-479(1981); Christof Zalka, *Simulating Quantum Systems on a Quantum Computer*, 454 MATHEMATICAL, PHYSICAL, AND ENG'G SCIENCES, 313, 313 (1998); Bruce M. Boghosian & Washington Taylor, *Simulating Quantum Mechanics on a Quantum Computer*, 120 PHYSICA D 30, 30 (1998); Nathan Wiebe et al., *Simulating Quantum Dynamics on a Quantum Computer*, 44 J. PHYS. A: MATH. THEOR., 445308, 1 (2011);
Francesco Tacchino, *Quantum Computers as Universal Quantum Simulators: State-of-the-Art and Perspectives,* 3 ADV. QUANTUM TECHNOL., 1900052, 1 (2020); Ehud Altman et al., *Quantum Simulators: Architectures and Opportunities*, 2 PRX QUANTUM, 017003, 1 (2021).

[16] Alberto Peruzzo et al., *A Variational Eigenvalue Solver on a Photonic Quantum Processor,* 5 NAT. COMMUN.**,** 4213, 1 (2014); Abhinav Kandala, *Hardware-Efficient Variational Quantum Eigensolver for Small Molecules and Quantum Magnets*, 549 NATURE, 242, 242 (2017); Nikolaj Moll et al., *Quantum Optimization Using Variational Algorithms on Near-Term Quantum Devices,* 3 QUANTUM SCI. TECHNOL., 030503, 1 (2018); Jarrod R. McClean et al., *The Theory of Variational Hybrid Quantum-Classical Algorithms*, 18 NEW J. PHYS., 023023, 1 (2016); Ying Li & Simon C. Benjamin, *Efficient Variational Quantum Simulator Incorporating Active Error Minimization*, 7 PHYS. REV. X, 021050, 1 (2017); Daiwei Zhu et al., *Training of Quantum Circuits on a Hybrid Quantum Computer*, 5 SCI ADV., eaaw9918, 1 (2019); Ryan R. Ferguson et al., *Measurement-Based Variational Quantum Eigensolver*, 126 PHYS. REV. LETT., 220501, 1 (2021); Bela Bauer, *Hybrid Quantum-Classical Approach to Correlated Materials*, 6 PHYS. REV. X, 031045, 2 (2016).

of decoherence. Whether it will be more robust, error-tolerant quantum processors[17] or better ways to correct and mitigate errors[18], or both, only time will show us.

For the time being, classical computers seem to address any problem thrown at a quantum computer similarly efficiently. However, according to some companies, like IBM and Google, we are on the verge of a true quantum advantage. Furthermore, many tech companies have already developed small, so-called noisy intermediate-scale quantum apparatuses which give us a peak of future quantum computer benefits.[19] Nonetheless, for most part, quantum computing is still in the early stage of commercialization, but the competition for quantum technologies has begun.

I. SOCIETY AT THE QUANTUM COMPUTING AGE

The funding of quantum computing has skyrocketed at the same time as the field has evolved further and the commercial applications have attained more attraction. Nevertheless, the basic research is currently supported from public sources (Figure 1.), and as of 2024–2025, public funding for quantum computing has increased substantially worldwide. China remains the leading investor, with approximately USD 15.3 billion in public funding under its national plans for 2021-2025.[20] In the United States, the National Quantum Initiative authorized about USD 1.2 billion for 2018-2022, while annual federal expenditures for quantum information science have reached around USD 1 billion per year from FY 2022 through FY 2025.[21] In addition, the U.S. Department of Energy (DOE) announced USD 65 million in 2024 for quantum computing research projects[22]

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[17] Earl T. Campbell et al., *Roads Towards Fault-Tolerant Universal Quantum Computation*, 549 NATURE**,** 172, 172 (2017).
[18] Julia Georgescu, *25 Years of Quantum Error Correction*, 2 NAT. REV. PHYS., 519, 519 (2020); Simon J. Devitt et al., *Quantum error correction for beginners*, 76 Rep. Prog. Phys. 76, 076001 (2013).
[19] John Preskill, *Quantum Computing in the NISQ era and beyond*, 2 QUANTUM 79, 79 (2018); Kishor Bharti et. al., *Noisy intermediate-scale quantum algorithms*, 94 REV. MOD. PHYS. 94, 015004 (2022); Alberto Peruzzo et al., *A variational eigenvalue solver on a photonic quantum processor,* 5 NAT. COMMC'NS. 5**,** 4213 (2014); Matteo Ippoliti et. al., *Many-Body Physics in the NISQ Era: Quantum Programming a Discrete Time Crystal*, 2 PRX QUANTUM 2, 030346 (2021).
[20] Masiowski, Niko Mohr, Henning Soller & Matija Zesko, *Quantum Computing Funding Remains Strong, but Talent Gap Raises Concern*, McKinsey & Company (2022), https://www.mckinsey.com/capabilities/tech-and-ai/our-insights/quantum-computing-funding-remains-strong-but-talent-gap-raises-concern
[21] Subcommittee on Quantum Information Science, *National Quantum Initiative Supplement to the President's FY 2025 Budget* (2024), National Science & Technology Council, National Quantum Initiative, https://www.quantum.gov/wp-content/uploads/2024/12/NQI-Annual-Report-FY2025.pdf
[22] U.S. Department of Energy, *Department of Energy Announces $65 Million for Quantum Computing Research* (2-24), https://www.energy.gov/science/articles/department-energy-announces-65-million-quantum-computing-research

and proposed additional long-term support through the DOE Quantum Leadership Act of 2025, which would allocate USD 2.5 billion for FY 2026–2030[23]. Beyond federal programs, several U.S. states, including New Mexico[24], Illinois[25], and South Carolina[26], have developed regional quantum initiatives. In Europe, the EU Quantum Flagship commits USD 1.1 billion over ten years[27]. This is complemented by national investments including Germany's USD 3.2 billion action plan for quantum technologies[28], the Netherlands' public investment of USD 65 million through the National Growth Fund for Quantum Delta NL[29], Spain's USD 900 million National Quantum Technologies Strategy 2025-2030[30], and the United Kingdom's commitment of approximately USD 3.1 billion in public funding for quantum technologies over ten years from 2024[31], as well as additional government investment of USD 672 million over four years[32], with several other countries also supporting national quantum initiatives.

[23] S.579 - 119th Congress (2025-2026): Department of Energy Quantum Leadership Act of 2025, S.579, 119th Cong. (2025), https://www.congress.gov/bill/119th-congress/senate-bill/579.
[24] Office of the Governor, *New Mexico at the Quantum Frontier: State and DARPA Forge Bold Partnership* (2025), https://www.governor.state.nm.us/2025/09/02/new-mexico-at-the-quantum-frontier-state-and-darpa-forge-bold-partnership/
[25] Office of the Governor, *Gov. Pritzker Breaks Ground on Illinois Quantum and Microelectronics Park (IQMP)* (2025), https://gov-pritzker-newsroom.prezly.com/gov-pritzker-breaks-ground-on-illinois-quantum-and-microelectronics-park-iqmp
[26] *One of Those Transformational Investments: $15M Brings Quantum Computing to SC*, SCbio (2024), https://www.scbio.org/one-of-those-transformational-investments-15m-brings-quantum-computing-to-sc/
[27] Quantum Flagship, https://qt.eu/
[28] Matt Swayne, *Germany Announces 3 Billion Euro Action Plan For a Universal Quantum Computer*, The Quantum Insider (2024), https://thequantuminsider.com/2023/05/03/germany-announces-3-billion-euro-action-plan-for-a-universal-quantum-computer/
[29] Lisa Langsdorf, *Quantum Delta NL Awarded €60 million by National Growth Fund for Additional International Programme* (2023), QuantumDelta**,** https://quantumdelta.nl/news/quantum-delta-nl-awarded-eur60-million-by-the-national-growth-fund-for-an-additional-international-programme
[30] *El Gobierno lanza la primera Estrategia de Tecnologías Cuánticas de España con una inversión de 800 millones de euros* (Ministerio para la Transformación Digital y de la Función Pública, 2025), https://digital.gob.es/comunicacion/notas-prensa/mtdfp/2025/04/2025-04-24
[31] *National Quantum Strategy* (Department for Science, Innovation & Technology,2023), **GOV.UK,** https://www.gov.uk/government/publications/national-quantum-strategy/national-quantum-strategy-accessible-webpage. See also Michael Bogobowicz et al., *Steady Progress in Approaching the Quantum Advantage* (2024), McKinsey & Company, https://www.mckinsey.com/capabilities/tech-and-ai/our-insights/steady-progress-in-approaching-the-quantum-advantage
[32] Matt Swayne, *UK Commits £500 Million to Quantum Computing Amid Sovereignty and Security Concerns* (2025), The Quantum Insider,https://thequantuminsider.com/2025/06/23/uk-commits-500-million-to-quantum-computing-amid-sovereignty-and-security-concerns/

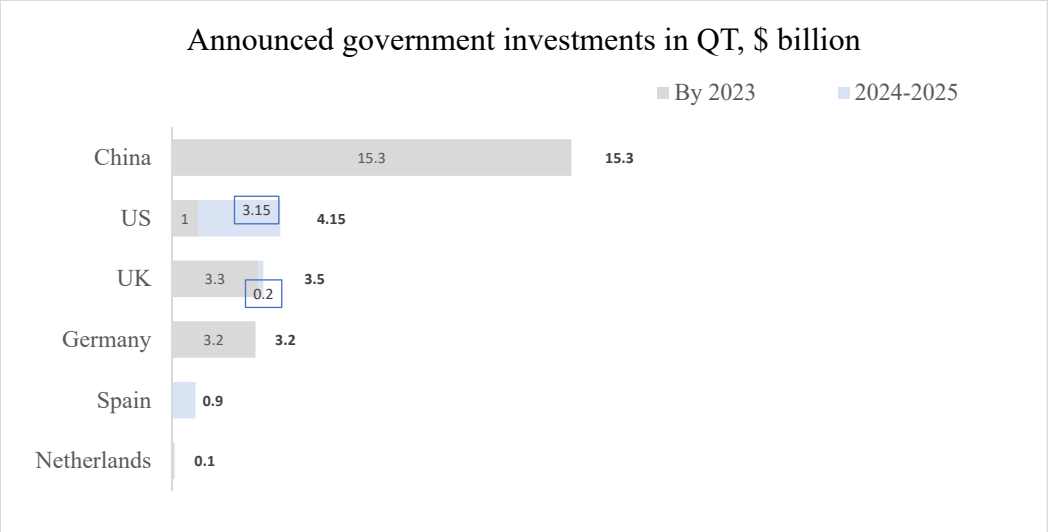

Figure 1. Announced government investments in QT, $ billion

As computers take the quantum leap to tackle challenges too complex for classical computers[33] private operators are also allured by unprecedented opportunities and possibilities in various societal and commercial areas.[34] Consequently, we expect private monetary flow to increase, and to hasten the development of the technology further. In fact, this progres has already started in the market practice as global leaders such as Amazon, Alibaba, Google, IBM, and Microsoft have launched their commercial sphere quantum computing services.[35] Furthermore, we should not underestimate the role of new, smaller scale players. Quantum computing has been a fertile field for new start-ups; in 2020, quantum computing start-ups raised funding for 0.7 billion, and by 2021 they more than doubled their funding, receiving 1.7 billion (Figure 2.).[36]

[33] See generally, e.g., Frank Arute et al., *Quantum Supremacy Using a Programmable Superconducting Processor*, 574 NATURE 505, 505, 509 (2019) (showing quantum computers outperforming classical computers); Han-Sen Zhong et al., *Quantum Computational Advantage Using Photons*, 370 SCIENCE 1460, 1460-63 (2020) (detaling another advantage of quantum computing over classical computing).

[34] Eran Kahana, *Quantum Computing and Computational Law Applications*, STAN.L.SCH. CODEX: THE STAN. CTR. ON LEGAL INFORMATICS (March 15, 2016), https://law.stanford.edu/2016/03/15/quantum-computing-and-computational-law-applications/ [https://perma.cc/25VG-KFHG

[35] Id.

[36] Matteo Biondi et al., supra note 20, Exhibit 2.

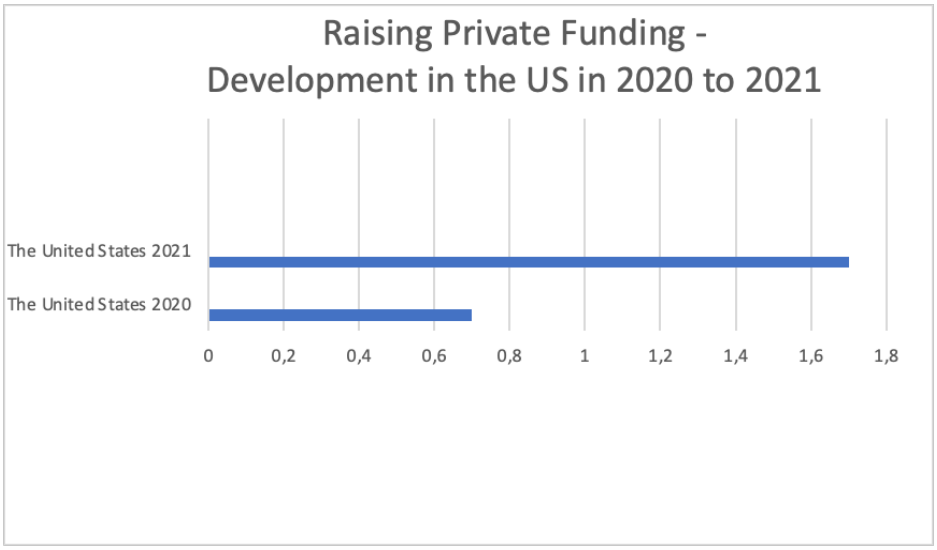

Figure 2. Private Funding - Development in the US in 2020 to 2021

Based on the ever-increasing amount of funding and already achieved progress, it is just a matter of time before quantum computers will be in a stage to fulfill the dreamed possibilities. However, we want to underline that quantum computers, even at their best, are not omnipotent or omniscient devices - they do not offer complete solutions *per se*.[37] The fruits of quantum computing should be put into a broader framework. In fact, the data mined from the new quantum sources will urge for a more careful human consideration specifically as regards actions, policies, or decisions that have an impact in society - this is a pressing remark, particularly in the fields where the implications could greatly affect individuals' rights or well-being.[38]

As indicated above, there are some legal and ethical aspects taken into account when integrating quantum computing as a part of our society. Nevertheless, we firmly believe that the significant benefits will outweigh the deficiencies regarding the utilization of quantum computers. There will be several technological areas that could be greatly influenced by the potential of quantum

[37] See generally,Thaddeus D. Ladd et al., *Quantum computers*, 464 NATURE 45, 45-53 (2010) (describing the various hardware limitations that must be overcome for quantum computing to become a viable tool).

[38] *Note:* For instance, *this consideration of a larger framework is important with regards to decisions on patients' medical care and treatments, improving DNA and genetic base studies, financial/ loan affecting individual decisions, decisions concerning individuals' rights in society or more broadly their equal standing. Human consideration is often needed to better understand all the implications that decisions or policies based on probabilities can cause on an individual level on rights, - but also on obligations. In these example cases, decisions or policies should not solely be based on probabilities without further broader human assessment.*

computers. Below, we address the possible near-future implications of quantum computing on society (Figure 3.).

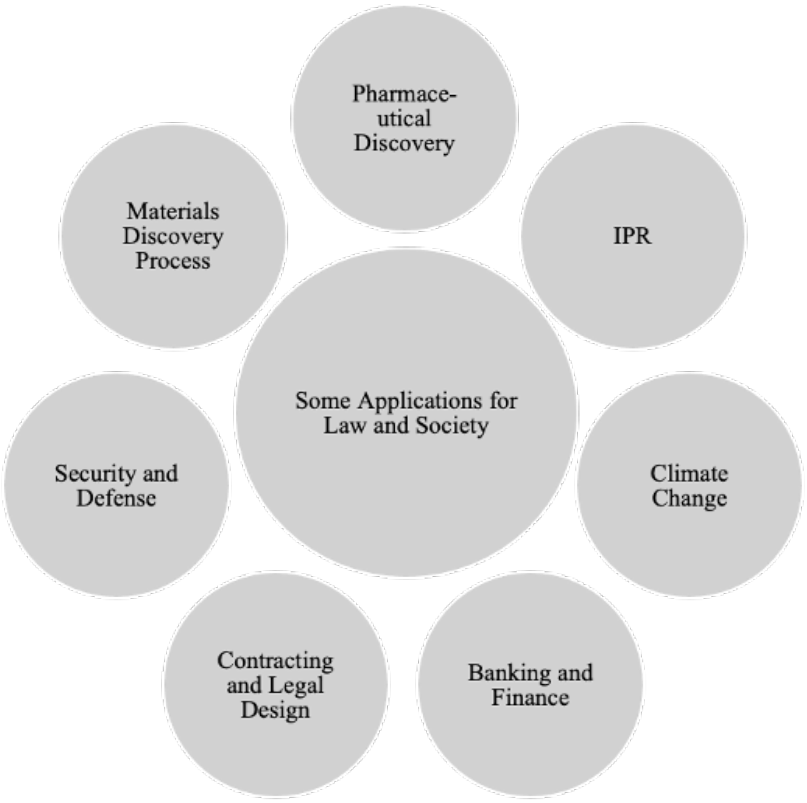

Figure 3. Some prosperous near-future applications of quantum computing

The most anticipated aspect of the future quantum computing resource is the accelerated research and discovery (hereinafter R&D) processes in various fields, such as in pharmaceuticals[39] and material research[40]. The quantum-boosted R&D will likely decrease transaction costs associated within discovery processes and provide for more efficiency since different ideas are more

[39] E.g. Yuan Cao et al., *Potential of Quantum Computing for Drug Discovery*, 62 IBM J. RES. DEV. 6, 1-2, 4-6, 8-10, 13-15 (2018) (descirbing how quantum computing improves and can be used with current computing models in early drug discovery stages); Carlos Outeiral et al., *The prospects of quantum computing in computational molecular biology*, 11 WILEY INTERDISCIP. REV. COMPUT. MOL. SCI. 1481, 1481, 1496-97 (2021) (discussing how various quantum computing models improve on previously used computational methods in molecular biology); Matteo Biondi et al., supra note 20 (breifly discussing the biopharmacuetical industry's interest in using quantum computing).

[40] Roman Malina & Stefan Woerner, *Expert Insights: Exploring Quantum Computing Use Cases for Manufacturing*, Report: IBM Institute for Business Values (June 2019) https://www.ibm.com/downloads/cas/LJBOKBLW [https://perma.cc/9639-NJZQ].

efficiently tested - and ruled out if unfeasible - than is currently.[41] This further translates into savings in scarce resources such as time, specialized workforce, and materials. In addition to the expedition of the design cycle, we are also likely to witness major innovations within the supply chain, process optimization, and risk modeling.[42]

Opportunities in discovery, development and design processes will result in a new wave of innovations bringing a systemic impact on a societal level.[43] As envisioned by the famous physicist, Richard Feynman, a quantum computer will be the ultimate simulator for the behavior of physical systems,[44] with far-reaching consequences for material science and chemistry likely leading to the discoveries of cutting-edge materials and novel catalysts for chemical reactions.[45] On the pharmaceutical science side, quantum computers could be a game changer for understanding how long and complex proteins fold; an insoluble task for a supercomputer employing a brute force strategy of levering its multiple processors.[46] The ability of resolving the protein fold problem would enhance the development of new treatments and drugs, as well as unlocking secrets behind genetic diseases. In addition, the synergies of quantum computing and artificial intelligence (hereon AI) have opened a new frontier of science to the world.[47]

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[41] The Berkley Technology Law Podcast, *Quantum Computing with Joonas Keski-Rahkonen and Katri Nousiainen,* BERKLEY TECH. L.J., (2022), https://btlj.org/2022/08/berkeley-technology-law-journal-podcast-quantum-computing/ [https://perma.cc/S4LH-JA93] ; Matteo Biondi et al., supra note 20.

[42] Eran Kahana, *Quantum Computing and Computational Law Applications*, STANFORD LAW SCHOOL BLOGS: CODEX: (March 15, 2016), https://law.stanford.edu/2016/03/15/quantum-computing-and-computational-law-applications/ [https://perma.cc/HHT9-EWBR].

[43] Nousiainen & Keski-Rahkonen, *supra* note **Error! Bookmark not defined.**.

[44] Richard P. Feynman, *Simulating Physics with Computers*, 21 INT. J. THEOR. PHYS. 467, 467-86 (1981).

[45] *See generally*, Benjamin P. Lanyon et al., *Towards Quantum Chemistry on a Quantum Computer*, 2 NATURE CHEMISTRY 106, 106-11 (2010); Zalka Christof, *Simulating Quantum Systems on a Quantum Computer*, 454 PROC. R. SOC. LOND. A. 313, 313-22 (1998); Ivan Kassal et al., *Simulating Chemistry Using Quantum Computers*, 62 ANNU. REV. PHYS. CHEM. 185, 185-207 (2011).

[46] *See*, Aviezri S. Fraenkel, *Complexity of Protein Folding*, 55 BULL. MATH. BIOLOGY 1199, 1199-1207 (1993); *see also*, Martin P. Andersson et al., *Quantum Computing for Chemical and Biomolecular Product Design*, 36 CURRENT OP. CHEM. ENG. S1, S5 n.100754 (2022); Carlos Outeiral et al., *The Prospects of Quantum Computing in Computational Molecular Biology*, WIREs COMPUT. MOL. SCI., Nov. 2021, at 1; Anton Robert et al., *Resource-efficient quantum algorithm for protein folding*, NPJ QUANTUM INF., Feb. 2021 at 1; Dillion M. Foxer et al., *RNA folding using quantum computers*, PLOS COMPUT. BIOL., April 2022 at 1.

[47] Vedran Dunjko & Hand J. Briegel, *Machine learning & artificial intelligence in the quantum domain: a review of recent progress*, REP. PROG. PHYS., June 2018 at 1; Vincent Moret-Bonillo, *Can artificial intelligence benefit from quantum computing?*, 3 PROG. ARTIF. INTELL., 89, 89-105 (2015); Andreas Trabesinger, *Quantum computing: towards reality*, 543 NATURE, S1, S1 n.7646 (2017).

In a larger picture, quantum-assisted material research can assist the green transition of society.[48] The post quantum climate actions could concretelevely compose of longer-lasting and more ecologic materials (e.g., reusable, emissions-free cement), reformations in agriculture (e.g., green fertilizers and green-gouse gasses reducing vaccinations for ruminants), reshaping industrial operations (e.g., energy efficient catalysis and carbon storage solvetents), decarbonizing the power and fuel production (e.g., better solar panels, efficient chemistry for green hydrogen and ammonia, and improvements for synfuels), and finally electrifying our lives in the form of better batteries than we have now.[49] Although the presented list might seem to be comprehensive, we speculate that it will only be just the tip of the iceberg. The possibilities of quantum computing could bring innovations throughout the economy that would have a huge influence on carbon abatement and caption. On the other hand, countries get alternatively options to satisfy their legal obligations under international conventions and regulations against the global warming[50] Therefore, quantum computing can have an indirect role, for instance, in complying with the United Nations Sustainable Development Goals on climate change, affordable and clean energy, and goals on industry, innovation and infrastructure.[51]

Besides the promising benefits, there will also be some legal implications and open ethical questions.[52] A natural consequence of the accelerated product development cycle will be an avalanche of intellectual property claims. In essence, different operators might be motivated to aim for extensive IPR portfolios and to acquire a good standing in a market. Thus being the first can be pivotal in strengthening one's position in a market (Figure 6.) - whether the operator targets for

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[48] Roman Malina & Stefan Woerner, *Expert Insights: Exploring Quantum Computing Use Cases for Manufacturing*, IBM INST. BUS. VALUES (June 2019). https://www.ibm.com/downloads/cas/LJBOKBLW [https://perma.cc/HQ9A-9RST]; *See also*, Casey Berger et al., *Quantum technologies for climate change: Preliminary assessment*, Q4CLIMATE (June 23, 2021), https://q4climate.github.io/assets/Q4C_Preliminary_Assessment.pdf [https://perma.cc/GB9U-XGE8].

[49] Peter Cooper et al., *Quantum Computing Just Might Save the Planet*, MCKINSEY DIGITAL, https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/quantum-computing-just-might-save-the-planet (May 19, 2022).

[50] *See* Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104, https://unfccc.int/sites/default/files/english_paris_agreement.pdf (EIF November 4, 2016); *See further A Beginner's Guide to Environmental Agreements,* AMERICAN UNIVERSITY INTERNATIONAL REALTIONS, https://ironline.american.edu/blog/beginners-guide-environmental-agreements/ (Dec 13, 2018).

[51] *Sustainable Development Goals*, UNITED NATIONS, https://www.un.org/sustainabledevelopment/sustainable-development-goals/.

[52] Katri Nousiainen & Joonas Keski-Rahkonen, *Law and Order at the Quantum Computing Era,* BTLJ submitted (2022).

market dominance or even monopoly position. These legal implications may be problematic and strong concentration can impede the access and availability of these technologies for wider societal application. On the other hand, we acknowledge the importance of operators having the incentives to innovate, conduct research and discovery, and eventually acquire a prize for it in the form of intellectual property right protection. Therefore, there should be an equilibrium between the exclusive rights and the access for many in order to balance the commercial incentives and the wider societal justice call.

Besides the legal, ethical and social considerations stemming from the quantum-boosted product development discussed above, quantum computing is also expected to have a profound impact on how we utilize ever-increasing volumes of data for the benefit of society. In the era of 'big' data, a quantum computer can provide significant advantages for recognizing patterns and behaviors. In fact, quantum machine learning can offer more accurate predictions with less data and with a smaller amount of time than classical computers.[53]

The quantum-enhanced data mining will most likely influence the banking and financial sector whose regulation is a complex and continuous process.[54] Although foreseeing the future state of the financial markets is an arduous challenge, there are various methods to extrapolate and extract trends. For instance, machine learning is widely employed to assess the future market behavior

[53] Marco Pistoia et al., *Quantum Machine Learning for Finance ICCAD Special Session Paper,*2021 IEEE/ACM INTL CONF. ON COMPUTER AIDED DEISGN. 1, 9 (2021), https://ieeexplore.ieee.org/document/9643469; Roman Orus et al., *Quantum Computing for Finance: Overview and Prospects,* 4 REV. PHYS. 100028, 100028-100040 (2019).

[54] *See, e.g.,* FRANKLIN R. EDWARDS, *THE NEW FINANCE: REGULATION AND FINANCIAL STABILITY* (American Enterprise Institute eds., 1996); Fernando Casal Bértoa et al., *The World Upside Down: Delegitimising Political Finance Regulation*, 35 INT'L. POLITICAL SCI. REV. 355, 355-375 (2014); Alexander A. Robichek, *Regulation and Modern Finance Theory*, 33 J. FINANCE 693, 693-705 (1978); Igor Klioutchnikov et al., *Chaos Theory in Finance*, 119 PROCEDIA COMPUT. SCI. 368, 368-375 (2017); Thomas J. Connelly, *Chaos Theory and the Financial Market*s, 9 J. FINANCIAL PLAN. 26, 26-30 (1996); Tom Mouck, *Capital Markets Research and Real World Complexity: The Emerging Challenge of Chaos Theory*, 23 ACCOUNT. ORGAN. SOC. 189, 189-215 (1998); William C. Clyde & Carol L. Osler, *Charting: Chaos theory in disguise?* 17 J. FUTURES MARK. 489, 489-514 (1997); Marisa Faggini & Anna Parziale, *The Failure of Economic Theory. Lessons from Chaos Theory*, 3 MOD. ECON. 1, 1-10 (2012); Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 211-268 (2009).

based on the past events.[55] Furthermore, the Monte Carlo[56] and optimization methods[57] provide statistical predictions for risk assessment and derivatives pricing[58], and for portfolio optimization[59], respectively. All these methods can be absorbed and improved by a quantum computer, even to the limit of outshining the computational performance on classical computers.[60] The future beneficial areas include different kinds of optimization tasks and financial forecasting activities plus risk management.[61] Information acquired through quantum AI tools could be exploited in the estimation of people's credit behavior, or in the assessment and evaluation of various financial risks. Overall, the quantum computing transition could lower operators' transaction costs.

When ushering into the post-quantum world, relevant authorities and legislators are obligated to take the necessary precautionary measures and practices to safeguard sustainable operation of the markets and to protect the rights of the people. In particular, the first steps should be taken before a novel financial prediction tool starts to influence the market. As with any forecasting tool, it is imperative to call for human consideration and deliberation - especially regarding actions or decisions affecting larger society or the well-being and rights of an individual such as in the context of loans, credits, personal banking, and securement and other financial instruments. Neither

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[55] *See, e.g.*, Bruno M. Henrique et al., *Literature Review: Machine Learning Techniques Applied to Financial Market Prediction*, 124 Expert Sys. with Apps. 226 (2019); *See also* Shunrong Shen, Haomiao Jiang & Tongda Zhang, *Stock Market Forecasting Using Machine Learning Algorithms* (2012) (Research presentation paper, Stanford University) (on file with the Stanford University Department of Electrical Engineering); László Györfi, György Ottucsák & Harro Walk, Machine Learning for Financial Engineering 83 (2012); *See also* Gang Kou et al., *Machine Learning Methods for Systemic Risk Analysis in Financial Sectors,* 25 Techn. & Econ. Dev. Econ. 716 (2019).

[56] *See,e.g.*, Patrick Rebentrost, Brajesh Gupt & Thomas R. Bromley, *Quantum Computational Finance: Monte Carlo Pricing of Financial Derivatives,* 98 Phys. Rev. A 022321(2018) (regarding derivatives); *See also, e.g.*, Stefan Woerner & Daniel J. Egger, *Quantum Risk Analysis,* 5 npj Quantum Inf. 15 (2018) (regarding value-at-risks).

[57] *See, e.g.*, Gérard Cornuéjols, Javier Peña & Reha Tütüncü, Optimization Methods in Finance (2d ed. 2018).

[58] *, e.g.*, Francesco Bova, Avi Goldfarb, & Roger G. Melko, *Commercial Applications of Quantum Computing*, 8 EPJ Quantum Techn. 2, 8 (2021) (citing *Rebentrost*, *supra* note 44, and citing *Woerner*, *supra* note 44).

[59] *See, e.g.*, Gah-Yi Ban et al., *Machine Learning and Portfolio Optimization*, 64 Mgmt. Sci. 1136 (2018); *see also, e.g.*,Wei Chen et al., *Mean–variance portfolio optimization using machine learning-based stock price prediction,* 100 Applied Soft Comput. 106943 (2021); *See also, e.g.*, Zihao Zhang et al., *Deep Learning for Portfolio Optimization*, 2 J. Fin. Data Sci. 8 (2020).

[60] *See* Xing-Dong Cai et al., *Entanglement-based Machine Learning on a Quantum Computer,* 114 Phys. Rev. Letters 110504 (2015); *see also* Maria Schuld et al., *An Introduction to Quantum Machine Learning*, 56 Contemp. Phys. 172 (2015); *see also* Maria Schuldet al., *Prediction by linear regression on a quantum computer,* 94 Phys. Rev. A 022342 (2016); *see also* Jacob Biamonte et al., *Quantum machine learning*, 549 Nature 195 (2017).

[61] *See, e.g.*, McKinsey Digital Report, *supra* note 18; *see also* Kristan Lemme et al., *Quantum Metropolis Sampling,* 471 Nature 87 (2011).

classical nor quantum computers are capable of taking into account prevailing circumstances. Subsequently, the neglection of the human factor can unintended result in unwanted actions and outcomes.

Since financial tools are always products of human design, we cannot expect pure neutrality or objectivity, but we should rather be aware of some level of bias. In the worst case scenario, unwanted bias incurs discriminatory tools, which instead generate unjust and discriminatory practices. In order to against the undesirable incidents and practices, technological tools affecting lives of individuals should be designed within a framework of non-discrimination and equality, keeping human-centricity at their core.[62] Furthermore, it is essential to pay attention to compliance. To build a just and equal society, lawyers and legislators have a focal role in evaluating the validity and soundness of tools working at the intersection of law and technological designs. Besides descriptive views, there is a pressing need for a normative assessment that is carried out from a legal angle.

Legal and financial sectors should also pay careful attention to the fact that quantum computing will also raise concerns on security and banking money transfers. Cybersecurity widely relies on the Rivest-Sharim-Adleman (RSA) standards[63]. However, these encryption protocols will become more insecure when quantum computers scale up in the future[64]. Besides the finance and banking sector, this development is of significant importance throughout the whole society, particular as regards classified and sensitive defense[65] and security information of nation states.

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[62] There are various cases from the USA where for instance personal loan quotas were regarded discriminatory as they were based on AI collected and estimated forecast information on prospective client's financial creditability. People were receiving different kinds of quotes just based on where they were living - setting aside more important and decisive factors. These practices were condemned discriminatory. For further examples on credit scoring challenges: *See* Francesco Bova, Avi Goldfarb, & Roger G. Melko, *Commercial Applications of Quantum Computing*, 8 EPJ Quantum Technol. 2, 2-15 (2021).

[63] *See* Francesco Bova, Avi Goldfarb, & Roger G. Melko, *Commercial Applications of Quantum Computing*, 8 EPJ Quantum Technol., 2 8 (2021).

[64] Id.

[65] *See* Chris Jay Hoofnagle & Simon L. Garfinkel, *Law and Policy for the Quantum Age,* Cambridge: Cambridge University, 21, 31 (2022).

While quantum computers may not be able to crack conventional encryption protocols right now, many cybersecurity and risk managers should evaluate their options now.[66] In the end, there are only two post-quantum cryptography strategies.[67] The first possibility is to replace the breakable encryption standards with quantum-safe protocols in a way that encrypted data is inaccessible to anyone outside of the intended recipients, even with the help of a quantum computer.[68] The second option is to fight quantum with quantum. In other words, we will resort to the quantum cryptography tools, which exploit the principles of quantum mechanics to secure our data.[69]

Within new emerging technologies, it is always important to be aware of prospective safety challenges and the impacts of unwanted incidents - to be prepared for the likelihood that they will realize. Unraveling sensitive, classified information such as military plans, international crime reports or documents on counterintelligence can cause unwanted international conflicts. For instance, the United States declared in 2018 the Quantum Initiative Act,[70] in response to the power competition between the United States and China covering also cybersecurity.[71] In the international arena, the cybersecurity matters were shed light when the World Economic Forum commented: "*Quantum computing could make today's cybersecurity obsolete"*.[72] Simultaneously,

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[66] *See*National Institute of Standards and Technology (NIST), *Status Report on the Second Round of the NIST Post-Quantum Cryptography Standardization Process*, 5 *(NISTIR 8309)*.

[67] David Joseph et al., *Transitioning Organizations to Post-Quantum Cryptography*, 605 Nature 237, 238 (2022);Daniel J. Bernstein & Tanja Lange, *Post-Quantum Cryptography,* 549 Nature 549**,** 188, 189 (2017); Vasileios Mavroeidis et al., *The Impact of Quantum Computing on Present Cryptography*, 3 Int. J. Adv. Comput. Sci. Appl. 3, 405 (2018).

[68] *See,* Daniel J. Bernstein, Johannes Buchmann, & Erik Dahmen, Post-Quantum Cryptography, 2 Springer Science & Business Media, 2009.

[69] *See* Nicolas Gisin et al., *Quantum Cryptography*, 74 Rev. Mod. Phys. 145, 146 (2002); Feihu Xu et al., *Secure Quantum Key Distribution With Realistic Devices*, 92 Rev. Mod. Phys. 92, 94 (2020); Anne Broadbent & Christian Schaffner, *Quantum Cryptography Beyond Quantum Key Distribution*, 78 Des. Codes Cryptogr., 351–353 (2016).

[70] The USA National Quantum Initiative Act, H.R. 6227, 115th Congress (2018)

[71] Elsa B. Kania & John Costello, *Quantum Hegemony? China's Ambitions and the Challenge to U.S. Innovation Leadership,* (September 12, 2018), https://www.cnas.org/publications/reports/quantum-hegemony [https://perma.cc/JR3D-6V5A]; Elsa B. Kania, *China's Quantum Future: Xi's Quest to Build a High-Tech Superpower*, Foreign Affairs,(September 26, 2018), https://www.foreignaffairs.com/articles/china/2018-09-26/chinas-quantum-future, [https://perma.cc/DQT7-5KBF]; Francesco Bova, Avi Goldfarb, & Roger G. Melko, *Commercial Applications of Quantum Computing*, 8 EPJ Quantum Technol., 4 (2021).

[72] Paige H. Adams, *Why Quantum Computing Could Make Today's Cybersecurity Obsolete*, World Economic Forum, (July 26, 2019), https://www.weforum.org/agenda/2019/07/why-quantum-computing-could-make-todays-cybersecurity-obsolete/.

the first guidelines on quantum computing were published - *the Quantum Computing Governance Principles*[73] - outlining nine themes that define the division of these principles. (Figure 4).[74]

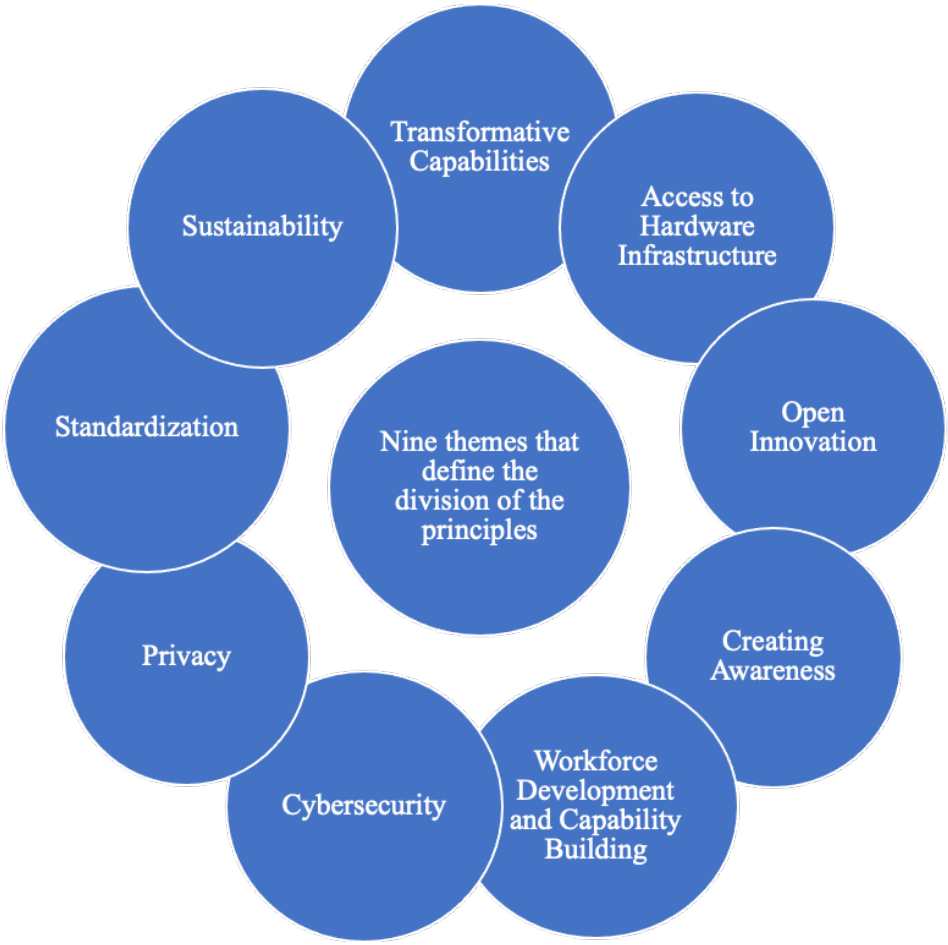

Figure 4. World Economic Forum: Nine themes

In addition to strategic plans, IPR portfolios, or trade secrets, organizations and corporations may need to adapt to a world wide legal environment, with regulations such as the *European General Data Protection Regulation*[75] (hereafter GDPR) that obligating operators to factor in the regulation while utilizing or collecting data related to people in the European Union. Notably, if processing personal data of EU residents or citizens, or offering services or goods to such people, the GDPR

[73] World Economic Forum, Quantum Computing Governance Principles, Report (January 2022), https://www3.weforum.org/docs/WEF_Quantum_Computing_2022.pdf.

[74] World Economic Forum, Quantum Computing Ethics, https://www.weforum.org/projects/quantum-computing-ethics/; World Economic Forum, Quantum Computing Governance Principles, Report (January 2022)https://www3.weforum.org/docs/WEF_Quantum_Computing_2022.pdf.

[75] GDPR, Complete Guide to GDPR Compliance (2025), https://gdpr.eu

is applicable regardless of whether the company is located in the EU or not[76], We want to emphasize that the GDPR applies in the post-quantum cybersecurity environment. Operators must take the necessary precaution and anticipatory measures to factor in the cyber risk that quantum computing imposes. Not obeying the regulation may become costly both for small and large businesses, as disobedience is grounds for largefines.[77] Besides the prospective fines, classified, sensitive information leakage will naturally also smear the image of the operator, and thereby have an effect on the future business.

Overall, accessibility to quantum resources will be a pivotal question in the future society. The race for quantum technologies is likely also driven by biased incentives, not just by altruism for the sake of advancing humankind. For instance, revealing the possession of a functional quantum computer may not be in everyone's best interest, particularly when sovereign and commercial interests are at stake. These biased incentives should be taken into account when creating the future legal framework, and when taking precaution through anticipatory protocols. From the ethical standpoint, equal access and openness could for some extend help to impede, or at least restrict, the first operators from dominating the field. One concrete future solution could be a cloud-based service enabling researchers and companies to fully tap into the benefits of quantum computers at the qual footing. This cloud-based quantum computing could be either provided by a commercial actor or organized by government authorities. In fact, the current giants of the commercial quantum computer field, such as IBM, Google, Microsoft and Amazon, are on pace to establish their quantum clouds, thus allowing the quantum computing experience to reach a broader audience.[78]

With quantum technologies maturing rapidly, it remains tol be seen whether the current incentives are enough for operators to take precautionary measures, or if a governmental nudge is

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[76] GDPR, The scope of the GDPR (2025), https://gdpr.eu/what-is-gdpr/.

[77] GDPR,The GDPR fines(2025), https://gdpr.eu/article-83-conditions-for-imposing-administrative-fines/. See, for instance,relevant articles 5(1)f and 32 of the Regulation.

[78] *See for instance*, Davide Castelvecchi, *IBM's quantum cloud computer goes commercial*, 543 NATURE 543, 159 (2017);
Evan R. MacQuarrie et al., *The emerging commercial landscape of quantum computing*, NAT. REV. PHYS. 2**,** 596–598 (2020); Masoud Mohseni et al., *Commercialize quantum technologies in five years*, 543 NATURE 543**,** 171–174 (2017); Frederic T. Chong et al., *Programming languages and compiler design for realistic quantum hardware*, 549 NATURE 549**,** 180–187 (2017).

required to motivate them to take action. However, by reflecting on the past, it seems that a major incident often needs to occur before appropriate measures are set in place.

I. LEGAL DESIGN FRAMEWORK FOR QUANTUM TECHNOLOGY

As our society ushers into the new era of quantum technologies, the legal field will also undergo its own quantum leap. The fundamental idea behind legal design is to apply a user-centered approach to judicial information, services, products, and processes in order to design them to be more comprehensible.[79] The legal design approach aims to generate a systemic impact via empowering people with law: in supporting equality, in creating and building value increasing tools and products, in decreasing knowledge and information asymmetry in society, and in enabling better access to law and legal information. Within this approach, people are empowered by employing means, such as, design methods, interdisciplinary best practices, and technology.
Legal design operates at least in four prominent ways, namely, in empowering, improving, supporting, and demonstrating. It builds on the design thinking process in reaching these functions.[80] The design thinking process determines the challenges and then executes solutions that take end-user needs into account. These needs are at the essence of solutions and concept development. The design thinking process centers on understanding, thinking, need-finding, creating, and doing.[81] (Figure 5.)

Figure 5. The Legal Design Approach: Some Prominent Functions

Empowers	People, communities, entities, and societie to decrease, or at the best, even fully abolish knowledge and information asymmetry between parties.

[79] Katri Nousiainen, *Legal Design in Commercial Contracting and Business Sustainability – New Quality Metrics Standards*, 6 J. Strategic Cont. And Negot. 137, 148 (2022).
[80] Katri Nousiainen, What Have I Signed? Do I Really Understand the Contract?, 12 CONTRACTING EXCELLENCE JOURNAL (2020).
[81] Stanford University, Design Thinking Process (2012), https://web.stanford.edu/class/me113/d_thinking.html. Note: there exist also various paths as regards the number and content of the design thinking process stages.

Improves	Quality, efficiency, and ethics whenever the practice and/or design employs a more user-centered approach.
Support	Gathered empirical data can be employed to support ethics and efficiency in policy and decision making.
Demonstrates	Law and economics is not just a theoretical science of neoclassical economics- but rather that it employs empirical research to offer numerical data to verify prospective impact and value of a certain legal process, service, or product..

Legal design can contribute to the quantum leap of society by creating systemic impact on the legal framework. Legal rules can be defined in a program since they are logical within their structure.[82] A computable contract lays out the obligations and rights in machine-executable code. It provides for a computable specification for the contract terms and clauses. Contracting can gain from contractual modularity[83], enabling more feasible customization and modifying of contracts.[84] Nevertheless, further technological advancement and development is needed for a prosperous application of quantum computing to law.[85] Human-language contracts have to be translated into a machine-readable form - currently this creates a bottleneck - thus, there is a demand to establish a standard contract language. As a return, computable contracts can provide incentives and benefits such as increasing process efficiency, improving trust and transparency, enabling more strategic decision making, and decreasing information asymmetry.

[82] Michael R. Genesereth, *Contract Definition Language*, Complaw Corner, Codex: The Stanford Center for Legal Informatics (April 7, 2021), https://law.stanford.edu/2021/04/07/contract-definition-language/. *Note*: Definitions of incidents are described employing a set of if-else rules that state divergent incidents, with consequences for those incidents. Employing coded contracts is expected to bring saving in transaction costs.

[83] Spencer Williams, Contracts as Systems, 45 DEL. J. CORP. L. 274 (2021).; George Triantis, *Improving contract quality: modularity, technology, and innovation in contract design*, Stanf J Law Bus Fin 18(2):177–214 (2013).; Henrik Smith, *Modularity in contracts: boilerplate and information flow*, Mich Law Rev 104:1175–1222 (2006).

[84] *See* Katri Nousiainen, *The Application of Legal Design to Complex System Theory on Commercial Contracting within Law and Economics Framework*, 25th International Legal Informatics Symposium (Febuary 22-23, 2022), https://iris-conferences.eu/iris22_23-26feb22[https://perma.cc/Q8RB-H5VG].

[85] *See* Jeffery Atik & Valentin Jeutner, *Quantum computing and computational law,* 13:2 LAW, INNOVATION AND TECHNOLOGY 302, 311 (2021).

For the legal profession, quantum-enhanced AI has a potential to substantially improve the quality and efficiency of litigation and contracting practice. As regards, for instance, case law - that builds on precedence - quantum computing AI can be put to use to categorize, to track patterns, benefit process development, and to forecast court or other judicial solutions and results. Moreover, in the contracting framework, the quantum algorithms can be applied to track practices, processes, and the development of patterns helpful in foreseeing legal opportunities and risks, and therefore widely improving the contracting quality and especially transparency. At the same time, quantum technologies can save on transaction costs. Furthermore, contracting management can be made use of as a risk management tool, but the legal solutions, categories, and patterns should always be evaluated with human consideration in a larger framework. In general, the quantum advance for the legal profession is the boosted legal process and contract optimization, and the ability to efficiently process enormous data sets, paving a shortened pathway to transparent legal resolutions.

Adopted from the economic path dependency theories[86] knowledge is widespread in society, and the learning process is regarded as gradual. We experience the same standing with quantum technologies, thus we have a chance to learn from the past, and build on knowledge that we currently possess. It is costly to acquire new information, yet information is regarded as a necessity for innovation, development and competition.[87]

Design methods must be employed in the combined field of machine learning, quantum computing, and computable contracts to safeguard human-centricity. The legal design approach helps to build design systems and data sets from which ethically sound machine learning can be conducted. The proposed approach builds on interdisciplinary best practices, user-centric design, increased comprehensibility, and the fostering of ethical values. In consequence, the employment of legally designed language can provide for comprehensible and non-discriminating user-centric tools.[88] Hence, we can build legally designed data sets and design systems for training quantum

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[86] *See generally* FREDERIK HAYEK, NEW STUDIES IN PHILOSOPHY, POLITICS, ECONOMICS AND THE HISTORY OF IDEAS (1978).
[87] *See* Katri Nousiainen, *General theory of legal design in law and economics framework of commercial contracting*, JOURNAL OF STRATEGIC CONTRACTING AND NEGOTIATION, 247, 248 (2022).
[88] *See* Katri Nousiainen, *General theory of legal design in law and economics framework of commercial contracting*, JOURNAL OF STRATEGIC CONTRACTING AND NEGOTIATION, 247, 248 (2022).

computers to bring transparency and clarity, to safeguard a more ethical, non-discriminating and more user-centric approach to law. Under the complex systems theory on legal design[89], *where the sum of the contract terms is bigger than its parts*, the system will take the environment into account and guide the quantum data design to be - not as a static - but a dynamic system with no closures and designed in a way that it takes ethical standing and user-centricity in its core.[90] Notwithstanding, there exists a possibility of bias in human-designed data analysis tools.[91] This may lead, although often unintentionally, to unequal or even discriminatory practices. Yet, the legal profession can benefit from quantum computing in providing for better legal certainty, legal quality, and accessibility to law.

I. SECURITY & DEFENSE: GAME THEORETICAL APPROACH TO SOME QUANTUM APPLICATIONS

Security and defense field is closely entangled with safe storage and transfers of information, which will be reformed within the emergence of quantum technologies. In order to ensure worldwide peace and security, there will most likely be a demand for a novel legal rule and surveillance framework in the intergovernmental and international arena in certain research areas of quantum computing.[92] The employment and possession of new technologies create possibilities but also bring responsibilities. A significant part of decision-making power is frequently vested and exercised by public authorities. Further, there are questions of a deeper functional cooperation

[89] *See* Katri Nousiainen, *The Application of Legal Design to Complex System Theory on Commercial Contracting within Law and Economics Framework*, 25th International Legal Informatics Symposium (Febuary 22-23, 2022), https://iris-conferences.eu/iris22_23-26feb22[https://perma.cc/Q8RB-H5VG].

[90] *See* Katri Nousiainen, *The Application of Legal Design to Complex System Theory on Commercial Contracting within Law and Economics Framework*, 25th International Legal Informatics Symposium (Febuary 22-23, 2022), https://iris-conferences.eu/iris22_23-26feb22[https://perma.cc/Q8RB-H5VG].

[91] *See* Jeutner, Valentin, *The Quantum Imperative: Addressing the Legal Dimension of Quantum Computers*, 1(1) Morals & Machines 52, 52 (2021).

[92] *See* Chris. Jay Hoofnagle & Simon L. Garfinkel, LAW AND POLICY FOR THE QUANTUM AGE2022); Michal Krelina, *Quantum Technology for Military Applications*, 8:24 EPJ Quantum Technol. 1, 2 (2021).

and agreed regulatory framework among countries[93] to impede abusing technologies, such as applying it for means to produce munitions.[94]

A resolution could be to find a legal cooperative framework for "Mandatory Reporting and Supervision" to insure international security and peace through collaboration. This could be executed, for instance, as a form of a Union of Sovereign States or as a Security Body -engaging to the same goals and means.[95] The accomplishment of the objectives and the operations should be overseen equally by the coalition member states, and the decision-making power should not be concentrated. Ideally, these members should extensively represent sovereign states of the world, and not only a few powerful ones. The more equal representation would leave room for actions to be taken with less historic and political burden.

The suggested approach is quite opposite to the current representation of the United Nations Security Council, where the most powerful members are the permanent members, namely, the War winning countries.[96] The political impact and historical burden have often caused the United Nations Security Council to seem to be toothless in taking necessary and proper actions as well as measures to respond to threats on international peace and security.[97] Frequently the mere *condemnation* is an inappropriate and insufficient way to respond, or even try to resolve, incidents that are taking place in international relations.[98]

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[93] *See e.g.NATO's Defense Innovation Accelerator for the North Atlantic (DIANA)*, MINISTRY OF FOREIGN AFFAIRS DENMARK, https://investindk.com/insights/new-danish-nato-center-for-quantum-technology[https://perma.cc/2MES-LFDT].

[94] *See* Chris. Jay Hoofnagle & Simon L. Garfinkel, LAW AND POLICY FOR THE QUANTUM AGE, (2022).; See further on quantum technology for military applications, Michal Krelina, *Quantum Technology for Military Applications*, 8:24 EPJ QUANTUM TECHNOL. 1, 2(2021).

[95] *Note*: We could learn from the past intergovernmental legal collaborative regulations/conventions, e.g., from the market for carbon emissions, to create a functional international framework for quantum computing operations.

[96] *See Security Council: Current Members, UNITED NATIONS*https://www.un.org/securitycouncil/content/current-members [https://perma.cc/L98B-MXGW].

[97] *See* Charles Chidi Eleonu & Sharon Ebikebina, *The United Nations Voting Result of December 21, 2017: How the United Nations is not Toothless*, 3:10 INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE 614, 6152019).; National edition with the headline: *THE WORLD: Cheer at the U.N.; Rare Unity Brings Smile to a 'Toothless Tiger*, Section 4, 2, The NewYork Times (1987), https://www.nytimes.com/1987/09/20/weekinreview/the-world-cheer-at-the-un-rare-unity-brings-smile-to-a-toothless-tiger.html.; World, *UNSC agrees first time on statement on Ukraine, but it's toothless*, National Herald India 7 May (2022), https://www.nationalheraldindia.com/world/unsc-agrees-first-time-on-statement-on-ukraine-but-its-toothless.

[98] *See* Andrew J. Carswell, *Unblocking the UN Security Council: The Uniting for Peace Resolution*, 18 JOURNAL OF CONFLICT AND SECURITY LAW, 453, 473 (2013) (showing more on critics around the current state of Security

We can learn from the past to safeguard for the future security and peace (Figure 6.). According to economic theory, it is often in the best interest of the operators to collaborate.[99] The lack of collaboration can in some incidents lead to extremely unwanted situations. This is also the case with quantum technologies when they are employed within illegal warfare or other unwanted activities that can harm people. Unfortunately, technologies can be employed for good and evil. This raises the need for efficient precautionary measures and anticipatory protocols as well as effective legal framework to surveillance the practice in the international arena. Without transparent international collaboration, mutually obeyed, and efficiently surveilled legal regulation - for instance when the stakes are extremely high - this can lead into the worst case scenario, a full-scale mutual destruction between nation states. Thus, it can be embraced from the game theory that it is best to collaborate when a full-scale world destruction is a possible incident, even when only pursuing one's rational self-interest. It is not in any state's best interest to become destroyed - or worse the whole world to become annihilated- thus, collaboration would be the primary self-interests tactic.[100] The current and former challenges as well as obstacles with supervisory bodies and international organizations should be converted into knowledge in order to employ appropriate precautionary and anticipatory practices.[101]

Figure 6. Lack of cooperation can incur detrimental situations[102]

Interdisciplinary and international cooperation is anticipated to be the key here as the lack of collaboration can incur detrimental situations and risks such as:

Counsel for securing international peace and security and how we can learn from the past); United Nations, Press Release, Security Council, *Security Council Must Reflect Twenty-First Century Realities, Delegates Tell General Assembly, with Many Calling for Urgent Expansion of Permanent Seats,*U.N. Press Release GA/12288 (Sept. 2, 2020), https://press.un.org/en/2020/ga12288.doc.htm [https://perma.cc/79UH-SZ8L].

[99] *See* Katri Nousiainen, *General theory of legal design in law and economics framework of commercial contracting*, 5 JOURNAL OF STRATEGIC CONTRACTING AND NEGOTIATION, 247, 253 (2022).

[100] Note:*We acknowledge, the development destroying and harmful practices/incidents may also realize gradually and not just with one single incident, for instance this could be the case with bio-and chemical applications.*

[101] *See* United Nations Security Council, https://www.un.org/securitycouncil/ [https://perma.cc/LU97-XJNS].

[102] *See Quantum Computing Governance,* WORLD ECONOMIC FORUM, https://www.weforum.org/projects/quantum-computing-ethics/;.World Economic Forum, *Quantum Computing Governance Principles Insight Report* (2022), https://www3.weforum.org/docs/WEF_Quantum_Computing_2022.pdf. [https://perma.cc/JS6H-3B6S].; Michal Krelina, *Quantum Technology for Military Applications*, 8 EPJ QUANTUM TECHNOL., 24, 45 (2021).

Disproportionate concentration of power.[103]	Lack of clarity, transparency, and shared understanding of technological progress.[104]	Challenges and obstacles (intentional and unintentional) in accessing new technologies. [105]	Social good aspects of new technological applications are being ignored or set aside to a large extent.[106]	Development of harmful or dangerous applications [107]

Adopted from the economic theories on path dependency,[108] knowledge in society is widespread, and we learn gradually. We encounter the same learning dilemma with the rise of quantum technologies. We have a possibility to learn from the past and to build upon what is currently known. It is regarded as costly to acquire new information. However, obtaining new knowledge is simultaneously seen as a necessary condition for innovation, progress, and business competition.[109]

In this context as well, ethical aspects, human-centricity, and inclusion play crucial roles in the employment and regulation of quantum technologies. We argue that by ensuring a more equal access to these resources one helps to foster international peace and anticipate better threats to peace and security in the international arena, when the access and power is not just at the hands of a few selected operators. Here we recognize an urge for balancing the right of inclusion with safeguarding for higher security aspects that are present in the international arena. These could

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[103] *See on the current organization* of The United Nations Security Council, https://www.un.org/securitycouncil/.

[104] *Note:* Inequalities between states/their citizens/international players call for transnational- governmental collaboration.

[105] *Note:*We should try to safeguard the access to knowledge/power for all, and not just for the few (West and the rich).

[106] Priority calls, for instance, for health, manufacturing, and green values. *See also Sustainable Development Goals*, UNITED NATIONS, https://www.un.org/sustainabledevelopment/sustainable-development-goals/ [https://perma.cc/627H-BD9J].

[107] Unwanted consequences or risks - for instance, warfare and illegal use.

[108] *See, e.g.*, F. A. HAYEK, NEW STUDIES IN PHILOSOPHY, POLITICS, ECONOMICS AND THE HISTORY OF IDEAS (1978).

[109] *See* Katri Nousiainen, *General theory of legal design in law and economics framework of commercial contracting*, 5 JOURNAL OF STRATEGIC CONTRACTING AND NEGOTIATION 247, 251-53 (2022).

include, for instance, threats of non-state actors reaching for their self-interested goals, or other activities that might threaten democracy, world safety, and peace in general. Despite this phenomenon, we see that inclusion can support transparent and mutual goals achieving discussion in the international arena. Our standing is also supported by the ethical standing to reduce the gap between the West and the rest. Without any doubt, quantum technologies will have a systemic social impact. Therefore it will be pivotal to recognize the best characters so that the flourishing new technology will maximally benefit the whole mankind.

I. Policy Making in International Commerce

As addressed in the earlier sections, the ongoing emergence of quantum technologies will have a significant systemic impact on law, economics, and society. It will have disruptive effects on societal and legal development, division of power as well as on international relations in general, if not needed precautionary steps are taken to guide regulatory actions with appropriate principles. For this purpose, we put forward a novel proposal of *The Quantum Roadmap - Law, Economics, Sustainability, and Society.* Our suggested guideline highlights five underlying principles for the social embodiment of quantum technologies:

i) **Ethics:** *The development or employment of new technologies should not create or aggravate inequalities, neither it should create different level of standing through its design nor should it leave room for hidden discriminatory practices. Primary calls for the benefit of humankind should be recognized together with commercial incentives. Equal access, public good, and transparency are the guiding principles.*

ii) **Inclusion:** *The development or employment of new technologies should be inclusive and provide benefits to be utilized for the good of the whole mankind. Democratic involvement, the sharing of knowledge and resources are the guiding principles.*

iii) **Balancing regulatory activities:** *The development or employment of new technologies should not be hindered by regulatory measures. Balancing legal development, legal rights and obligations, public good, and incentives to innovate as well as to safeguard a fertile soil to develop technologies further are the guiding principles.*

iv) **Safeguarding individual rights:** *The development or employment of new technologies should not interfere with recognized individual rights, exclude individual access without good cause, create or aggravate inequalities between individuals, interfere on individual autonomy, create barriers to justice or other recognized democratic principles. Safeguarding equal standing, non-interference on individual rights, and safeguarding for taking larger frameworks into account when making justified decisions affecting individual's rights and obligations are the guiding principles.*

v) **Innovating by design:** *The development or employment of new technologies should be designed in accordance with equality, transparency, ethics, and human-centricity. Providing an equal access to technology, designing technologies to foster non-discriminatory practices, transparency, and sustainability.*

Desirably the principles above would be grounded in the future legal regulation. In the end, equally forceable and effective, as stability, predictability, and transparency are the mainstay for functional and respectful international relations.

National and international legal frameworks should come together and establish a common road-map, international level ground rules, to achieve commonly agreed goals and restrictions for new technologies. To be effective, the prospective international set of common guidelines must be legally binding, be surveillanced by the participating states, and have clear sanction measures to prevent disobeying. The international agreement on common guidelines could be preceded by national roadmaps, such as the US and EU versions.

We want to point out that there is a pressing demand for a regulatory framework for the employment of quantum technologies in the society-wide context. The current frameworks are not sufficient to cover quantum technologies. For instance, the voluntary export controls on conventional arms and dual-use and technologies (hereafter, the Wassenaar Arrangement)[110] is not legally binding, and only affects the export of quantum technologies - but not the employment of

[110] *See Wassenaar Arrangement*, NUCLEAR THREAT INITIATIVE, https://www.nti.org/education-center/treaties-and-regimes/wassenaar-arrangement/; *The Wassenaar Arrangement at a Glance,* ARMS CONTROL ASS'N, https://www.armscontrol.org/factsheets/wassenaar [https://perma.cc/28AJ-MJYB]; *Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies*, U.S. DEP'T OF STATE: ARCHIVE, https://1997-2001.state.gov/global/arms/np/mtcr/000322_wassenaar.html [https://perma.cc/NX5S-R297].

the technology. However, it is under debate whether the current Wassenaar Arrangement should be extended to also cover quantum technologies. Nonetheless, an international arena must work together to establish a functional regulatory framework to safeguard proper incentives to innovate, while being able to assure international peace and security at the same time. It is of the utmost importance to find the regulatory balance, ensuring the functionality of society while not smothering the progress and further development.

In fact, some countries have already taken export restriction actions at their national level as regards quantum technologies. These actions have been realized in the form of export controls. It is even expected that we will witness the USA and China technology war in the future.[111] For example, the United States has included some quantum technologies to the list of goods whose export is being restricted.[112] At the end of 2018, the Commerce Department's Bureau of Industry and Security announced that certain quantum technologies, such as quantum computing, sensing, and encryption, should be added to a list of blocked U.S exports due to their dual-usage character. [113]The dual-usage term refers to the aspect that technology can be employed for both military and in the commercial sphere. There is surely a call for a more extensive and legally binding regulatory framework to address quantum technologies and their export restrictions. However, we must ensure that regulations and export restrictions will not hinder the development of new technologies[114] or cause excessive barriers for its financing, other investments, or slow down scientific dialogues. Further we must ensure that the existing legislation, both national and international, is obeyed. Most importantly, it should be understood that the rise of technologies

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[111] Noah Barkin, *Export Controls and the US-China Tech War,* MERCATOR INSTITUTE FOR CHINA STUDIES (Mar. 18, 2020), https://tendenzblick.net/wp-content/uploads/2020/08/merics_ChinaMonitor_US-CH-EU-Export-Controls_en_final.pdf [https://perma.cc/N8G7-QSHU].

[112] Implementation of Certain New Controls on Emerging Technologies Agreed at Wassenaar Arrangement 2019 Plenary, 85 FR 62583 (Oct. 5, 2020) (to be codified at 15 C.F.R. pts. 740, 772, 774).

[113]Review of Controls for Certain Emerging Technologies, 83 Fed. Reg. 58201 (Nov. 19, 2018) (to be codified at 15 C.F.R. pt. 744). Commerce and Defense both are part of the Treasury's Committee on Foreign Investment in the United States (CFIUS), which makes decisions related to export-control. *See CFIUS Overview*, U.S. DEP'T OF THE TREASURY, https://home.treasury.gov/policy-issues/international/the-committee-on-foreign-investment-in-the-united-states-cfius/cfius-overview [https://perma.cc/AQ5C-WWF4]. *See also* BUREAU OF INDUST. AND SEC., U.S. DEP'T OF COM., 0694-AH75, EXPORT CONTROLS FOR QUANTUM COMPUTERS (2021).

[114] On current technological development, *see also* EDWARD PARKER, DANIEL GONZALES, AJAY K. KOCHHAR, SYDNEY LITTERER, KATHRYN O'CONNOR, JON SCHMID, KELLER SCHOLL, RICHARD SILBERGLITT, JOAN CHANG, CHRISTOPHER A. EUSEBI & SCOTT W. HAROLD, RAND CORP., AN ASSESSMENT OF THE U.S. AND CHINESE INDUSTRIAL BASES IN QUANTUM TECHNOLOGY (2022), https://www.rand.org/pubs/research_reports/RRA869-1.html (although China is leading on quantum communications, the USA and EU are ahead on quantum sensing) [https://perma.cc/75MV-KZG7].

brings forward technical complexities which must be converted in the existing or coming legal contexts.

States should be prudent to set the goals they aim to achieve through export restrictions. We acknowledge that export also offers great opportunities to collaborate[115] and learn from each other, and it also provides transparency in the development of new technologies. Like with the usage of technology, export policy has also dual-character: it can be channeled for good and evil. As the quantum technologies get commercialized, it is a linchpin to find the right balance to safeguard security and peace, as well as to improve technological development. However, deciding the right kind of regulatory environment is like drawing a line in water.

CONCLUSION

The anticipated quantum technologies are already upon us. In the first section, we briefly presented the key concepts behind a quantum computer. In quantum computing, we store data and perform computational tasks on a computer explicitly working according to the rules of quantum mechanics. Although any computational problem solvable with a classical computer can also be solved by a quantum computer, there are some situations where a quantum computer outshines its classical counterparts spectacularly. There are – at least – two areas which would benefit from quantum-enchantment. First, a quantum computer offers an ultimate platform to analyze the

[115] For examples of intergovernmental friendly agreements and research partnerships on quantum technologies, *see* OFF. OF THE SPOKESPERSON, U.S. DEP'T OF STATE, JOINT STATEMENT OF THE UNITED STATES AND FINLAND ON COOPERATION IN QUANTUM INFORMATION SCIENCE AND TECHNOLOGY (2022), https://2021-2025.state.gov/joint-statement-of-the-united-states-and-finland-on-cooperation-in-quantum-information-science-and-technology/ [https://perma.cc/2TPD-QA4Q]; *The United States and Australia Partner to Build Quantum Future*, NAT'L QUANTUM INITIATIVE (Nov. 18, 2021), https://www.quantum.gov/the-united-states-and-australia-partner-to-build-quantum-future/ [https://perma.cc/85R2-2J6K]; *The United States and Sweden Sign Quantum Cooperation Statement*, NAT'L QUANTUM INITIATIVE (Apr. 11, 2022), https://www.quantum.gov/the-united-states-and-sweden-sign-quantum-cooperation-statement/ [https://perma.cc/PXM2-74D5]; OFF. OF SCIENCE AND TECH. POL'Y, THE WHITE HOUSE, THE UNITED STATES AND UNITED KINGDOM ISSUE JOINT STATEMENT TO ENHANCE COOPERATION ON QUANTUM INFORMATION SCIENCE AND TECHNOLOGY (2021), https://bidenwhitehouse.archives.gov/ostp/news-updates/2021/11/04/the-united-states-and-united-kingdom-issue-joint-statement-to-enhance-cooperation-on-quantum-information-science-and-technology/ [https://perma.cc/YQ5K-56H5]; *New joint statement between UK and US to strengthen quantum collaboration*, GOV.UK: PRESS RELEASE (Nov. 4, 2021), https://www.gov.uk/government/news/new-joint-statement-between-uk-and-us-to-strengthen-quantum-collaboration [https://perma.cc/ES69-4MCP].

behavior of various physical systems thus yielding new horizons to science. Second, quantum computing excels in problems requiring to go over a myriad of possible combinations in order to figure out the solution, which can expedite the evolution of data science. Overall, the quantum boost will have far-reaching consequences for society.

As we are taking first steps into the new quantum era, the whole legal sphere with governmental institutes and commercial operators should reflect upon the legal and social significance of quantum computing. For this purpose, in the second section, we have introduced a novel approach on quantum computing to law. Although it might initially seem odd to present quantum computing in the legal arena, the chapter brought worthy applications and implications relevant to law, economics, sustainability, and society. The section proceeded discussing incentives and benefits to take advantage of quantum computing in various settings in society.

The upcoming new quantum era requires a new legal environment. Therefore, in the third section, we will address the legal design framework for quantum technology. The section ended with introducing quantum computing in the legal design framework and provided aspects for further research in the area. For the authors' knowledge, there has not been academic discussion on how to foster better quality legal services with legal design in the quantum computing context. This shortcoming is further enhanced by the lack of a greater accessibility of information - such as within case law patterns, prospective decisions, or optimization - that build on quantum application in legal regime. Thus, this chapter fills in the gap by providing a direction for further discussions. Here it is emphasized that the legal design approach should be applied in quantum computing context to make law and legal practice more transparent, human-centric, efficient, and comprehensible as well as to foster better quality and the values of non-discrimination. Nonetheless, further research is required to demonstrate and to support the expectations on benefits derived from this approach on contracts and legal practice in the quantum computing field.

The evolution of quantum technologies is fueled by a diverse range of motives, not just intellect curiosity or altruistic desires. In the fourth section, we introduced a novel approach to quantum computing within the law and economic framework with a twist of game theory. We discussed power concentration in international relations and how collaboration and transparency are crucial in tackling prospective challenges with new technologies. We further proposed a legally forceable

collaborative framework for “Mandatory Reporting and Supervision” to ensure international peace and security. The proposition further suggested to form a Union of Sovereign States or as a Security Body that would engage to the same goals and means. The accomplishment of the objectives and the operations was proposed to be overseen equally by coalition member states, and the decision-making power should be dispersed. Ideally, in our proposition, these members should extensively represent sovereign states of the world. We claimed that the more equal representation could leave room for actions to be taken with less historic and political burden.

We acknowledged that the employment and possession of new technologies create possibilities but also bring responsibilities. We further discussed questions of a deeper functional cooperation and agreed regulatory framework among countries to impede abusing technologies, such as applying it for means to produce munitions. We concluded that even game-theoretically the best option is to collaborate when stakes are extremely high.

Currently the new quantum technologies are at the early stage of commercialization, but at an increasing pace. Nevertheless, we do not expect that quantum innovations will cause a sudden market disruption. Instead, the quantum leap will be a natural market evolution process during which quantum techs become a part of our society. To address the quantification of society, in the fifth, and last section of the chapter, we discussed policy making in international commerce, including export controls and the balancing of interests and incentives. We covered recent trends in regulation and export controls in the US and then we discussed some of the pros and cons of restrictive practices. Furthermore, we presented a novel proposal of *The Quantum Roadmap - Law, Economics, Sustainability and Society* (LESS is more!). Our suggested guideline highlighted five underlying principles for the social embodiment of quantum technologies: *ethics*, *inclusion*, *balancing regulatory activities*, *safeguarding individual rights*, and *innovating by design*. We discussed every principle in detail.

Undoubtedly, quantum technologies will have a systemic social impact. Therefore it will be pivotal to recognize the best characters so that the flourishing new technology will maximally benefit the whole mankind. We underline that it is of the utmost importance to find the regulatory balance,

ensuring the functionality of society while not smothering the evolution and integration of quantum technologies.

Exposing the Wizard of Oz: Transparency and testing of artificial intelligence systems

Henry H. Perritt, Jr.[1]

Abstract

The press and media, elected officials, some high-tech entrepreneurs, and a new breed of "ethicists" are calling loudly for governments to regulate artificial intelligence ("AI"), especially generative AI, popularized by Chat GPT and Google Gemini. Much of the clamor is ill informed about the technology and based on exaggerated concerns about its risks. Nevertheless the pressure for regulation is real and is already evoking governmental responses. Transparency requirements are far better than command-and-control regulation. The technology is far too new, however, for any form of command-and-control regulation. Would-be regulators need to take a deep breath and sit back for a while to see how the systems are used in the real world and what problems actually arise from their use, as opposed to rushing into action based on hypothetical nightmares.

Mandating transparency enjoys a long pedigree in regulation of technology. Arguments for greater transparency about the use of sophisticated AI technology are persuasive, but advocates of transparency should be more precise in exactly what they want to be transparent. Forcing developers and entrepreneurs to reveal the details of their black boxes—the statistical learning models and resulting algorithms—does little good to consumers and poses the greatest risk to legitimate intellectual property interests. Transparency with respect to the scope and content of machine learning databases, the fact of use, the purposes of use, the quality of results produced, and the availability of appeals to human beings is meritorious.

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[1] Professor of Law Emeritus, and former dean, Chicago-Kent College of Law, Illinois Institute of Technology. Author of 25 books and more than 100 law review articles on labor and employment law, administrative law, law and technology, and international relations, including Trade Secrets for the Practitioner (3d ed 2024). Democratic nominee for the U.S. House of Representatives, Illinois 10th District, 2002. Former member, National Academy of Sciences Computer Science and Telecommunications Board. Member of the bar: Virginia, Pennsylvania (inactive), District of Columbia, Maryland, Illinois (retired), USPTO, and the Supreme Court of the United States. Commercial helicopter, private instrument airplane, and drone pilot. Extra-class radio amateur (K9KDF). The author wrote an expert system that evaluated the law of employment terminations during the mid-80s boom in AIA. See Henry H. Perritt, *Artificial Intelligence Techniques for Evaluating Employee Terminations on a Personal Computer* 13 RUTGERS COMPUTER & TECH. L. J. 342 (1987)

Introduction

Brent Cordon and Sterling Dillman are students at the University of Virginia ("UVA"). Brent is a graduate of Virginia Tech, where he majored in electrical and computer engineering and was president of the AI and Machine Learning Club. He now is a first year MBA candidate at UVA's Darden School, where he is active in the Batten Institute for Entrepreneurship, Innovation, and Technology.

Sterling has a bachelors degree in philosophy from UVA with a concentration in AI ethics. He now is a first year law student at UVA law school. Brent and Sterling did not know each other until they both attended a public seminar on "AI ethics and Data Activism." They happened to sit next to each other, and Sterling heard Brent mutter under his breath during the presentation, "This is such BS!"

At a break, Sterling introduced himself to Brent and said, "I couldn't help but overhear what you said."

"What did I say?" Brent asked, not unwilling to make a new friend.

"You said that AI ethics is BS."

"It is. It's a hobby horse of people who don't know anything about technology, who instinctively want to take society back to the Stone Age, and who are determined to be busybodies to impose their own conceptions of the public interest on everybody else."

"Wow!" Sterling said. "I guess I better drop out of school and go become a brick mason or something."

"I wouldn't do that," Brent said. "Robots are taking over brick masonry."

"I guess I won't drop out of school, then. I'm going to law school precisely because I want to become an AI ethicist. I don't think an AI robot can do that. They're not self-aware—yet."

Brett blushed deeply and he hesitated. "I didn't mean –"

"Sure sounded like you meant it," Sterling said. "But my first year law classes are teaching me not to wear my opinions on my sleeve and to be willing to engage someone in argument even though we are on opposite sides of an issue—and we certainly appear to be on opposite sides of this issue."

"I must say: that's very civilized after what I said," Brent said. He laughed. "I'm sorry. I put it the way I did."

"Let's get together for a beer after this is over – assuming we don't get into a fist fight during the Q&A period."

"I'll be quiet until we have beers in front of us," Brent said. "If I speak my mind in this crowd, I'll probably get lynched."

Once the young men that settled down face-to-face with each other. Brent said, "So you want to abolish AI."

"No," Sterling said. "That's not what I want; I just want to regulate it."

"Regulate it, like how?" Brent asked.

“The starting point,” Sterling said, “is to impose transparency requirements and maybe accompany them with pre-sale testing and approval requirements.”
“First of all, how are you going to define AI? Do you want to ban sales of Microsoft Word’s auto-complete and spell checker until some bureaucrat “working” from home approves it?”
“No; it's your turn, and I get to do the cross examination. You said that you're an engineer and that you're already embarked on an entrepreneurial startup to bring an AI product to market. Tell me what your definition is. What is your new product?”
“Well,” Brent said, looking around and lowering his voice. “We hope to be able to get a patent on it, but in the meantime we need to keep it as a trade secret.”
“So you won’t tell me about it,” Sterling said, laughing. “So much for transparency. You strike out at the first pitch.”
“Don’t be so quick to call me ‘out’. I can tell you all about it if you sign a nondisclosure agreement. You want to hire lawyers to work out some fancy legal document?”
“No,” Sterling said. “Give me a moment. He took out a blue felt tip pen, smoothed a clean napkin, and began to write on it. After about 45 seconds he had a couple of sentences. He pushed the napkin across the table to Brent and said, “I’ll sign it at the bottom and date it.”
Brent looked at him, and then at the napkin. “I promise not to reveal the information disclosed to me by Brent Corden which I agree constitutes trade secrets.” With a snicker, he pushed the napkin back and Sterling signed it.
Brent pulled it back and said. “Thanks. What we are working on is a laser recharger for drones. Small drones’ low cost makes them attractive for a variety of missions, but their utility is limited because of relatively short endurance – almost never more than 40 or 45 minutes. Requiring them to return and land at some kind of charging or battery-replacement station interferes with their mission performance.
“Research and development has shown that arbitrary amounts of electrical power can be transmitted by microwave or laser. Indeed, Nikolas Tesla was preoccupied with possibilities for wireless transmission of electrical energy late in his career, around the turn of the 19th to the 20th centuries. Now, with improvements in laser technology and semiconductor chips to control it, lasers can transmit enough energy to keep a drone battery charged or to recharge it. That's what we're working on, the system and method for doing that.”
“Wow!” Sterling said. “That's interesting. I don't know that I can understand the details of it –“
“I’ll try to explain it. I'm going to have to explain it on the patent application, and it will be good practice.”
“All right. I’ll pay close attention.”
After some 20 minutes of going over how the technology works and how it would be deployed on a drone and an affordable laser power transmission unit, Sterling said, “I've read that ordinary lasers like those in presentation pointers can do damage if they are pointed at someone's eyes.”
“They can. They could blind someone.”
“But these laser beams you are talking about would be a good deal stronger.”
“A *lot* stronger,” Brent said.
“And what happens if someone gets between the transmission station and the drone – walks through the laser beam?”
“That would not be a good thing at all,” Brent said.
“So what you're doing very well could injure somebody.”
“Kill them.”
“And you’re telling me this should not be regulated?”

"Lasers are already regulated, and my system uses AI to make sure no one gets pierced by a laser beam. Anyway, if somebody gets hurt, they have damages remedies available by filing a lawsuit."
"That's not going to help much if they're dead."
"So what you propose instead? Send me and my investors to jail?"
"Transparency at the very least, and probably more."
"How the hell is transparency going to help?"
"Most basically, make sure the laser beam is visible, so people can avoid it."
"Hard to do."
"Maybe you have to put up a sign and cordon off the area where the transmitter is located so that innocent pedestrians and drivers can avoid it. I don't know what you do about helicopters and aircraft that might fly through it."
"Also, this AI system you are going to use to protect people needs to be checked out to make sure it works."
"From what I saw and heard in the seminar just know, the people who are calling the loudest for regulation of AI don't know the first thing about how it works."
Sterling laughed. "Neither do I."
"You don't understand it, and yet you are going to regulate it? It's kind of hard to write a regulation to cover something you cannot define and to cover conduct you cannot describe or anticipate."
"At least we can make systems like yours 'transparent.'"
Objectively, any form of regulation of AI is unwarranted or premature. Existing law adequately addresses the most talked-about concerns. Conventional law of copyright infringement and defamation covers the misuse of copyrighted works in learning databases[2] and harmful hallucinations by AI systems.[3] Existing law also prohibits discrimination effected by statistical decision making.[4] The impact of new technologies on labor markets is not an appropriate subject for command-and-control regulation in a market economy.[5]
It may be that experience with new AI technologies will reveal risks of injury to legitimate interests that are not covered adequately by existing law, but legislators and regulators should wait until those risks crystallize before writing rules and statutes.
Nevertheless, there is a great clamor over the need to regulate AI, and regulation of new technologies is as much a political phenomenon as an objective analytical legal one. So some form of regulation is likely to emerge from all the excitement; indeed it already has emerged in Europe[6] and been sketched by the Biden administration.[7]
The pragmatic question is what form should this regulation take so as to do the least harm and the most good?
Transparency mandates are the answer, requiring AI developers and vendors to disclose aspects of their systems, without command-and-control mandates for engineering specifications or performance results. Several types of transparency could be required: those requiring disclosure that generative AI technology has been used, those requiring disclosure of the elements of

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[2] *See See* Henry H. Perritt, *Robots as Pirates?,* 73 CATH. U. L. REV. 57, 103 (2024).
[3] *See* Henry H. Perritt, *Robot Slanderer*, 46 UALR L. REV. 169, 194, 229 (2023).
[4] *See* Henry H. Perritt, *Robot Regulations*, 75 S. C. L. REV. 219, 253-54 (2023).
[5] *See* Henry H. Perritt, *Robot Job Destroyers*, 84 LA. L. REV. 207, 268 (2023).
[6] *See infra* § III(D)(7).
[7] *See infra* § III(D)(2)-(5).

decision making on which they were used, and those requiring disclosure of recourse to human intervention to override AI-based decisions. seem meritorious.
Requirements to reveal the inner workings of learning models are less desirable, because they impinge the greatest on legitimate trade secret interests and because the complexity of the inner workings of large learning models is unlikely to provide useful guidance to consumers.
Conversely, disclosure of the source and characteristics of learning databases may be useful in helping consumers, governmental overseers, and critics to evaluate the propensity of systems for accuracy and illegal group-based discrimination. This is so even though learning database assembly and use also may be cloaked with trade secret protection.
Transparency requirements are not prescriptions; they are like labeling requirements in the food and drug industry. The FDA does not set a maximum limit on how much sugar can be in a soft drink, but it requires that the amount of sugar be disclosed on a label.[8] Similarly, the transparency requirement applied to AI machine learning would not specify the type of statistical model that must be used, but it would require disclosure, for example, that linear multiple regression model was used instead of a convolutional layer model.
Part II, following this introduction, offers a primer on generative AI technology, explaining its incremental character building on decades old statistical analytical techniques, and identifying its novel features. Part III explores the politics and law of the movement to regulate AI technology. Part IV analyzes the regulatory tools that might be applies to AI, distinguishing between transparency requirements and command-and-control regulation. Part V explores why transparency regulation is so often proposed and why it fits the state of the art in AI technology. Part VI considers the particular aspects of AI technology that might be subject to transparency requirements and concludes that little purpose would be served by requiring the disclosure of details of the statistical models and their resulting algorithms; transparency with respect to learning databases, areas of use, purposes of use, quality of results, and availability of human appeals are far more useful.
Part VII concludes by explaining how a movement to make AI transparency can co-exist with, and indeed be reinforced by, patent and trade secret law.

AI technology

Broad meaning

A major difficulty in regulating AI is that the proponents of regulation cannot define it. The recent definition in Executive Order 14110[9] would sweep under the definition Microsoft Word

[8] *See* 21 C.F.R. § 101.9(c)(6)(ii) (2024).

[9] Section 3(b) and 3(c) of Exec. Order. 14110 defines artificial intelligence:
(b) "The term "artificial intelligence" or "AI" has the meaning set forth in 15 U.S.C. 9401(3): a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. Artificial intelligence systems use machine- and human-based inputs to perceive real and virtual environments; abstract such perceptions into models through analysis in an automated manner; and use model inference to formulate options for information or action. Exec. Order No. 14,110, 88 Fed. Reg. 75191, 75193 (Nov. 1, 2023).
(c) The term "AI model" means a component of an information system that implements AI technology and uses computational, statistical, or machine-learning techniques to produce outputs from a given set of inputs. *Id.*

spellcheck, Microsoft Excel arithmetic formulas, Westlaw and Lexis searches, and Google searches.[10]

HHS does better. It defines a subset—predictive decision support intervention—as "technology that supports decision-making based on algorithms or models that derive relationships from training data and then produces an output that results in prediction, classification, recommendation, evaluation, or analysis."[11]

The EU AI Act defines "AI system" as:

> a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments.[12]

The EU AI Act[13] seeks to avoid overbreadth in the definition, "the definition should be based on key characteristics of AI systems that distinguish it from simpler traditional software systems or programming approaches and should not cover systems that are based on the rules defined solely by natural persons to automatically execute operations."[14]

Machine learning

The developments in AI technology that have attracted the most attention result from advances in machine learning, a process in which an artificial intelligence system develops algorithms from large quantities of data in a *learning database*.[15] Machine learning is of two different types and is aimed at two different objectives.

Supervised learning uses labeled data for classification, selection, or feature identification purposes. It is used to teach systems to recognize particular types of images such as faces or animal species, in face recognition, and in regression analysis to assign weights to variables.[16] This is the older form. *Unsupervised learning* is newer; it uses unlabeled datasets to cluster data instances and to associate them. It also reduces the number of different dimensions to manageable levels.[17]

Though the same underlying statistical techniques are used: two different artificial intelligence approaches exist: discriminative and generative.[18] Discriminative models select instances from

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[10] These popular software examples are "machine-based systems" that "make predictions" for "a given set of human-defined objectives." The use models and computational and statistical techniques to product outputs from a given set of inputs. *See id.*

[11] Health Data, Technology, and Interoperability: Certification Program Updates, Algorithm Transparency, and Information Sharing, 89 Fed. Reg. 1192, 1244 (Jan. 9, 2024) (to be codified at 45 C.F.R. pts. 170, 171).

[12] Regulation 2024/1689 of the European Parliament and of the Council, 2024 J.O. (L) 46

[13] *See generally*, *Id.* at 4

[14] *Id.* at 4.

[15] *See* IBM, *What is machine learning (ML)?*, https://www.ibm.com/topics/machine-learning (last visited Aug. 13, 2024) [https://perma.cc/63LL-SUZ9].

[16] *See* Julia Delua, *Supervised versus unsupervised learning: What's the difference?*, IBM, https://www.ibm.com/think/topics/supervised-vs-unsupervised-learning [https://perma.cc/EF9J-LDYW]. In supervised machine learning for image recognition, some images in the data set are labeled "human face," some "bull," some "calf," and some "rock."

[17] *Id.*

[18] DAVID FOSTER, GENERATIVE DEEP LEARNING: TEACHING MACHINES TO PAINT, WRITE, COMPOSE, AND PLAY 4–6 (Nicole Butterfield et al. eds., 2d ed. 2023).

databases.[19] Facial recognition systems are examples. Machine learning develops algorithms for facial discriminators from processing millions of facial images. In popular applications of deterministic AI, systems look for matches based on similarity between features of a candidate instance, usually an image, and an artifact in the database. The algorithms permit the system to predict that the image of a candidate face is in the database.[20] Discriminative models are likely to use supervised learning approaches.

Generative models create entirely new content.[21] They are more likely to use unsupervised learning, although multiple regression analysis is a simple example of generative artificial intelligence that uses supervised learning. The systems compute values representing correlations among variables and then uses those values to project outcomes in the future. Chat GPT[22] and Google Gemini[23] are powerful examples.

Twenty-first century machine learning relies on *neural networks*. Each node in a *neural network* is called a neuron. A neuron might represent a letter of the alphabet or a word. Each neuron outputs a value between zero and one by applying a function to the combination of inputs received from neurons to which it is connected. The function is a combination of weights and bias. Together, they represent the probability that a letter or a word will be followed by any other. Activation functions can be linear or non-linear; most are non-linear. Non-linear types include *sigmoid*, *hyberbolic tangent*, rectified linear unit (*ReLU*), and *leaky ReLU*. ReLU functions are the most common.[24]

In a fully connected neural network, every node (neuron) in every layer is connected to every node in each adjacent layer. As granularity of input and intermediate layers decreases, the number of connections becomes so large that the system is infeasible to manipulate mathematically.

Neural networks use *tensors* to embed data. A tensor is a multidimensional matrix. If one imagines two layers of binary data, wherein each point is a zero or a one, the connections between every point in one layer and every point in the other layer can be represented by a tensor. A black-and-white bitmap of an image can be expressed as a matrix, a two-dimensional tensor. A color bitmap of an image can be represented by a six-dimensional tensor—one additional dimension for each primary color.

Most machine learning systems define an error function and seek to minimize it. Recursive learning feeds back the results of one learning session through some feedback mechanism to assess and reduce errors in prediction. The neural network system minimizes its *error function* by iteratively changing each weight in each activation function until reaches a minimum for the value of the error function.[25]

Several types of generative models exist:

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[19] *Id.* at 5-6.

[20] *See* Henry H. Perritt, Jr., *Defending Face-Recognition Technology (And Defending Against It)*, 25 FLA. J. TECH. LAW & POL'Y 42, 47–49 (2020) (describing face-recognition machine learning).

[21] FOSTER, *supra* note 18, at 6.

[22] https://openai.com/chatgpt/.

[23] https://gemini.google.com/.

[24] Sagar Sharma, *Activation Functions in Neural Networks,* article in *Towards Data Science*, MEDIUM (Sep. 6, 2017), https://towardsdatascience.com/activation-functions-neural-networks-1cbd9f8d91d6 [https://perma.cc/SJ7M-G9VN].

[25] *Learning to Minimize Error: Gradient Descent Method*, page on *Deep Learning Courses for Humanists*, GITHUB, https://yogayu.github.io/DeepLearningCourse/04/GradientDescent.html [https://perma.cc/54H7-6MDJ] (explaining how a system can seek error minimum by incrementally varying value of weight in direction that leads to lower error value).

Generative Adversarial Networks (GANs) are frameworks for generating images, audio, and text.[26] GANs can be difficult to train because of mode collapse, where the generator produces limited variations of output,[27] and vanishing gradients,[28] hindering the learning process. Moreover, GANs often require large amounts of training data and computational resources, limiting their accessibility.

Diffusion models have gained significant traction in machine learning, particularly for image generation, due to their ability to produce high-quality, diverse samples.[29] By gradually denoising random noise, diffusion models learn complex data distributions and generate realistic images. Their training process is generally more stable than GANs, avoiding issues like mode collapse. Additionally, diffusion models offer fine-grained control over the generation process, allowing for manipulation of attributes like image quality and diversity. Diffusion models are, however, computationally expensive, requiring substantial resources for training and inference. Generating high-quality samples may also require multiple steps, making them slower than some alternative methods.

Recursive Neural Networks (RNNs), sometimes known as *recurrent* neural networks, are designed to process hierarchical data structures, like trees, making them well-suited for tasks such as natural language processing and scene parsing.[30] RNNs are deep neural networks trained on sequential data like natural language or time series data like weather patterns to make predictions about what comes next. Siri, voice search, and Google Translate use them.[31] Their ability to capture relationships between different levels of a hierarchy allows for a more nuanced

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[26] See Foster at 128; *Introduction*, page in *Advanced Courses* on *GANs*, GOOGLE (Jul. 18, 2022) https://developers.google.com/machine-learning/gan [https://perma.cc/W677-F2YA] (visited Aug. 13, 2024) (explaining generative adversarial networks).

[27] Mode collapse is a common failure mode in generative adversarial networks (GANs), where the generator produces a limited variety of outputs, often converging to a single or few modes in the data distribution. This occurs when the generator learns to trick the discriminator by exploiting its weaknesses, rather than learning to generate diverse and realistic samples. The discriminator, in turn, becomes too specialized in detecting those specific outputs, leading to a cyclical feedback loop. This phenomenon hinders the GAN's ability to capture the full complexity and diversity of the training data, resulting in repetitive and less interesting outputs. See *Common Problems*, page in *Advanced Courses* on *GANs*, GOOGLE (Jul. 17, 2022), https://developers.google.com/machine-learning/gan/problems [https://perma.cc/C52V-FWPW] (visited Aug. 13, 2024).

[28] In machine learning, the vanishing gradient problem occurs during the training of deep neural networks using gradient-based learning methods and backpropagation. In such methods, each weight in the network is adjusted based on the partial derivative of the error function with respect to the current weight during each training iteration. The issue is that the gradient magnitude tends to decrease as the sequence length increases, slowing down the training process. In the worst-case scenario, this can completely halt the further training of the neural network. One cause of this problem is the use of activation functions like the hyperbolic tangent function, which have gradients in the range of -1 to 1. Backpropagation calculates gradients using the chain rule, resulting in the multiplication of many small numbers to compute gradients of the early layers in a deep network. This causes the gradient (error signal) to decrease exponentially with the number of layers, leading to extremely slow training of the early layers. See id; Sunitha Basodi et al., *Gradient Amplification: An Efficient Way to Train Deep Neural Networks*, 3 BIG DATA MINING AND ANALYTICS 3, 197 (2020).

[29] See Foster at 205; Ryan O'Connor, *Introduction to Diffusion Models for Machine Learning*, ASSEMBLYAI (May 12, 2022), https://www.assemblyai.com/blog/diffusion-models-for-machine-learning-introduction/ [https://perma.cc/S6ZV-85PS] (explaining diffusion models).

[30] See Foster at 131-32, 149; Cole Stryker, *What is an RNN?*, IBM (Oct. 04, 2024) https://www.ibm.com/topics/recurrent-neural-networks [https://perma.cc/Z7Z8-5MM6] (visited Aug. 13, 2024).

[31] See IBM, What is an RNN?, https://www.ibm.com/topics/recurrent-neural-networks (visited Aug. 12, 2024); Kira Warje, *Recurrent Neural Networks*, THE DECISION LAB, https://thedecisionlab.com/reference-guide/computer-science/recurrent-neural-networks [https://perma.cc/5BMS-QMSE] (visited Oct. 28, 2024).

understanding of complex data. RNNs can be computationally expensive, however, especially for large and deep trees, as the processing time grows exponentially with the depth of the tree. Additionally, training RNNs can be difficult due to the vanishing gradient problem, where gradients diminish as they propagate back through the network, hindering the learning of long-range dependencies. Moreover, the need for pre-defined hierarchical structures for input data limits the flexibility of RNNs in handling unstructured data.

Convolutional Neural Networks (CNNs) excel in various tasks like image recognition, classification, and object detection due to their ability to automatically learn spatial hierarchies of features.[32] They are translation invariant, meaning they can recognize patterns regardless of their position in the input. CNNs also share weights, reducing the number of parameters and making them computationally efficient. CNNs can be computationally intensive, requiring powerful hardware for training and deployment. They also need large amounts of labeled data to achieve high accuracy, which can be a challenge in some domains. Additionally, CNNs lack interpretability, making it difficult to understand the reasoning behind their decisions, which raises concerns in critical applications like healthcare.

A CNN comprises an input layer, hidden layers, and an output layer. In a convolutional neural network, the hidden layers include one or more learnable layers that perform convolutions. CNNs learn by taking filters, a kind of digital cutout or mask, and placing each filter repeatedly over slightly different parts of an image from the input layer to see how well the underlying pattern matches the cutout. This is called *convolution*.[33] The process permits relatively low-level features, such as edges, to be recognized, and, at higher layers, more abstract features, such as lips and eyes to be recognized. Each placement of the filter generates an error value, when then can be minimized as parameters of the convolutional filter are varied.

Transformers have revolutionized natural language processing (NLP) and other machine learning tasks due to their ability to capture long-range dependencies and process sequences in parallel.[34] The self-attention mechanism allows them to weigh the importance of different words in a sentence, leading to better contextual understanding and improved performance on tasks like translation, summarization, and question-answering. Additionally, transformers are highly parallelizable, making them computationally efficient for large-scale training. However, transformers also present challenges. They can be computationally expensive to train and require large amounts of data to achieve optimal results. Additionally, they lack interpretability, making it difficult to understand the reasoning behind their decisions.

Because of the absence of labels in unsupervised learning and generational AI, explanations of system results may be hard to come by. Research in XAI (explainable AI) focuses on developing methods to make AI systems more interpretable. Techniques such as model-agnostic interpretability methods,[35] local interpretable model-agnostic explanations (LIME),[36] and

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[32] See Foster at 40-41; IBM, *What are convolutional neural networks?*, https://www.ibm.com/topics/convolutional-neural-networks [https://www.ibm.com/topics/convolutional-neural-networks] (visited Aug. 13, 2024).

[33] *See* Eric Weisstein, *Convolution*, WOLFRAM MATHWORLD, https://mathworld.wolfram.com/Convolution.html [https://perma.cc/2572-Q86A] (last visited Jun, 24, 2024).

[34] *See What are Transformers in Artificial Intelligence?*, AMAZON WEB SERVICES, https://aws.amazon.com/what-is/transformers-in-artificial-intelligence/ [https://perma.cc/PT6M-GGM4] (last visited Aug. 13, 2024).

[35] *See* CHRISTOPHER MOLNAR, INTERPRETABLE MACHINE LEARNING 110 (2d ed. 2024).

[36] *See What is Local Interpretable Model-Agnostic Explanations (LIME)?,* C3.AI, https://c3.ai/glossary/data-science/lime-local-interpretable-model-agnostic-explanations/ [https://perma.cc/4SCH-FCZJ] (last visited Aug. 13, 2024) (explaining approach involving changing input values and observing effect on output values).

SHapley Additive exPlanations (SHAP)[37] can help make AI decision-making processes more understandable.

Applications

These artificial intelligence techniques have demonstrated their practicability and writing technical reports,[38] fiction,[39] essays about current events,[40] and summaries of long documents.[41] Face recognition technology has been widely deployed,[42] and newer systems are showing their ability to generate new faces and animation in compliance with detailed verbal instructions.[43] The technologies are in wide use in autopilots for autonomous vehicles, including drones[44] and motor vehicles,[45] and the technologies are proving their capacity to generate acceptable music.[46]

Calls for regulation and responses

Rhetoric

AI could replace 300 million jobs.[47] CNET Staff Unionize, Saying AI Use Threatens Our Jobs and Reputations.[48] Our Jobless Future: An essay on artificial intelligence and the economic singularity.[49] AI "promises to transform all realms of human experience . . ."[50] "transformations potentially more profound that even those of the Enlightenment."[51]

"*Should* we let machines flood our information channels with propaganda and untruth? *Should* we automate away all the jobs, including the fulfilling ones? *Should* we develop nonhuman minds that might eventually outnumber, outsmart, obsolete and replace us? *Should* we risk loss of control of our civilization? Such decisions must not be delegated to unelected tech leaders. Powerful AI systems should be developed only once we are confident that their effects will be positive and their risks will be manageable.

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"[W]e call on all AI labs to immediately pause for at least 6 months the training of AI systems more powerful than GPT-4. This pause should be public and verifiable, and include all key

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[37] *See SHapley Additive exPlanations or SHAP: What Is It?*, DATASCIENTIST (Mar. 9 2023) https://datascientest.com/en/shap-what-is-it [https://perma.cc/2KLA-EDV7] (explaining that SHAP calculates a value that represents the contribution of each feature to the model outcome).

[38] CITE AI technical reports.

[39] CITE AI storytelling

[40] CITE AI reports on current events and sports

[41] CITE AI summaries of long documents and collections of such

[42] CITE re deployment of face recognition

[43] CITE AI image generation per verbal instruction

[44] CITE AI for drones

[45] CITE AI tesla autopilot

[46] CITE AI music

[47] Chris Vallance, *AI Could Replace Equivalent of 300 Million Jobs - Report*, BBC (Mar. 9 2023), https://www.bbc.com/news/technology-65102150 [https://perma.cc/ZUW8-RQEX] (reporting that, according to Goldman Sachs, AI could replace a quarter of jobs in U.S. and Europe).

[48] Maggie Harrison, *CNET Staff Unionize, Saying AI Use "Threatens Our Jobs and Reputations*", FUTURISM, (May 18, 2023) https://futurism.com/cnet-staff-unionize-ai [https://perma.cc/K8EJ-SH2A].

[49] CALUM CHANCE, OUR JOBLESS FUTURE: AN ESSAY ON ARTIFICIAL INTELLIGENCE AND THE ECONOMIC SINGULARITY, (2018) (ebook)

[50] HENRY A. KISSINGER ET AL, THE AGE OF AI 17 (2021) [hereinafter *Age of AI*].

[51] *Id.* at 19.

actors. If such a pause cannot be enacted quickly, governments should step in and institute a moratorium.

"AI labs and independent experts should use this pause to jointly develop and implement a set of shared safety protocols for advanced AI design and development that are rigorously audited and overseen by independent outside experts. These protocols should ensure that systems adhering to them are safe beyond a reasonable doubt."[52]

"Among the great challenges posed to democracy today is the use of technology, data, and automated systems in ways that threaten the rights of the American public. Too often, these tools are used to limit our opportunities and prevent our access to critical resources or services. These problems are well documented. In America and around the world, systems supposed to help with patient care have proven unsafe, ineffective, or biased. Algorithms used in hiring and credit decisions have been found to reflect and reproduce existing unwanted inequities or embed new harmful bias and discrimination. Unchecked social media data collection has been used to threaten people's opportunities, undermine their privacy, or pervasively track their activity—often without their knowledge or consent."

A hurricane of stories like these reflects a perfect storm of politics and public relations much more than it does informed assessment of real technologies or serious proposals for governmental action. Open AI released ChatGPT as a marketing initiative aimed also at enlisting a multitude of users in wringing out the shortcomings of the system.[53] Others in the industry and in the computer science profession jumped on the bandwagon of excitement about the astounding level of humanlike fluency ChatGPT displays, understanding that they could turn the excitement into investor interest and entrepreneurial opportunity. At the same time, interest groups and identity groups, always alert to developments that might help them grab public attention for their causes, have joined the throng, warning of the technology's potential to harm this or that protected interest. And then, the progressive movement, instinctively wary of big business and already championing the need to reign in big tech, has found new arguments in the perceived dangers of generative AI. The press and media are lapping it all up with headline after headline. Some of them understand the technology, but not many.

The technology itself is incremental, building on statistical and analytical techniques that have been the bread and butter of social scientists for a hundred years or more. Now, large collections of data on the Internet, and greatly increased computing power, storage, and communications capacity at low cost extend machine learning and pattern matching techniques that have been gradually emerging throughout society for twenty or so years in a variety of natural language and other computing applications.

The concerns are amorphous and philosophical. The most concrete involve fears about loss of employment opportunities. Careful investigation and analysis shows no evidence of actual job loss to the technologies and reason for considerable skepticism that widespread adoption in the future will result in net loss of employment.[54] Nevertheless, political and legal systems respond

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[52] *Pause Giant AI Experiments: An Open Letter,* FUTURE OF LIFE (Mar. 22, 2023), https://futureoflife.org/open-letter/pause-giant-ai-experiments/ [https://perma.cc/8ZCN-9H4W] (showing open letter signed by Elon Musk, Steve Wozniak and 27565 others).

[53] *See* Felix Salmon, *What Sam Altman's Chimerical Trillions Say about AI Hype* , AXIOS (Feb. 17, 2024), https://www.axios.com/2024/02/17/sam-altman-openai-7trillion [https://perma.cc/URS8-PNUR]; John Herrman, *Sam Altman and OpenAI Are Victims of Their Own Hype*, N.Y. MAGAZINE, (Nov. 22, 2023), https://nymag.com/intelligencer/2023/11/how-big-techs-ai-hype-cycle-swallowed-sam-altman-openai.html [https://perma.cc/S3PD-4663].

[54] *See* Henry H. Perritt, Jr., *Robot Job Destroyer,* 84 LOUISIANA LA. L. REV. 207, 209 (2023).

to public opinion and energetic movements; not to engineers' perceptions of reality.[55] So the mere fact that there is so much excitement about generative AI and so much concern about its potential for harm means that lawmakers may be motivated to enact new statutes, promulgate new regulations, and interpret what is already on the books so as to deter the use of the technology in order to respond to public demands.

Rise of "ethicists"

A cottage industry of "AI ethicists" has developed, with universities and consulting firms seeing business opportunities[56] and a trade association devoted to promoting the idea. The Association of AI Ethicists[57] expresses its goal:

"to promote and protect the professional interests of AI ethicists and other professionals working in the field of ethical AI. This includes advocating for the recognition and advancement of the profession, as well as providing support and resources to its members.

"We are also committed to raising awareness about the importance of ethical considerations in the development and deployment of AI technologies. To this end, the association invests in outreach activities that aim to educate the public, policymakers, and industry stakeholders about the role and value of AI ethics professionals."[58]

A distinct job category has emerged, devoted to raising the alarm about AI.

The intellectual history of ethics treated it as an aspect of philosophy and religion. As the Western world has become more secular and less religious, and as the study of philosophy as an academic discipline has gone out of fashion, "ethics" in particular fields like artificial intelligence has become disconnected from any solid intellectual foundations. Specialists in AI ethics, like specialists in the ethics of other specialized fields, like, say, green energy, rely on idiosyncratic and personal value systems as the basis for "ethical" prescriptions.

Marketing responses

Regardless of the validity of the concerns raised, the public uproar about AI has been good for business. Sam Altman, the CEO of OpenAI and the promoter of its Chat GPT is everywhere,

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[55] *See* Laura Blessing, *Social Movements and Policy Change*, Geo. Univ. Gov't Affs. Inst., (Sep. 8, 2020), https://gai.georgetown.edu/social-movements-and-policy-change/ [https://perma.cc/KT7Y-H87U].

[56] *See* Univ. of San Diego, *The Importance of AI Ethicists & How to Become One*, https://onlinedegrees.sandiego.edu/ai-ethicist-career/ [https://perma.cc/UEL9-XXCG] (last visited Aug. 11, 2024) (advertising on-line course leading to career as AI ethicist); Deloitte, *Does Your Company Need a Chief AI Ethics Officer, an AI Ethicist, AI Ethics Council, or All Three?*, https://www2.deloitte.com/us/en/pages/consulting/articles/ai-ethicist-and-ai-bias.html [https://perma.cc/2UXB-WRSU] (last visited Aug. 11, 2024) (suggesting skills for AI Ethicist positions and recommending a team); https://www.aiethicist.org/ (visited Aug 11, 2024) (offering training for AI ethicists and consulting).

[57] Ass'n of AI Ethicists, https://ethicists.ai/ [https://perma.cc/J82H-JV8Z] (visited Aug. 11, 2024) (articulating purpose of organization).

[58] *Id.*

testifying before Congress,[59] vanquishing opponents on the Open AI Board,[60] teasing new disruptive products.[61] The book value of his Open AI tripled in the course of 2023.[62] NVIDIA, the dominant maker of integrated circuit chips for generative AI computing, is soaring: "[w]ith a $3.3 trillion valuation, Nvidia is now worth more than tech behemoths Microsoft and Apple."[63]

> Globally, venture-capital funding in AI companies grew 25 percent to $25.87 billion in the first three months of 2024, compared with the last three months of 2023, according to research firm PitchBook. Microsoft, Meta, Apple and Amazon are investing billions into AI, hiring PhDs and building data centers. Earlier this month, Amazon poured $2.5 billion into Anthropic AI, bringing its total investment in the OpenAI competitor to $4 billion. This week, Microsoft, Google and Meta all confirmed they would spend billions of dollars on new data centers for AI this year alone.[64]

Governmental responses

Members of congress and the president have been rushing to regulate AI.

Congressional proposals

The Algorithmic Accountability Act of 2023 requires companies to assess the impacts of the AI systems they use and sell, creates new transparency about when and how such systems are used, and empowers consumers to make informed choices when they interact with AI systems.[65]
In 2024, Senators John Hickenlooper (D-CO) and Shelly Capito (R-WV) introduced S.4769, the "Validation and Evaluation for Trustworthy (VET) Artificial Intelligence Act" or the "VET Artificial Intelligence Act. "[66]

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[59] *See* Written Testimony of Sam Altman Chief Executive Officer OpenAI Before the U.S. Senate Committee on the Judiciary Subcommittee on Privacy, Technology, & the Law (May.26, 2023), https://www.judiciary.senate.gov/imo/media/doc/2023-05-16%20-%20Bio%20&%20Testimony%20-%20Altman.pdf [https://perma.cc/ZZ7Z-JW8U].
[60] *See* Rachel Metz & Shirin Ghaffary, *OpenAI's Sam Altman Returns to Board After Probe Clears Him*, Bloomberg, Mar. 8, 2024, https://www.bloomberg.com/news/articles/2024-03-08/openai-s-altman-returns-to-board-after-probe-clears-him?embedded-checkout=true [https://perma.cc/R2RX-DKY4] (reporting on Sam Altman's dismissal and then reinstatement at CEO of Open AI).
[61] *See* Jordan Hart, *It Looks Like Sam Altman Is Dropping Hints About OpenAI's Next Big Thing*, Business Insider, Aug. 10, 2024, https://www.businessinsider.com/sam-altman-hints-at-project-strawberry-2024-8 [https://perma.cc/ME2D-NW5X] (reporting on rumors of new project to use generative AI to harness the Internet).
[62] *See* Deepa Seetharaman & Berber Jin, *OpenAI Seeks New Valuation of Up to $90 Billion in Sale of Existing Shares*, Wall St. J. (Sept. 26, 2023, 6:21 PM), https://www.wsj.com/tech/ai/openai-seeks-new-valuation-of-up-to-90-billion-in-sale-of-existing-shares-ed6229e0.
[63] *Revisiting Nvidia Stock's Risks As Valuation Tops $3.3 Trillion*, Forbes (June 21, 2024, 5:00 AM), https://www.forbes.com/sites/greatspeculations/2024/06/21/revisiting-nvidia-stocks-risks-as-valuation-tops-33-trillion/.
[64] Gerrit De Vynck, *The AI hype bubble is deflating. Now comes the hard part.*, Wash. Post (Apr. 25, 2024, 7:06 PM), https://www.washingtonpost.com/technology/2024/04/18/ai-bubble-hype-dying-money/.
[65] *See* H.R. 5628, 118th Cong. §§ 1, 3(b), 4(a)(8) (2023); S. 2892, 118th Cong. §§ 1, 3(b), 4(a)(8) (2023).
[66] *See infra* note **Error! Bookmark not defined.** and accompanying text discussing bill.

Executive Order

President Biden issued an executive order on AI in October, 2023.[67] The executive order articulates eight principles and requires federal agencies to adhere to them:

> (a) Artificial Intelligence must be safe and secure. . . .
>
> (b) Promoting responsible innovation, competition, and collaboration will allow the United States to lead in AI and unlock the technology's potential to solve some of society's most difficult challenges. . . .
>
> (c) The responsible development and use of AI require a commitment to supporting American workers. . . .
>
> (d) Artificial Intelligence policies must be consistent with my Administration's dedication to advancing equity and civil rights. . . .
>
> (e) The interests of Americans who increasingly use, interact with, or purchase AI and AI-enabled products in their daily lives must be protected. . . .
>
> (f) Americans' privacy and civil liberties must be protected as AI continues advancing. . . .
>
> (g) It is important to manage the risks from the Federal Government's own use of AI and increase its internal capacity to regulate, govern, and support responsible use of AI to deliver better results for Americans. . . .
>
> (h) The Federal Government should lead the way to global societal, economic, and technological progress, as the United States has in previous eras of disruptive innovation and change.[68]

FTC

The Federal Trade Commission published guidance in 2020 on the use of AI algorithms.[69] These included guidelines on transparency:

> Don't deceive consumers about how you use automated tools. . . .
>
> Be transparent when collecting sensitive data. . . .
>
> If you make automated decisions based on information from a third-party vendor, you may be required to provide the consumer with an "adverse action" notice. . . .
>
> If you deny consumers something of value based on algorithmic decision-making, explain why. . . .
>
> If you use algorithms to assign risk scores to consumers, also disclose the key factors that affected the score, rank ordered for importance. . . .
>
> If you might change the terms of a deal based on automated tools, make sure to tell consumers.[70]

Other guidelines aim to assure fair decisions:

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[67] *See* Exec. Order No. 14,110, 88 Fed. Reg. 75191 (Nov. 1, 2023).
[68] *Id.* § 2, at 75191-93.
[69] Andrew Smith, *Using Artificial Intelligence and Algorithms*, FTC: BUS. BLOG (Apr. 8, 2020), https://www.ftc.gov/business-guidance/blog/2020/04/using-artificial-intelligence-algorithms [https://perma.cc/3NNB-RYSG].
[70] *Id.*

> Don't discriminate based on protected classes. . . .
> Focus on inputs, but also on outcomes. . . .
> Give consumers access and an opportunity to correct information used to make decisions about them.[71]

The guidelines also aim to ensure that "data and models are robust and empirically sound[:]"[72]

> If you provide data about consumers to others to make decisions about consumer access to credit, employment, insurance, housing, government benefits, check-cashing or similar transactions, you may be a consumer reporting agency that must comply with the FCRA, including ensuring that the data is accurate and up to date. . . .
> If you provide data about your customers to others for use in automated decision-making, you may have obligations to ensure that the data is accurate, even if you are not a consumer reporting agency. . . .
> Make sure that your AI models are validated and revalidated to ensure that they work as intended, and do not illegally discriminate.[73]

They insist on accountability:

> Ask questions before you use the algorithm. . . .
> Protect your algorithm from unauthorized use. . . .
> Consider your accountability mechanism. [Encouraging use of external standards or independent expertise][74]

NIST

The National Institute of Standards and Technology (NIST) has published a risk management framework for generative AI.[75] This framework enumerates some dozen specific risks associated with the use of AI[76] and also identifies more than 500 mitigation measures that can reduce those risks.[77] Some mitigation measures involve additional transparency.[78]

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[71] *Id.*
[72] *Id.*
[73] *Id.*
[74] *Id.* (encouraging use of external standards or independent expertise).
[75] NAT'L INST. OF STANDARDS AND TECH., NIST AI 600-1, ARTIFICIAL INTELLIGENCE RISK MANAGEMENT FRAMEWORK: GENERATIVE ARTIFICIAL INTELLIGENCE PROFILE (2024), https://www.nist.gov/publications/artificial-intelligence-risk-management-framework-generative-artificial-intelligence [https://doi.org/10.6028/NIST.AI.600-1] [hereinafter "NIST Framework"].
[76] *Id.* § 2, at 2-12.
[77] *Id.* § 3.
[78] *See id.* at 20 ("Disclose interactions with GAI systems to users prior to interactive activities"); *see also id.* ("Engage independent experts to audit models, data sources, licenses, algorithms, and other system components, Consider sponsoring or engaging in community- based exercises (e.g., bug bounties, hackathons, competitions) where AI Actors assess and benchmark the performance of AI systems, including the robustness of content provenance management under various conditions"); *see also id.* at 25 ("Document GAI system ownership, intended use, direct organizational value, and assumptions and limitations"); *see also id.* at 26 ("Define GAI system's task(s) that relate to content provenance, such as original content creation, media synthesis, or data augmentation while

HHS

The most detailed U.S. regulation of AI systems is contained in the January 2024 transparency rule of the U.S. Department of Health and Human Services.[79] The rule sets standards and requirements for certification of information technology used to facilitate patient care. In particular, it regulates predictive decision support intervention or "predictive DSI", which is defined as "technology that supports decision-making based on algorithms or models that derive relationships from training data and then produces an output that results in prediction, classification, recommendation, evaluation, or analysis."[80]

The rule emphasizes that its transparency requirements do not require disclosing or sharing intellectual property.[81] It noted, with respect to its final rule, "The information required in source attributes is not intended to include detailed information on model parameters, hyperparameters, detailed specifics around how input or output variables are defined, transformed, or otherwise operationalized. We do not believe that information at that level of detail is necessary for source attributes in § 170.315(b)(11)(iv)(B) or necessary for users of a Predictive DSI to determine whether it is fair, appropriate, valid, effective, and safe."[82] The requirements reflect a preoccupation with bias:

"[B]ias associated with AI and machine learning algorithms could create substantial risks if they are presented to the end user without information to understand how they were constructed, evaluated, and should be maintained. . . . We have only amended existing requirements for evidence-based DSIs by asking for specific data elements to be identified when used by the DSI, including race, ethnicity, language, sexual orientation, gender identity, sex, date of birth, SDOH, sexual orientation, and health assessments data elements (*e.g.,* disability status)."[83] It is thus much more limited than the EU requirement.

States

Colorado has enacted a general artificial intelligence statute[84] that requires deployers of high risk AI systems to perform risk assessments and to disclose to consumers reasons for "consequential decisions" made with the aid of high risk AI systems, the "degree to which and manner in which" the AI system contributed to the decision, the type of data that was process in making the consequential decision, the sources of the data, and an opportunity for the consumer to correct

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incorporating tracking measures"); *see also id*. at 27 ("Institute audit trails for data and content flows within the system, including but not limited to, original data sources, data transformations, and decision-making criteria"); *see also id*. at 39 ("Document the construct validity of methodologies employed in GAI systems relative to their context of use"); *see also id*. at 39 ("Measure, monitor, and document prevalence of erroneous GAI output content, system availability, and reproducibility of outcomes via field testing or other randomized controlled experiments"); *see also id*. at 44 ("Use interpretable machine learning techniques to make AI processes and outcomes more transparent, and easier to understand how decisions are made"); *see also id*. at 45 ("Document GAI model details including: Proposed use and organizational value; Assumptions and limitations, Data collection methodologies; Data provenance; Data quality; Model architecture (e.g., convolutional neural network, transformers, etc.); Optimization objectives; Training algorithms; RLHF approaches; Fine-tuning approaches; Evaluation data; Ethical considerations; Legal and regulatory requirements").

[79] Health Data, Technology, and Interoperability: Certification Program Updates, Algorithm Transparency, and Information Sharing, 89 Fed. Reg. 1192 (Jan. 9, 2024) (to be codified at 45 C.F.R. pts. 170-171).

[80] *Id*. at 1244.

[81] *Id*. at 1259, 1261.

[82] 89 Fed. Reg. 1261 (Jan. 09, 2024).

[83] 89 Fed. Reg. 1265 (Jan. 09, 2024).

[84] Colo. Rev. Stat. Ann. § 6-1-1703 (West, 2024).

any incorrect personal data used, an opportunity to appeal any adverse decision, and an opportunity to insist on human involvement in the review if that is feasible.

The statute does not make it clear whether the data disclosure requirement concerns only data identified with the consumer or whether it extends more broadly to data used to train, validate, or censor the AI system.

EU

Article 13 of the European Union Artificial Intelligence Act, adopted in July 2024, is the most formal and concrete list of governmental transparency requirements, so far. The Act has no direct effect in the United States, but the EU Act is held out as a model by many U.S. advocates of AI regulation.[85]

The EU Act imposes some basic requirements, such as the requirement that developers disclose "any known or foreseeable circumstance . . . which may lead to risks to the health and safety or fundamental rights,"[86] or the requirement that developers disclose "the name of the provider and the version of the system reflecting its relation to previous versions."[87] Others are more sophisticated, such as the requirement that "High-risk AI systems shall be designed and developed in such a way as to ensure that their operation is sufficiently transparent to enable deployers to interpret a system's output and use it appropriately,"[88] and the requirement that they "be accompanied by instructions for use in an appropriate digital format or otherwise that include concise, complete, correct and clear information that is relevant, accessible and comprehensible to deployers,"[89] reinforce patent law's requirement that the disclosure be sufficiently detailed as to enable one skilled in the art to make and use the invention.[90]

Developers must provide:

"A detailed description of the elements of the AI system and of the process for its development, including:

"(a) the methods and steps performed for the development of the AI system, including, where relevant, recourse to pre-trained systems or tools provided by third parties and how those were used, integrated or modified by the provider;

"(b) the design specifications of the system, namely the general logic of the AI system and of the algorithms; the key design choices including the rationale and assumptions made, including with regard to persons or groups of persons in respect of who, the system is intended to be used; the main classification choices; what the system is designed to optimize for, and the relevance of the different parameters; the description of the expected output and output quality of the system; the decisions about any possible trade-off made regarding the technical solutions . . .;

"(c) the description of the system architecture explaining how software components build on or feed into each other and integrate into the overall processing; the computational resources used to develop, train, test and validate the AI system."[91]

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[85] See John Hillman, Smart Regulation: Lessons from the Artificial Intelligence Act, 37 Emory Int'l L. Rev. 775, 822 (2023) (calling for U.S. to catch up to Europe and to use EU Act as a model for regulating AI).

[86] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 on harmonised rules on artificial intelligence, art. 13(3)(b)(iii), 2024 O.J. (L series) 89-90.

[87] Id. Annex IV, § 1(a) at 190-91.

[88] Id. art. 13(1) at 89.

[89] Id. art. 13(2) at 89.

[90] 35 U.S.C. § 112(a) (2023).

[91] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 on harmonised rules on artificial intelligence, Annex IV, § 2(a)-(c), 2024 O.J. (L series) 190-91.

UNESCO

The United National UNESCO organization has published the following ten ethical principles for AI:

> 1. *Proportionality and Do No Harm*. The use of AI systems must not go beyond what is necessary to achieve a legitimate aim. Risk assessment should be used to prevent harms which may result from such uses.
> 2. *Safety and Security*. Unwanted harms (safety risks) as well as vulnerabilities to attack (security risks) should be avoided and addressed by AI actors.
> 3. *Right to Privacy and Data Protection*. Privacy must be protected and promoted throughout the AI lifecycle. Adequate data protection frameworks should also be established.
> 4. *Multi-stakeholder and Adaptive Governance & Collaboration*. International law & national sovereignty must be respected in the use of data. Additionally, participation of diverse stakeholders is necessary for inclusive approaches to AI governance.
> 5. *Responsibility and Accountability*. AI systems should be auditable and traceable. There should be oversight, impact assessment, audit and due diligence mechanisms in place to avoid conflicts with human rights norms and threats to environmental wellbeing.
> 6. *Transparency and Explainability*. The ethical deployment of AI systems depends on their transparency & explainability (T&E). The level of T&E should be appropriate to the context, as there may be tensions between T&E and other principles such as privacy, safety and security.
> 7. *Human Oversight and Determination*. Member States should ensure that AI systems do not displace ultimate human responsibility and accountability.
> 8. *Sustainability*. AI technologies should be assessed against their impacts on 'sustainability', understood as a set of constantly evolving goals including those set out in the UN's Sustainable Development Goals.
> 9. *Awareness & Literacy*. Public understanding of AI and data should be promoted through open & accessible education, civic engagement, digital skills & AI ethics training, media & information literacy.
> 10. *Fairness and Non-Discrimination*. AI actors should promote social justice, fairness, and non-discrimination while taking an inclusive approach to ensure AI's benefits are accessible to all.[92]

UNESCO has been controversial to the extent that the United States withdrew from the organization for a period of years. [93] But its list of principles for AI are sensible, for the most part.

The UNESCO principles are unexceptionable and generally track principles for generative AI deployment articulated by other authorities, including the FTC. The first UNESCO principal

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[92] *Ethics of Artificial Intelligence*, UNESCO, https://www.unesco.org/en/artificial-intelligence/recommendation-ethics (last visited Aug. 14, 2024) [https://perma.cc/7C6B-JZLW].

[93] *See* Angela Charlton & Matthew Lee, *US decides to rejoin UNESCO and pay back dues, to counter Chinese influence*, AP NEWS (June 12, 2023, 6:08 AM), https://apnews.com/article/unesco-us-rejoin-palestine-china-5b7849bd2cae966e4e9837380c0c094f [https://perma.cc/P7E4-5NLD].

appropriately encourages risk assessment. The second principle can be satisfied when AI products are accompanied by instructions to users on safety and security practices. Principle five encourages explainability[94] and audits.[95] Principle six appropriately recognizes that there may be some tension between large amounts of transparency and other interests such as privacy, security, and trade secret protection. Number seven exalts ultimate human responsibility by assuring oversight and human overriding of computer determinations.
The FTC guidance is congruent with the UNESCO principles, but the UNESCO principles are structured in a more easily understandable format.
One of the questionable principles is number four, which would impose stakeholder participation on private sector decision-making, diluting managerial prerogative and accountability and representing an end run around constitutional structures for democratic government.
Another questionable principle is number eight as it could be employed to block energy-intensive AI uses on the grounds that it may worsen climate change. Number nine is unexceptionable to the extent that it is limited to better public education, but if its reference to ethics training empowers self-appointed ethicists who are who have overblown concerns about the impact of new technologies, it is undesirable. Number ten seems to embrace diversity, equity, and inclusion which is controversial because of its tendency to resolve into demonizing of certain ethnic groups and as quotas for the unqualified.

Tools

AI can be regulated by insisting that it be transparent, by imposing governmental command-and-control engineering or performance requirements, and by requiring third-party audits

Transparency mandates

AI transparency refers to decision-making processes, data usage, and underlying algorithms. Transparency can be pursued in a variety of ways:

- Vendors may be subject to post-hoc liability if systems malfunction;
- Vendors can be encouraged or required to adhere to basic principles—broad guidelines that allow for flexibility and adaptability as AI technologies evolve;
- Vendors can be required to meet standards developed through industry consensus, imposed by regulatory agencies, or federal law;[96]
- Products may be prohibited unless they are certified as meeting standards;
- Certain documentation can be required. Comprehensive documentation of AI data sources, model architecture, training processes, and performance metrics can be required.
- Certain disclosures may be mandated.

Requiring transparency is a particularly benign form of regulation. It is far superior to setting either engineering or performance standards for an embryonic technology such as generative AI. Transparency, another name for labeling, improves the position of consumers vis-à-vis suppliers

[94] For more discussion on explainability, see *supra* notes **Error! Bookmark not defined.-Error! Bookmark not defined.** and accompanying text.
[95] *See* discussion of audits *infra* Section 0.
[96] *See, e.g.*, Brad Kelechava, *ANSI Z136.6 – Safe Use of Lasers Outdoors*, AM. NAT'L STANDARDS INST. (Feb. 4, 2016), https://blog.ansi.org/ansi-z136-6-safe-use-of-lasers-outdoors/ [https://perma.cc/S7KR-JK3W].

of AI systems; it redresses the information asymmetry that would interfere in the effective functioning of the market.

The more that a consumer knows about an AI system affecting her, the more empowered she is to make an informed choice about whether to use it at all and, if she uses it, for what purpose and with what precautions. Transparency requirements also provide maximum entrepreneurial and inventive flexibility to innovators. The law does not tell them what to do; it just requires them to explain what they have done and why.

If a regulation requiring transparency interposes its own judgments about which alternatives are better than others, a transparency requirement has morphed into a prescriptive engineering standard.[97]

However, transparency flies in the face of secrecy that many developers rely on to protect their inventions against free riding – popularly known as piracy.[98] But disclosure can be crafted to allow crucial trade secrets to remain secret, and, as this author has suggested elsewhere, transparency requirements may shift developer preferences for intellectual property in the form of patents rather than trade secrets where detailed disclosure is accompanied by twenty-year protection against free riding.[99]

Labelling requirements

Labeling is an oft-used regulatory strategy, aimed at increasing transparency.[100] The requirements are justified as necessary to permit consumers to avoid products containing certain ingredients.[101] Newer proposals for labelling household chemicals are accompanied by proposed requirements for additional testing and the submission of data to regulatory agencies to permit pre-sale determinations of safety.[102] Originating with efforts to protect consumers against adulterated foods and drugs, these have extended into other areas, including genetically modified foods, labeling of alternative fuel vehicles due to environmental concerns,[103] and compliance with fair labor standards in the manufacture of clothing.[104]

The Federal Aviation Administration imposes labeling requirements in the form of placards and markings on aircraft.[105] The FCC imposes labeling requirements on radio devices.[106] The FDA imposes performance requirements, engineering standards and labeling requirements on

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[97] *See* discission of engineering standards *infra* Section 0.

[98] *See* discussion of trade secret protection *infra* Section 0.

[99] Henry H. Perritt, Jr., Undressing AI: Transparency through patents 55-56 (2024) (unpublished comment) (on file with the University of Texas Intellectual Property Law Journal).

[100] *See* Tobias J. Gillett, *Lessons From Nutritional Labeling on the 20th Anniversary of the NLEA: Applying the History of Food Labeling to the Future of Household Chemical Labeling*, 37 WASH. U. J.L. & POL'Y 267, 272-95 (2011) (describing existing and proposed federal labeling requirements).

[101] "The current labeling regulations for most chemical products lack full ingredient disclosure, limiting the ability of consumers to select products without chemicals they wish to avoid." *Id.* at 270.

[102] *See id.* at 301–303 (discussingproposed testing and data submission requirements for chemical manufacturers).

[103] *See generally* Sebastian J. Filgueira, Recent Development, *Comparative Advantage: New Alternative Fuel Vehicle Labeling Requirements*, 1 U. HOUS. ENV'T & ENERGY L. & POL'Y J. 259, 259–261 (2005) (describing history of alternative fuel vehicle labeling requirements).

[104] *See generally* Onno Kuik, *Fair Trade and Ethical Labeling in the Clothing, Textile, and Footwear Sector: The Case of Blue Jeans*, 11 NOVA SE. U. ILSA J. INT'L & COMPAR. L. 619, 627–629 (2005) (assessing value of "social" compared with "environmental" labels to enable consumer product selection); Robert J. Liubicic, *Corporate Codes Of Conduct and Product Labeling Schemes: The Limits and Possibilities of Promoting International Labor Rights Through Private Initiatives*, 30 GEO. L. & POL'Y INT'L BUS. 111, 114–119 (1998) (discussing theoretical justification for labelling of compliance with labor standards andsources of consumer pressure on suppliers).

[105] *See* 14 C.F.R. §§ 27.1541–27.1565 (2024).

[106] *See*47 C.F.R. §§ 2.901, 2.925 (2023).

lasers.[107] The Consumer Product Safety Commission ("CPSC") imposes performance standards and labeling requirements on power lawn mowers.[108] Many of the required labels simply attest compliance with standards.[109] Others must disclose performance and technical data in their warnings.[110]

Transparency in the form of labels for AI systems can be useful for the reasons identified in § 0, supra, but the product avoidance rationale for labels on foods, drugs, and clothing is weaker with respect to certain types of AI systems when the use may be beyond the control of the consumer, and the consumer may have little real choice when it comes to the goods selected or made available by the AI system. Healthcare, welfare benefits, educational admissions, and jobs, financing, insurance are examples.

Whether transparency should be imposed as a means of organizing movements in opposition to the use of the technology presents a weaker justification.

Civil discovery

If an AI system is suspected of having contributed to personal injury or property damage, the person or entity responsible for the AI system is subject to liability in a civil action. The plaintiff has the burden of pleading and proving the elements of a legal theory, presumably negligence. The claim might be based on negligence in the choice of AI systems, and their application, or in their design. Breach of the duty of care with respect to any of these aspects of AI system deployment will be difficult without access to the details of the system, although the doctrine of *res ipsa loquitur* might be available to avoid specific proof of how the system works to produce the injury.[111]

When a claim of negligence or another theory of liability asserted in a civil action brought against the designer or user of an AI system, the details of the system may be discoverable. Discovery results in post-hoc transparency.

The federal discovery rules provide:

"Parties may obtain discovery regarding any nonprivileged matter that is relevant to any party's claim or defense and proportional to the needs of the case, considering the importance of the issues at stake in the action, the amount in controversy, the parties' relative access to relevant information, the parties' resources, the importance of the discovery in resolving the issues, and whether the burden or expense of the proposed discovery outweighs its likely benefit. Information within this scope of discovery need not be admissible in evidence to be discoverable."[112]

In Culligan v. Yamaha Motor Corp.,[113] a federal magistrate applied the federal rules and compelled disclosure of trade secrets in an ATV accident case, but imposed a protective order security the information from further disclosure. The plaintiff sought information about testing, research and development of ATVs such as the one involved in the accident. The magistrate found that the information was relevant and necessary to proving the plaintiff's case, and that

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[107] *See* 21 C.F.R. § 1040.10 (2024).
[108] *See* 16 C.F.R. §§ 1205.6, 1205.35, 1205.36 (2024).
[109] *See, e.g.,* 16 C.F.R. § 1420.3(b)(2024) (requiring label on ATV certifying compliance with "action plan" filed with CPSC).
[110] *See, e.g.,* 16 C.F.R. § 1407.3 (2024) (imposing labeling requirement on portable electric generators).
[111] *See* Henry H. Perritt, Jr., *Who Pays When Drones Crash?*, 21 UCLA J. L. & TECH. 1, 27–29, 31 (2017) (exploring how to establish liability via res ipsa loquitur when robots are involved in vehicle crashes causing injury).
[112] FED. R. CIV. P. 26(b)(1).
[113] Culligan v. Yamaha Motor Corp., 110 F.R.D. 122 (S.D.N.Y. 1986).

any harm to the defendant's competitive interests could be reduced or eliminated by entry of a protective order.[114]

State rules are similar. In Ex Parte Miltope Corp.,[115] the Alabama Supreme Court granted a writ of mandamus against compelling an employer to produce internal records of boar meeting minutes that constituted trade secrets and were, at best, peripheral to the plaintiff's claim for unpaid commissions. Trade secrets should receive greater protection from discovery, the court held.[116]

In In re Kongsberg Inc. ~~and Bombardier Recreational Products, Inc~~.,[117] the Texas intermediate court granted a writ of mandamus against an order compelling the defendant to produce trade secrets in discovery in a motorcycle accident case. The information sought related to computer software used to receive and analyze data from the motorcycles such as the one involved in the accident, particularly the power steering unit, which the plaintiff alleged had malfunctioned. The plaintiff's expert admitted that he was present when defendant personnel ran the software and extracted data, which they gave to the expert. He also was allowed to make a video recording of the screens while the software was running.[118]

The court applied the standard for discovery of trade secrets in Texas: that "the party seeking the discovery must prove that the discovery is necessary to the fair resolution of the claims that have been raised in the case."[119] The court found that the other forms of access and the willingness of the defendant to do additional runs of the software in the defendant's presents made disclosure of the trade secrets unnecessary.[120]

When trade secrets are subject to discovery, they must be shielded from broader disclosure by a protective order, as the court held in Columbia Hospital (Palm Beaches) Ltd. Partnership v. Hasson.[121] It concluded that the plaintiff was entitled to discovery of the trade secrets, but that discovery should have been stayed until a protective order was imposed.[122]

So a plaintiff in a civil lawsuit is likely to be able to discover the details of an AI system, including the detailed of its learning databases and the way in which it used machine learning if the plaintiff can overcome any trade secret assertion by showing the need for discovery because of the absence of any other way to prove the plaintiff's case and a willingness to adhere to a protective order protecting the trade secrets.

Command-and-control regulation

Regulatory agencies engage in command-and-control regulation when they impose standards of conduct and prescribe penalties for not living up to those standards. This is quite different from merely mandating transparency.[123] Command-and-control regulation is particularly inappropriate

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[114] *See id*. at 125-26.
[115] *Ex Parte* Miltope Corp., 823 So. 2d 640 (Ala. 2001).
[116] *See id*. at 645.
[117] *In re* Kongsberg Inc., 563 S.W.3d 915 (Tex. Ct. App. 2018).
[118] *See id*. at 918-19.
[119] *Id*. at 921.
[120] *Id*. at 923.
[121] Columbia Hosp. (Palm Beaches) Ltd. P'ship v. Hasson, 33 So.3d 148 (Fla. Dist. Ct. App. 2010).
[122] *Id*. at 150-51.
[123] *See* Webb v. Trader Joe's Co., 418 F. Supp. 3d 524, 528-30 (S.D. Cal. 2019) (noting agency opposition to command-and-control regulation; finding federal preemption of consumer's state law claim); Stephen Breyer, *Analyzing Regulatory Failure: Mismatches, Less Restrictive Alternatives, and Reform*, 92 Harv. L. Rev. 549, 570-75, 579-80 (1979) (explaining advantages of disclosure regulation over standard setting).

for new technologies where the risks and modes of operation may not be well understood.[124] When legislators or agency regulators develop and impose command-and-control performance or engineering standards, they must base them on adequate knowledge about risks and how to prevent them. Such knowledge may be lacking in new technology areas such as generative AI. Even with more mature technologies, the nature and level of risks in the efficacy of mitigation measures may be hotly contested.[125]

Performance standards v. engineering standards

Command-and-control regulation can take the form of performance standards, or engineering and design standards. The Office of Management and Budget requires federal agencies to prefer performance standards:[126] "To the extent feasible, [agencies should] specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt."[127]

The FAA recognizes the superiority of performance standards over engineering or design standards:

> It is well understood that regulations that are articulated in terms of the desired outcomes (i.e., "performance standards") are generally preferable to those that specify the means to achieve the desired outcomes (i.e., "design" standards). According to Office of Management and Budget Circular A–4 ("Regulatory Analysis"), performance standards "give the regulated parties the flexibility to achieve the regulatory objectives in the most cost-effective way.
>
> Design standards have a tendency to lock in certain approaches that limit the incentives to innovate and may effectively prohibit new technologies altogether. The distinction between design and performance standards is particularly important where technology is evolving rapidly, as is the case with small UAS.[128]

In the air and water pollution contexts, for example, a performance standard can be set at the effluent levels achievable by the best available technology, while leaving the choice of the particular technology to be used to the regulated entity.[129]

One disadvantage of any performance-based regulatory standard is unpredictability. A regulatee has flexibility to choose how to meet the performance standard, but he has no guarantee that the regulator or a court hearing a civil claim may not reach a different conclusion, after the fact, about the most appropriate way to meet the standard. Uncertainty can be reduced by publication of a non-exclusive safe harbor. A regulatee may apply different standards at its discretion, but if it seeks more certainty, it can apply the published, safe harbor standard. By proving that it followed the published standard, it has protection against being found in violation or being held liable.

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[124] *See* Ass'n of Irritated Residents v. State Air Res. Bd., 206 Cal. App. 4th 1487, 1503 (2012) (noting that command and control regulation may be infeasible in the face of scientific uncertainty; upholding aspirational regulations).

[125] CITE for tong war over risks and mitigation measures

[126] *See* Jay P. Kesan & Rajiv C. Shah, *Shaping Code*, 18 HARV. J.L. & TECH. 320, 340–41 (2005) (distinguishing performance standards, design standards, and best-available-technology standards and briefly summarizing criticisms of each).

[127] *See* Improving Regulation and Regulatory Review, 76 Fed. Reg. 3821 (Jan. 21, 2011).

[128] Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9552 (Feb. 23, 2015).

[129] *See* Richard L. Revesz & Allison L. Westfahl Kong, *Regulatory Change and Optimal Transition Relief*, 105 NW. L. REV. 1581, 1597 (2011) (explaining that performance standards allow for technological innovation, while design standards do not, in the context of water-pollution regulation); *see also* Timothy Malloy, *The Social Construction of Regulation: Lessons from the War Against Command and Control*, 58 BUFF. L. REV. 267, 310–19 (2010) (arguing superiority of performance standards, and evaluating how they are used by EPA in regulating air pollution).

Antitrust guidelines published by the Department of Justice[130] are a good example of this approach.

If a regulatory agency were to require that large learning models for images must use convolutional neural networks with an input shape of 224 x 224 x 3, 64 filters in the first convolutional later, with a 3 x 3 kernel, and 128 filters in the second convolutional later with a 3 x 3 kernel, that would be an engineering standard. If the agency instead were to require that large learning models for images must produce accurate matches with an error rate of less than 0.05, that would be a performance standard.

It is not uncommon for agencies sitting either engineering or performance standards to require agency certification that a product meets the standards before it can be released into the market. This is the case with new drugs receiving approval from the FDA[131] and new aircraft receiving airworthiness certificates from the FAA.[132]

The October, 2023 executive order is an example of quite general performance standards.[133] The EU AI Act's Article 15 is an example of performance standards for accuracy, robustness and cybersecurity: "AI systems shall be designed and developed in such a way that they achieve an appropriate level of accuracy, robustness, and cybersecurity, and that they perform consistently in those respects throughout their lifecycle."[134] Commentators have identified other performance standards.[135]

Example of performance standards for machine learning:

"Learning databases must be adequate in size in representative in scope to permit valid statistical modeling of the relevant universe of content or subjects. The tools used to develop predictive algorithms from such databases must reflect best available practices."

Example of performance standards approach focused on system results:

"Covered systems must not discriminate based on legally prohibited characteristics or conduct. They must produce reasonably accurate results adequate for their intended uses. Their results must be explainable. They must be reasonable efficient, considering their intended uses. The fact of their use, their intended uses, and any appropriate precautions on their use must be disclosed to users in an easily understandable form."

Performance standards can morph into engineering standards when they are linked to mandatory or voluntary technical guidelines that are detailed in nature. Test protocols, and performance metrics can begin this slippery slope.

Certification

The stiffest form of command-and-control regulation – after an outright prohibition – is a premarket approval requirement. The EU AI act prohibits placing on the market AI systems with

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[130] *See* U.S. DEP'T OF JUST., ANTITRUST DIV., ANTITRUST DIV. MANUAL ch. 7 (5th ed. 2015), http://www.justice.gov/sites/default/files/atr/legacy/2015/05/13/chapter7.pdf [http://perma.cc/8STB-A42R].

[131] 21 U.S.C. § 355(a) (prohibiting introduction of new drug unless approved by FDA).

[132] 49 U.S.C. §§ 44704 (authorizing issuance of type certificates, design and production certificates, and airworthiness certificates); § 44711(a)(1) (prohibiting operation of aircraft without airworthiness certificate).

[133] *See* § 0, analyzing Executive Order.

[134] 2024 O.J. (L 1686) 15.

[135] *See* Diana M. Thomas et al, Machine learning modeling practices to support the principles of AI and ethics in nutrition research, 12 Nut. & Diab., 48 (2022), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9715415/ (offering criteria for best machine learning practices).

certain goals and features, for example.[136] Often, regulatory agency approval will be memorialized by some kind of certification.[137]

Alternatively, regulated entities may be obligated to meet certain engineering or performance standards but allowed to decide for themselves if they have met them before introducing their products into the stream of commerce. Explicit self certification may be required.[138] If the product does not in fact meet the regulatory standards, enforcement may occur through private civil actions, agency enforcement orders and civil penalties, or, less often, criminal prosecution. Such post market enforcement allows more flexibility to entrepreneurs and avoids regulatory delay, but it presents a level of of uncertainty that many entrepreneurs and more established businesses abjure.

Preapproval represents the greatest burden on the regulatees and the greatest barrier to innovation. So a fundamental question in crafting an approach to AI regulation is whether the preapproval strategy can be replaced by self-certification. It can. In fact, self-certification is the prevailing way to assure compliance with safety standards in industries such as motor vehicles, consumer products, and consumer electronics.

Anyone is prohibited from selling or distributing a motor vehicle unless it complies with federal safety standards.[139] Manufacturers must certify compliance to the next entity in the stream of commerce—for example, to dealers[140]—and must also affix a certificate of compliance to the vehicle.[141]

Manufacturers are responsible for doing whatever they deem necessary to certify compliance with Federal Motor Vehicle Safety Standards (FMVSSs). "This is a self-certification process as opposed to the type of approval process which is used in some other countries such as Japan. The National Highway Traffic Safety Administration ("NHTSA") does not issue approval tags, stickers or labels for vehicles or equipment items before or after the first sale."[142] NHTSA does not specify test procedures or quality control programs. Those are decisions left to the manufacturer.[143]

The Consumer Product Safety Act[144] establishes an independent regulatory commission, the Consumer Products Safety Commission ("CPSC"), authorized to develop "uniform safety standards for consumer products" and to reduce conflict between federal regulation and state and local regulation.[145]

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[136] 2024 O.J. (L 1686) 5(1).

[137] See NHTSA Importation and Certification FAQs, (https://www.nhtsa.gov/importing-vehicle/importation-and-certification-faqs#:~:text=For%20motor%20vehicles%2C%20the%20certification,on%20its%20date%20of%20manufacture.)

[138] Self Certify in Special Ed, CITE, https://www.citeprograms.com/self-certify-in-special-ed/ (For self certification).

[139] 49 U.S.C. § 30112 (2012) (prohibition on selling noncompliant vehicles).

[140] *Id.* § 30115 (requiring certification of compliance).

[141] 49 C.F.R § 567.4 (2013) (requiring certification placard).

[142] NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP'T OF TRANSP., COMPLIANCE TESTING PROGRAM (Aug. 18, 1998), http://www.nhtsa.gov/cars/testing/comply/Mission/1_ovsc_1.html [http://perma.cc/DS3M-MT4F]. *Accord*, Stephen P. Wood, et al., *The Potential Regulatory Challenges of Increasingly Autonomous Motor Vehicles*, 52 SANTA CLARA L. REV. 1423, 1435 (2012) (asserting th "NHTSA does not certify or approve products"; self-certification is the regulatory approach).

[143] NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 142.

[144] 15 U.S.C. § 2053 (2012).

[145] *Id.* § 2051.

The Consumer Products Safety Improvement Act (CPSIA)[146] sets regulations for "children's products" and rules for compliance by the manufacturers or importers into the United States.[147] The products must comply with children's product safety rules, be tested for compliance by an accredited laboratory, provide evidence through a certificate of the product's compliance, and have a tracking number that contains information about the manufacturer, location of production, and details about the manufacturing process.[148]

Walk-behind lawn mower manufacturers and importers must certify their safety compliance by labeling their products accordingly.[149] The manufacturer or importer must issue certificates of safety based on a "reasonable testing program."[150] Unlike children's products, such as cribs, walk-behind lawn mowers do not require certification at an accredited laboratory.[151] A manufacturer can establish a "reasonable testing program" through which testing "provides reasonable assurance" of the safety standards.[152] A manufacturer can divide products into production lots and certify an entire lot by only testing a sample.[153] If the product fails the testing, the manufacturer cannot certify any member of the production lot unless the manufacturer makes necessary adjustments for safety conformity.[154]

Unintentional radio frequency ("RF") radiators pose some risk of RF interference, but not nearly as much as intentional radiators. Accordingly, the FCC's regulatory regime, aimed at reducing the risks of RF interference, allows self-certification of compliance by the vendors of low-risk unintentional radiators. However, the FCC prescribes default testing procedures even for these vendors. Intentional radiators, posing a higher risk, must be certified by the FCC in advance of the sale.

The FCC regulations[155] define classes of electronics for the purpose of certification. A consumer device can be an intentional, an unintentional, or an incidental radiator. An intentional radiator emits radio frequencies through induction or radiation. An unintentional radiator emits internal radio frequencies.An incidental radiator emits radio frequencies but was not designed for that purpose.[156] An electronic manufacturer can self-certify its product through Verification[157] or a Declaration of Conformity,[158] or it can seek Certification[159] prior to marketing, pursuant to FCC requirements. All methods require manufacturers to test their products and take the necessary measurements to "ensure that the equipment complies with the appropriate technical standards."[160] Certification, however, requires the applicant to submit measurements and test data for approval.[161] The FCC does not require manufacturers to send their product for approval

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[146] Consumer Products Safety Improvement Act of 2008, Pub. L. No. 110-314, 122 Stat. 3016 (2008).
[147] *See id.*
[148] *See id* §§ 102, 103, 122 Stat. at 3022, 3028
[149] 16 C.F.R. § 1205.30.
[150] *Id.*
[151] *See id.* § 1205.33.
[152] *Id.* § 1205.33(b)(1).
[153] *See id.* § 1205.33(b).
[154] *See id.* § 1205.33(b)(4).
[155] Federal Communications Commission, 47 C.F.R. Ch. 1(2014).
[156] *See id.* § 15.3.
[157] *Id.* § 2.902.
[158] *Id.* § 2.906.
[159] *Id.* § 2.907.
[160] *Id.* §§ 2.906–2.907.
[161] 47 C.F.R. § 2.907 (2014).

unless specifically requested,[162] but the FCC requests test measurements for Certification. Whether a manufacturer requires a Declaration of Conformity ("DoC") or Certification depends on the class of radiator and type of electronic device—discussed in a subsequent paragraph. The level of burden depends on the type of spectrum occupied. The devices that require Verification simply receive signals and do not transmit. The devices that require a DoC transmit signals but occupy unlicensed spectrums. The devices that require Certification occupy licensed and congested spectrums. The following types of electronic equipment authorizations are listed in ascending order by their level of compliance burden:

Devices like FM and Television broadcast receivers can self-certify through verification. By verification, the manufacturer determines that the product complies with FCC technical standards.[163]

Unlike DoC and Certification, Verification requires testing at any laboratory—the laboratory need not be accredited. Manufacturers must design products to comply with FCC regulations that govern radio frequency emissions. For devices that connect to the public utility power lines, the product shall not exceed the limits of radio frequency voltage introduced back into the AC power lines.[164] Products also have limits on radio frequency emissions measured from various distances.[165]

The Declaration of Conformity by a manufacturer signifies that the product complies with FCC regulations.[166] DoC does not differ from Verification except that a DoC requires testing by an accredited laboratory.[167] The FCC requires the same document maintenance[168] and may request a sample product for testing.[169]

A Declaration of Conformity is sufficient for Consumer Industrial, Scientific, and Medical ("ISM") devices like WiFi Access Points ("APs").[170] Manufacturers must test their products in an accredited laboratory equipped with an anechoic chamber to take measurements of their devices. One of these measurements is antenna power.[171]

Audits

Producer compliance with regulatory guidance or mandates can be assured by third-party audits, as is common with respect to corporate finance regulation.[172]

AI auditing enterprises are beginning to advertise:

"Establish trust in your AI systems: Conduct audits of your AI systems to showcase the trustworthiness of your technology… Show impartiality. Provide quantitative measures of

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[162] *See id.* §§ *2.902*–2.907.
[163] *Id.* § 2.952.
[164] *See id.* § 15.107.
[165] *See id.* § 15.109.
[166] *Id.* § 2.906.
[167] *See Equipment Authorization Procedures*, FED. COMMC'NS COMM'N, https://www.fcc.gov/oet/ea/procedures.html [https://perma.cc/9XKT].
[168] 47 C.F.R. § 2.1075 (2014).
[169] *Id.* § 2.1076.
[170] An access point (AP) is not what is commonly referred to as a router. What consumers generally consider a router includes a device directs traffic between the local area network (LAN) and the wide area network (WAN) called the router, a network switch that allows physical connections into the device, and a wireless access point (AP) that allows wireless connection with the network.
[171] 47 C.F.R. § 15.247 (2024) (limiting antenna power to 1 watt). *See also FCC Rules Dictate Antenna Use*, BITSTORM, http://www.bitstorm.com/fcc-regulations/ [http://perma.cc/K75S-6Y8Y] (last visited Sept. 24, 2014).
[172] Touche Ross & Co. v. SEC, 609 F.2d 570, 580-581 (2d Cir. 1979) (explaining purpose of requirement that financial statements be audited).

subgroup differences of AI systems to build trust with your customers … Prove reliability. Showcase the integrity of your tech to relevant stakeholders and its resilience to malicious activity… Minimize AI risk. Mitigate potential financial, legal, and reputational risk to innovate with confidence.“[173]

“BABL AI employs Certified Independent Auditors to ensure your AI systems comply with the ever changing AI regulation landscape. Our Independent Third-Party Audits follow globally recognized assurance engagement standards, similar to financial auditing.”[174]

Senators John Hickenlooper (D-CO) and Shelly Capito (R-WV) introduced S.4769, the ”Validation and Evaluation for Trustworthy (VET) Artificial Intelligence Act” or the VET Artificial Intelligence Act, ”to require the Director of the National Institute of Standards and Technology to develop voluntary guidelines and specifications for internal and external assurances of artificial intelligence systems.”[175] Among other things, the bill requires a study “to evaluate the capabilities of the sector of entities that conduct internal artificial intelligence assurances and external artificial intelligence assurances” [176] and to report on desirability capabilities of such entities and steps to be take for improving capability and availability.[177] Booz Allen and the Institute of Internal Auditors have endorsed S.4769,[178] no doubt seeing business opportunities.[179]

Audits as part of transparency requirements are better than governmental command and control regulation. But they are not risk-free. Organizations deriving the revenue from the performance of audits have an incentive to exaggerate risks and to become the center of a kind of racket.

Procedure

Guidance for product design and use may be developed through legislative or rulemaking processes, in the case of command and control regulation, by industry standards bodies,[180] or inferred as best industry practices.[181]

The existence of command-and-control standards presupposes some governmental entity to establish them. But after they are established, the entity either may have enforcement powers, or enforcement may be left up to civil litigation left by private plaintiffs through civil litigation Alternatively, standards can be developed on a case-by-case basis through civil litigation or agency enforcement orders. The common law has long experience in working out standards for duties associated with the negligence concept, for example.[182]

Penalties for violating command-and-control standards or for failing to live up to self- articulated guidelinesmust be balanced. They should be severe enough to give rise to a disincentive for noncompliance, while not so great as to discourage participation in the market altogether.

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[173] Holistic AI, https://www.holisticai.com/ai-audit [https://perma.cc/Y6VD-KAFT] (visited Aug. 11, 2024).
[174] Babl, https://babl.ai/ [https://perma.cc/B5VX-YNW2] (visited Aug. 11, 2024).
[175] S.4769, 118th Cong. 2d Sess. (Introduced July 24, 2024).
[176] Id. § 6(a).
[177] Id. § 6(c).
[178] Press release: “Hickenlooper, Capito Introduce Bipartisan Bill to Create Guidelines for Third-Party Audits of AI“, July 25, 2024, https://www.hickenlooper.senate.gov/press_releases/hickenlooper-capito-introduce-bipartisan-bill-to-create-guidelines-for-third-party-audits-of-ai/.
[179] *See also* Geoff Schaefer, BOOZ ALLEN JOINS RESPONSIBLE AI INSTITUTE (May 28, 2024), https://www.boozallen.com/insights/ai/responsible-ai-institute.html.
[180] CITE industry standard.
[181] CITE case on best industry practices
[182] CITE for some concrete negligence standard

Regulatory philosophy

Regulation of new technology should not be based on speculation about the technology's effects. A new technology such as generative AI, the telegraph, radio, or the automobile, when it just leaves the lab, can and often does fan excited speculation about all the harms it might do.[183] Writing law around those fantasies is a bad idea. Law should address actual risks; not imagined ones.

Instead, legislators and regulators should wait for the technology to be deployed in the marketplace. That will happen in hard-to predict ways based on how well the technology resonates with entrepreneurs and investors and how much traction it has with potential consumers. Most "inventions" are never commercialized; they never need to be regulated.

Then, the risks associated with the technology will become apparent, but only after it is been in use for a period of time. Various kinds of mishaps are inevitable, but they are hard to predict.

And then, when mishaps do occur, some are so trivial that no one cares to fight about them, so the legal system should wait a while longer to see what mishaps mature into lawsuits.

Then, the system should wait some more to see how the judges decide those lawsuits. Only then are conditions ripe for possible regulation or legislation to correct erroneous judgments or to fill in the gaps that could not be satisfied by civil litigation under existing law.

Why is transparency a common theme?

The clamor for regulation of AI has not crystallized on any particular regulatory approach. Transparency, however, is prominent among almost all of the regulatory proposals. Requiring transparency is a particularly benign form of regulation. It is far superior to setting either engineering or performance standards for an embryonic technology such as generative AI. Transparency, another name for labeling,[184]1 improves the position of consumers vis-à-vis suppliers of AI systems; it redresses the information asymmetry that would interfere in the effective functioning of the market.

Transparency mandates, often called *disclosure* requirements in the US regulatory context, are a relatively gentle form of regulation. They leave it up to the regulated entity to decide on the design of its products and services, on their intended uses, on their marketing, and on any instructions to consumers. The entity's only obligation is to tell the public about its decisions and choices. Transparency requirements, as opposed to more substantive forms of command-and-control regulation, are appropriate in three circumstances:

1. When legislators and regulators do not know enough about new technologies and the products that embody them to define command-and-control engineering standards or performance standards;
2. When the risks are such that the intrusion of substantive regulation is unwarranted and consumers need only to be fully informed to make choices about what risks to tolerate;
3. When an agency lacks authority to impose more substantive requirements. The Federal Trade Commission is an example. It has thirty years of history in regulating based on disclosure instead of setting standards itself;[185] and

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[183] CITE e.g.s of horror stories about radio and automobiles and telephone

[184] *See infra* § 0 (analyzing labeling requirements as form of regulation).

[185] FED. TRADE COMM, , Privacy and Security Enforcement, https://www.ftc.gov/news-events/topics/protecting-consumer-privacy-security/privacy-security-enforcement (visited Aug.

4. When political will is insufficient to impose more substantive requirements.

Transparency mandates in the form of disclosure and labeling requirements are pervasive.[186] Imposing transparency requirements does not foreclose the possibility of command-and-control regulation as well. In any event a disclosure or label may represent an enforceable representation to the consuming public, giving rise to actions for deceptive trade practices if they are violated.[187]

Transparent AI systems enhance accountability by enabling users to understand how decisions are made. When users understand how an AI system works, they are more likely to trust its outputs and recommendations. Transparency helps avoid bias, intellectual property infringement, and invasions of personal data privacy. It also helps evaluate the propensity of systems to hallucinate.

Transparency allows consumers to make intelligent selections among products according to each consumer's value systems. A consumer might avoid a novel written largely by a generative AI system or a television program scripted largely by generative AI system. This justification for transparency would not, however, operate with respect to AI systems used to select people for employment or other kinds of benefits. The decision whether to deploy AI technology as part of the selection process is out of the hands of the applicant, and the applicant likely does not want to avoid applying for the affected benefits.

Transparency also may facilitate decisions by injured parties and their lawyers whether to file civil actions, relieving them of the cost and inconvenience of filing a lawsuit first and then engaging in civil discovery.

Most broadly, transparency permits activists to mobilize consumer resistance to and l political pressure against AI systems that the activists disfavor. In other words, transparency facilitates public shaming.[188]

Achieving AI transparency is challenging. Many AI systems based on deep learningare inherently complex and operate as "black boxes." Their decision-making processes are not easily interpretable, even by their developers and outside experts. Detailed disclosures about how data is used and processed can potentially expose private personal information. Transparency may jeopardize the trade secrets developers rely on to protect themselves against piracy.

Elements that might be transparent

In the field of artificial intelligence (AI), full transparency involves detailed information about data sources, model architecture, training processes, and performance metrics. The FTC guidelines are a reasonably comprehensive collection of the subjects as to which transparency might be required.[189]

13, 2024) (“When companies tell consumers they will safeguard their personal information, the FTC can and does take law enforcement action to make sure that companies live up these promises” by charging them with unfair and deceptive acts).

[186] *See infra* § 0. .

[187] *See supra* note 185.

[188] *See* Margaret Kwoka & Bridget DuPery, *Targeted Transparency as Regulation*, 48 FLA. ST. UNIV. L. REV. 385, 388-389 (2021) (explaining purposes of private sector transparency (disclosure) requirements and noting criticisms that they are ineffective, though popular).

[189] *supra* § 0.(analyzing FTC guidelines).

In considering the utility of any taxonomy of transparency requirements, one must evaluate how well they accommodate the operations of different kinds of AI systems, at least including AI systems that make decisions or recommend decisions as to medical treatment, employment, insurance coverage, or welfare benefits, systems that create content such as those that draft news stories, essays or fiction, those that analyze historical facts or current events, those that create still or full-motion video imagery, those the write music, AI deployed in connection with the operation of physical devices, such as autopilots for aircraft, space systems, and motor vehicles. With that in mind, transparency reasonably can be required in the following forms:

- Disclosureof the use of AI in a particular implementation or with respect to particular decisions;
- Disclosure of the purpose of such use;
- Disclosure of the risks of use;
- Disclosure of the content of learning data bases;
- Disclosure of machine learning models;
- Disclosure of results reviews;
- Disclosure of validation methods;
- Disclosure of audits and their results; and
- Disclosure of human appeal mechanisms

Each of these is considered in the sections that follow.
Relying on developer reporting and assessment of use and results is better than simply disclosing the technologies and models without explanation. If that is done, evaluation becomes a kind of free-for-all in the public arena, with many ill-informed commentators and many pursuing undisclosed agendas.

Disclose the use of AI

The simplest form of AI transparency requirement is to mandate the disclosure that AI tools have been used, in connection with the creation of a news story or sports report, in an advertisement, in a still image or animation, in a decision regarding benefits, employment, insurance coverage, or medical treatment, or in the operation of a physical device.
The disclosure may be required to include the purpose of such use and the risks of use.
These types of transparency provide benefits in terms of correcting for information asymmetry in the market and enabling consumer choice.[190] Disclosure of risks also enhances consumer choice, but may confuse consumers if the magnitude of the risks that must be disclosed is de minimis. Disclosure of specific risks of use tracks the requirements that corporate filings contain a risk assessment section,[191] that human drugs must identify risks,[192] and that aircraft flight manuals identify the risks of particular maneuvers and configurations.[193]

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[190] *See* Noga Blickstein Shchory, *Information Asymmetries in E-Commerce: The Challenge of Credence Qualities*, 20 J. HIGH TECH. L. 1, 10-11 (2020) (explaining information asymmetry as a type of market failure).
[191] *See* 17 CFR § 229.105 (2024) (requiring discussion of material risk factors in registration statements filed with SEC).
[192] *See* 21 CFR § 369.20 (2024) (providing language for mandatory risk warnings on drugs).
[193] *See* 14 CFR §§ 23.2620 (2024) (requiring aircraft flight manual to disclose information necessary for safe operation because of aircraft characteristics); 23.2615(a)(2) (2024) (requiring aircraft systems to include limitations).

Disclose machine learning methods: Inside the black box

Disclosure of the content of learning databases, disclosure of machine learning models, and disclosure of validation methods present the greatest concerns. They are most likely to intrude into trade secret protections, and knowing the details of machine learning models and validation methods may not enable anyone lacking considerable expertise in the technology of machine learning to act differently because of receiving the knowledge.
Disclosure of the content and characteristics of the learning databases, however, can reveal basic characteristics of the machine learning process that may impair or enhance the robustness of the results, and therefore there is a stronger argument for disclosure of that information even though it risks impairing trade secret protection.

Learning database

The selection of the learning database matters. If a generative AI system were trained only on textual artifacts drawn from the archives of the Ku Klux Klan, it would generate new expression that is be racist and otherwise reflect the attitudes of the language on which it was trained. If a generative AI system were trained on the Marxist literature of the 1920s and 1930s, the expressions that it would generate would have a Marxist bias.
Depending on the context, its reasonable for users and regulators to assure themselves that this kind of biased learning did not shape a particular model. At the same time, many activists wish that history were different: that slavery had not occurred; that Jews had been welcomed into white shoe New York law firms in the early part of the 20th century, that gay sexual orientation had been accepted during the 1940s and 1950s. Many of them would like to impose censorship requirements or generative AI systems forcing them to be unfaithful to a history that displeases the activists.

Documenting data sources is fundamental to understanding the foundation upon which AI models are built. It involves detailing where the data comes from, how it was collected, and any preprocessing steps undertaken. High-quality data is essential for creating reliable AI models. Documentation helps identify potential issues in data collection and preprocessing that could affect model performance. Researchers and developers can replicate studies and validate findings if they have access to comprehensive data source information. Detailed documentation ensures compliance with legal and ethical standards, such as data privacy regulations.

Transparency of data source can disclose for example, the fact that unfiltered social media rather than Wikipedia entries comprised the learning database. It can relate to the scope of the data, for example that the learning database for the face recognition system included only photographs of prison inmates and mugshots of arrestees, as compared to the full range of photographs that appear on Facebook, Instagram, and YouTube. Temporal scope also may be disclosed, if, for example, only data in the public domain before 2020 was used in the learning database.
When coded data is involved, transparency of data can require disclosure that race was coded but not income level.
Data transparency also may require an evaluation of the representativeness of the data, considering the intended use of the learned algorithms. Recency of learning data is likely to be less important in systems intended for generation of images than those intended to generate essays or reports about current events.

Transparency of all these types also can be applied to validation databases as well as to learning databases. How did the developer evaluate a propensity to hallucinate, for example? What standards did he use to determine the truth as compared to possibly false hallucinatory results? Transparency can extend to the organization or platform from training data was obtained, detailed descriptions of instruments and techniques for collecting the data, the scope of the data, including size, diversity, evaluation of the data's representativeness, any augmentation techniques used such as steps taken to clean, normalize, and preprocess the data before it is used for training, information on how data was labeled or annotated, including the expertise of annotators, and documentation of consent obtained from data subjects, anonymization techniques, and any intellectual property involved. The training procedure can be described, including data splitting (e.g., train/validation/test), and any cross-validation techniques used.

Model architecture

Transparency of model architecture provides insights into the complexity and capabilities of the model, helps users understand model limitations, helps developers and users understand the model's structure for troubleshooting and iterative improvements, and ensures consistency in model deployment across different application environments.

The model type fundamentally defines how an AI system processes input data to produce outputs. It affects the model's complexity, interpretability, and suitability for specific tasks. Documenting the model type helps stakeholders understand the model's capabilities and limitations. Detailed documentation allows other researchers and developers to replicate the model, ensuring that results can be independently verified.

The documentation would specify whether the model is a supervised, unsupervised, or reinforcement learning model. It would indicate the specific algorithm used (e.g., logistic regression, support vector machine, deep neural network). It would describe the intended use justify the selection of this model type.

The number of training iterations or epochs and the criteria for early stopping can be disclosed.[194]

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[194] In an NLP model training process, documentation might include:

- **Training Data**:
  - Size: 1 million sentences.
  - Diversity: Sentences from multiple domains (e.g., news, blogs, academic).
  - Augmentation: Synonym replacement, random word dropouts.
- **Training Procedure**:
  - Data splitting: 80% train, 10% validation, 10% test.
  - Cross-validation: 5-fold cross-validation.
- **Hyperparameter Tuning**:
  - Initial grid search over learning rates [0.001, 0.01, 0.1], batch sizes [16, 32, 64].
  - Final tuning using Bayesian optimization.
- **Training Environment**:
  - Hardware: NVIDIA V100 GPUs.
  - Software: PyTorch 1.7, CUDA 10.2.
- **Performance Monitoring**:
  - Loss function: Cross-entropy loss.
  - Metrics: Accuracy, F1-score, Precision, Recall.
  - Validation checks every 1000 iterations.
- **Training Iterations**:

The documentation would specify the types of layers used (e.g., convolutional, pooling, dense), include parameters for each layer, such as the number of units, kernel size, activation functions, and dropout rates, and describe how layers are connected, including any skip connections or residual links.[195]

Hyperparameters also would be documented. Hyperparameters are critical settings that influence the training process and final performance of an AI model. Hyperparameter details include**:** the Learning Rate, which specifies the step size used in updating model parameters during training; the Batch Size, which indicates the number of training examples used in one iteration; the Number of Epochs--the number of complete passes through the training dataset; the regularization Parameters-- settings for techniques like dropout rate or L2 regularization; and the optimizer--the optimization algorithm used (e.g., SGD, Adam).

The training framework encompasses the software and tools used to develop and train the AI model. Documentation would include the software Framework: The main software used for model development (e.g., TensorFlow, PyTorch); libraries and dependencies required to run the model; details of the hardware used for training, such as GPU types and memory.

Architectural diagrams visually represent the structure and flow of an AI model, making it easier to understand its design and operation. They show how data moves through the model from input to output; visually represent of the connections between different layers, including any special

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- Epochs: 30.
- Early stopping criteria: No improvement in validation loss for 5 consecutive epochs.

Epoch: An essential notion in real-time programming, DATASCIENTIST, (June 2, 2023), https://datascientest.com/en/epoch-an-essential-notion [https://perma.cc/SK2W-ER3S] (explaining epochs and asserting that 11 epochs is ideal for training on most datasets); Neri Van Otten, *F1 Score The Ultimate Guide: Formulas, Explanations, Examples. Advantages, Disadvantages, Alternatives & Python Code*, SPOT INTELLIGENCE (May 8, 2023), https://spotintelligence.com/2023/05/08/f1-score/#:~:text=The%20F1%20score%20is%20a%20metric%20used%20to%20evaluate%20the,and%200%20indicating%20poor%20performance [https://perma.cc/6ZCK-WYFU] (explaining F1 score); Saurav Maheshkar, *What Is Cross Entropy Loss? A Tutorial With Code*, WEIGHTS & BIASES (June 26, 2024), https://wandb.ai/sauravmaheshkar/cross-entropy/reports/What-Is-Cross-Entropy-Loss-A-Tutorial-With-Code--VmlldzoxMDA5NTMx#:~:text=Cross%20entropy%20loss%20is%20a,close%20to%200%20as%20possible [https://perma.cc/3KN6-XB68] (explaining cross-entropy loss as one of the most common loss functions for training neural networks); *Hyperparameter tuning*, GEEKSFORGEEKS (Dec. 7, 2023), https://www.geeksforgeeks.org/hyperparameter-tuning/ [https://perma.cc/YW2T-JBGL] (explaining hyperparameter tuning for learning rate, number of neurons, and kernel size).

[195] For a CNN used in image classification, layer details documentation might include:

- **Input Layer**: Input shape (224x224x3 for RGB images).
- **Conv Layer 1**: 64 filters, 3x3 kernel, ReLU activation.
- **Max Pooling Layer 1**: 2x2 pool size.
- **Conv Layer 2**: 128 filters, 3x3 kernel, ReLU activation.
- **Max Pooling Layer 2**: 2x2 pool size.
- **Fully Connected Layer**: 512 units, ReLU activation.
- **Output Layer**: Softmax activation for 10 classes.

See, e.g., Alex Krizhevsky, Ilya Sutskever, & Geoffrey E. Hinton, *ImageNet Classification with Deep Convolutional Neural Networks*, 60 COMMC'NS OF THE ACM 84 (2017) (documenting layer details for a CNN used in image classification).

connections like skip layers or attention mechanisms; and annotates key components with details such as layer type and parameters.
Transparency should include the:

> Model Type: Description of the type of model (e.g., convolutional neural network, recurrent neural network, transformer).[196]
>
> Layer Details: Detailed information about each layer in the model, including type (e.g., dense, convolutional), activation functions, and output dimensions.
>
> Hyperparameters: List of hyperparameters used in the model, such as learning rate, batch size, and number of epochs.
>
> Training Framework: Information about the software framework used for building and training the model (e.g., TensorFlow, PyTorch).
>
> Architectural Diagram: Visual representation of the model architecture, showing the flow of data through the network.

Transparency of models and algorithms used in machine learning should focus on requiring the developer to articulate the reasons for the choices he made. Why did he choose the models that he did: GAN versus RNN, transformers are not? What engines did he use and why, ChatGPT, versus Gemini? What prompt templates and prompt crafters did he use and why?
What are the pros and cons of each technology? Why did he select what he did? Why did he reject what he rejected?

Algorithms

It is theoretically possible for algorithms used for machine learning to distort the relationships found in the learning database so that the resulting model produces expression that is not in fact

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[196] In an image classification task, model architecture documentation might include:

- **Model Type**: Convolutional neural network (CNN).
- **Layer Details**:
  - Input layer: 224x224x3 (image size).
  - Conv1: 64 filters, 3x3 kernel, ReLU activation.
  - MaxPool1: 2x2 pool size.
  - Conv2: 128 filters, 3x3 kernel, ReLU activation.
  - MaxPool2: 2x2 pool size.
  - Fully connected layer: 512 units, ReLU activation.
  - Output layer: Softmax activation, 10 classes (for 10 categories of images).
- **Hyperparameters**: Learning rate: 0.001, Batch size: 32, Epochs: 50.
- **Training Framework**: TensorFlow 2.0.
- **Dropout Rate**: 0.5 (in fully connected layers)
- **Optimizer**: Adam optimizer with default parameters
- **Architectural Diagram**: Diagram showing the flow from input image to output classification.

See, e.g., *id.*

likely to be found in the database. This defect in learning algorithms is unlikely; if a designer wishes to produce distorted results, he is better off selecting a biased learning database than trying to force results by biased algorithms. The exception would be deliberate censorship. Furthermore, it is extremely difficult to look at an algorithm, which will be in the form of a mathematical equation and predict how it will act on billions of records in a learning database. It is far easier to take a trained model and see what kind of output it produces; in other words, to impose performance standards rather than engineering standards.

Disclose reviews of results

Developers can be required to disclose test protocols and to explain why they selected the protocols they did. They also can be required to disclose test results and entitled to explain how they interpret their significance.

Results can be assessed by listing metrics used to evaluate the model, such as accuracy, precision, recall, F1-score, ROC-AUC, describing the conditions under which the model was tested, including the test dataset and any specific scenarios or edge cases considered, comparing of the model's performance with baseline models or previous versions, detailed analysis of errors made by the model, including common failure modes and potential reasons, assessment of the model's robustness and ability to generalize to new, unseen data, and evaluation of the model's performance across different demographic groups to identify and mitigate biases.[197]

The disclosure of results reviews and audits similarly can enhance consumer choice, including consumer decisions whether to challenge decisions resulting from use of an AI system.

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[197] In a speech recognition system, results assessment documentation might include:

- **Evaluation Metrics**:
  - Word error rate (WER).
  - Character error rate (CER).
  - Sentence accuracy.
- **Test Conditions**:
  - Test dataset: 10,000 audio clips from diverse speakers (age, gender, accent).
  - Scenarios: Quiet environment, noisy environment, varying speech speeds.
- **Baseline Comparisons**:
  - Baseline model: Previous version with WER of 12%.
  - Current model: WER of 8%.
- **Error Analysis**:
  - Common errors: Misrecognition of homophones, errors in noisy environments.
  - Potential reasons: Limited training data for certain accents, background noise interference.
- **Robustness and Generalization**:
  - Performance on unseen data: WER of 9%.
  - Cross-domain generalization: Evaluation on medical and legal domain speech.
- **Fairness and Bias**:
  - Performance across demographics: WER of 7% for male speakers, 9% for female speakers.

See, e.g., Awni Hannun, Carl Case, Jared Casper, Bryan Catanzaro, Greg Diamos, Erich Elsen, Ryan Prenger, Sanjeev Satheesh, Shubho Sengupta, Adam Coates, & Andrew Y. Ng, *Deep Speech: Scaling up end-to-end speech recognition* (Dec. 19, 2014) (unpublished manuscript) arXiv: 1412.5567v2 [cs.CL].

"Model validation is a core component of developing machine learning or artificial intelligence (ML/AI). It assesses the ability of an ML or statistical model to produce predictions with enough accuracy to be used to achieve business objectives."[198]

Standards for validation published by the Equal Employment Opportunity Commission ("EEOC") under Title VII of the Civil Rights Act of 1964[199] are a useful reference point for validation in general.

Criterion-related validation involves demonstrating that the test (or model) accurately predicts the outcome it is intended to measure. Thus, in the context of ML, this means rigorously evaluating the model's performance using appropriate metrics (e.g., accuracy, precision, recall) on a representative sample of data. It also involves ensuring that the model's predictions are consistent and reliable across different demographic groups, thus avoiding disparate impact.

"Evidence of the validity of a test or other selection procedure by a criterion-related validity study should consist of empirical data demonstrating that the selection procedure is predictive of or significantly correlated with important elements of job performance."[200]

C*ontent validation*, seeks to ensure that the content of the test (or ML model) is representative of the job (or task) it is intended to predict. Thus, in ML, this means that the features used by the model should be relevant to the task at hand and free from bias. For instance, if an ML model is used to screen job applicants, the features should accurately reflect the qualifications and skills necessary for the job, rather than irrelevant attributes that could introduce bias.

"Evidence of the validity of a test or other selection procedure by a content validity study should consist of data showing that the content of the selection procedure is representative of important aspects of performance on the job for which the candidates are to be evaluated."[201]

Construct validation seeks to ensure that the test measures the theoretical construct it claims to measure. Applied to ML, construct validation involves verifying that the model's predictions align with the underlying theoretical constructs of the task. For example, if an ML model is designed to predict employee performance, it should be based on constructs like skills, experience, and productivity, rather than unrelated factors.

"Evidence of the validity of a test or other selection procedure through a construct validity study should consist of data showing that the procedure measures the degree to which candidates have identifiable characteristics which have been determined to be important in successful performance in the job for which the candidates are to be evaluated."[202]

The Food and Drug Administration requires "adequate and well controlled studies" in applications to market new drugs.[203] Studies must permit a valid comparison with a control group,[204] minimize bias with respect to age, sex, severity of disease, and treatment.[205] Study

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[198] Robert Koch, *How to Validate Machine Learning Models: A Comprehensive Guide*, CLICKWORKER, https://www.clickworker.com/customer-blog/how-to-validate-machine-learning-models/ (last visited Aug. 15, 2024), [https://perma.cc/JA69-8RBX].

[199] 29 CFR § 1607.5 (2024).

[200] 29 CFR § 1607.5(b) (2024).

[201] Id.

[202] Id.

[203] 21 CFR § 314.126 (2024).

[204] 21 CFR § 314.126(b)(2)(2024).

[205] 21 CFR § 314.126(b)(4) (2024).

reports must explain "the variables measured, the methods of observation, and criteria used to assess response"[206] and "describe the results and the analytic methods used to evaluate them, including any appropriate statistical methods."[207]

The biggest challenge in adapting EEOC and FDA test validation standards to AI is defining what one is testing for in an AI system. In the employment or the new-drug context, that is not a difficult question: employers are using tests to select employees for hire, promotion, or separation; pharmaceutical companies are testing new drugs to show that they are efficacious and safe.

AI systems might be tested for accuracy, in which case defining the benchmark is challenging. Is this content construct or what?

They might be tested for bias, in which case application of EEOC validation standards and other statistical techniques from the employment discrimination context can be straightforward.

They might be tested for linguistic quality, such as simplicity, compliance with grammatical rules,[208] and according to more subtle criteria such as clear organization and, for fiction, goal orientation, obstacles, conflict, and suspense.

Image systems might be tested for perspective, lighting, realistic portrayals.

Simply enumerating the possibilities for testing results reveals how fraught with controversy test validation would be. Beauty of imagery and verbal expression is in the eye of the beholder, and accuracy is the subject of constant debate.

But even if regulators and the public are unlikely to agree on what AI system results should be tested for, they would benefit from knowing whether they were tested, knowing the nature of the tests, and knowing the results.

Adverse impact analysis, a concept from Title VII, can also be adapted for ML validation. This analysis examines whether the use of a test or model disproportionately affects a particular protected group. In ML, this involves analyzing the model's outputs to identify and mitigate any biases that may disadvantage certain groups. Techniques such as fairness-aware algorithms, bias detection tools, and regular audits can help identify and address potential adverse impacts, ensuring that the model operates fairly and equitably.

Disclosing human appeal mechanisms

Disclosing human appeal mechanisms is appropriate with respect to AI deployment for decision-making[209] but less applicable for analytical and creative applications. In autopilot type applications it typically is provided by disengaging the autopilot and allowing the human

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[206] 21 CFR § 314.126(b)(6) (2024).

[207] 21 CFR § 314.126(b)(7) (2024).

[208] Microsoft Word already does this, with its built-in editor function. *Microsoft Editor checks grammar and more in documents, mail and the web*, MICROSOFT: MICROSOFT SUPPORT, https://support.microsoft.com/en-us/office/microsoft-editor-checks-grammar-and-more-in-documents-mail-and-the-web-91ecbe1b-d021-4e9e-a82e-abc4cd7163d7 [https://perma.cc/UBG4-8BYU] (last visited Oct. 26, 2024).

[209] *See* Exec. Ord. 14110, 88 Fed. Reg. 75213 (Nov. 1, 2023) (requiring processes to appeal denials to human reviewers); David Thomas, *Decisions made by AI need a meaningful appeals process*, MEDIUM (Oct. 3, 2021), https://medium.com/@adventuresafely/decisions-made-by-ai-need-a-meaningful-appeals-process-ddca17dbc07a [https://perma.cc/7U67-JSMC]; Kristen Vaccaro & Karrie Karahalios, *Algorithmic Appeals*, KRISTEN VACCARO (2017), https://s3.amazonaws.com/kvaccaro.com/documents/algappeal.pdf [https://perma.cc/E4CE-BRW8].

operator to regain control of the device. That is a standard feature of most aircraft and motor vehicle systems.[210]

High-risk versus ordinary systems

A common approach to AI regulation is to distinguish high-risk uses from other uses. The EU AI act does this, as does the Colorado statute. In deciding what is high risk and what is not, one can identify seven basic use categories.

1. Systems that drive actuators on machines, such as factory robots, manned aircraft, unmanned aircraft, railroad trains, automobiles, trucks, and construction equipment;
2. Systems that determine healthcare treatment such as ones that automatically administer doses of insulin or drugs, systems that control the administration of the intravenous administration of fluids, and systems that control the administration of oxygen. In this category also fall systems that alert medical personnel to changes in patient conditions, as in intensive care units;
3. Systems that select among candidates for employment, housing, eligibility for social benefits or admission to educational programs;
4. Systems that target individuals for law enforcement investigation or prosecution;
5. Systems that create information to sell, such as automated animation generators, automatic image generators, and automatic fiction narrative generators;
6. Systems that summarize information for use by human beings to aid them in doing their jobs;
7. Help desk and other customer support functions.

Deciding what is high risk presupposes a judgment about what risks are more significant than others. Conventionally the highest category of risk is assigned to phenomena that threaten bodily injury or death. Next are those that threaten significant property damage. Economic injury follows, and reputational or emotional injury follow that. It is reasonable to conclude that the first two categories qualify as high risk because of the significant impact on life and limb of erroneous decisions. Categories 3 and 4 are arguable. Categories 5, 6, and 7 are not high risk.
The European Union, however, has an expansive view of what constitutes high risk. It includes:
Biometric systems such as face recognition;[211]
Critical infrastructure systems such as safety components for digital infrastructure, road traffic or the supply of water, gas, heating or electricity;[212]
Systems that determine access to educational programs and that evaluate learning outcomes;[213]
Employment systems used for recruitment or decisions about promotion or termination or terms of employment;[214]
Systems used to evaluate eligibility for public benefits and services;[215]

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[210] *See* FED. AVIATION ADMIN., Advisory Circular No. 25.1329-IC, APPROVAL OF FLIGHT GUIDANCE SYSTEMS (2014), at 14 https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25_1329-1C.pdf (providing information on disengagement of aircraft autopilots).
[211] 2024 O.J. (L 1689) 127.
[212] *Id.*
[213] *Id.*
[214] *Id.*
[215] *Id.* at 127-28.

Law enforcement systems such as systems intended to assess the risk of becoming a victim of crime or to evaluate the reliability of evidence in the investigation and prosecution of crimes or systems for assessing the risk of a natural person offending or re-offending; Polygraphs and similar tools;[216]
Systems for use in border control to assess risks posed by proposed entrants or to evaluate applications for asylum, visa or residence permits;[217]
Systems for the administration of justice and democratic processes, including – remarkably enough, systems for researching and interpreting facts and law and in applying a lot of concrete facts, in other words Lexis and Westlaw – and systems for influencing the outcome of an election;[218]
The employment category would sweep into the high risk AI coverage ordinary test instruments for evaluating intelligence, technical knowledge, and aptitude for certain types of tasks. Such tasks have been around for a century or more.
The administration of justice category nonsensically includes ordinary legal research tools, as well as political campaign systems for managing mass emails, political ad placement, and robotic phone calls.
Suffice it to say the purported dichotomy between high risk and ordinary systems in the EU act is illusory. Everything is high risk.

IP concerns

Tension exists between a desire for transparency of AI systems and the interest of developers and vendors of such systems to protect their intellectual property through trade secrets, but the disclosure required by the patent system may align nicely with the push for transparency.

Trade secrets

Many aspects of AI systems qualify as trade secrets: they confer a competitive advantage by not being generally known and are subject to reasonable efforts to maintain their secrecy.[219] These criteria are easily met with respect to the details of learning databases and the models used in machine learning programs. They also are likely to be met with respect to the algorithms developed through machine learning. Vetting and validation may qualify as well.
Full transparency would compromise trade secrets, which no longer qualify as such once they become publicly known.

Patent

The details of AI systems qualify for patents.[220] New generative AI inventions qualify for patents if they meet the tests for patentability under section 101,[221] as interpreted in Alice/Mayo.[222] It is

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[216] *Id.* at 128.
[217] *Id.*
[218] *Id.* at 128-29.
[219] See HENRY H. PERRITT, JR., TRADE SECRETS FOR THE PRACTITIONER § 1:1 (3d ed. 2024) (defining trade secret).
[220] See Perritt, *Undressing AI*, supra note 99.
[221] 35 U.S.C. § 101.
[222] See discussion of Alice/Mayo test for eligibility of subject matter *supra* 35 U.S.C. § 101.

also clear that prompts for an AI system can satisfy the conception requirement.[223] The Patent Office published new guidance on the patent eligibility of AI inventions in July, 2024.[224] It provides three new examples of inventions involving AI that are and are not eligible for patent.[225]

Analysis of recently granted patents involving artificial intelligence, and recent PTAB cases suggest that current law is entirely workable as applied to artificial intelligence inventions.[226] Patent examiners apparently are allowing patents for AI inventions that particularize how they advance the art, and the PTAB opinions make coherent distinctions between patentable AI and purported AI that represents little more than a collection of known algorithms and techniques.

If an AI system is patented, the disclosure required by section 112 of the patent law[227] extinguishes trade secret protection for the same subject matter as the patent. The patent protects its owner from competitor use of that subject matter,[228] eliminating the need for trade secret protection. Moreover, the disclosure required to obtain a patent may satisfy any requirements for AI transparency.[229]

Relationship between transparency and intellectual property

Developers of generative AI systems invest substantial amounts of money in assembling data for the learning databases, running the machine learning models, and fine tuning the resulting algorithms. They are naturally interested in protecting the value of their investment against free riding. Such protection is the purpose of intellectual property,[230] primarily patents and trade secrets in the AI context. Other practical protections exist as well: the pace of innovation may be such that by the time a pirate gets its imitation to market, the innovator will have developed and marketed the next new thing. Also, it may be difficult to disentangle the algorithms resulting from machine learning from the underlying data and learning models; a potential pirate thus may

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[223] Inventorship Guidance for AI-Assisted Inventions, 89 Fed. Reg. 10043, 10048 (Feb. 13, 2024) (Guiding Principle No. 2) ("[A] significant contribution could be shown by the way the person constructs the prompt in view of a specific problem to elicit a particular solution from the AI system.").

[224] 2024 Guidance Update on Patent Subject Matter Eligibility, Including on Artificial Intelligence, 89 Fed. Reg. 58128 (July 17, 2024).

[225] New Subject Matter Eligibility Examples for AI Inventions., 89 Fed. Reg. at 58138, (July 17, 2024) (referring to examples at www.uspto.gov/PatentEligibility) (presenting Examples 47, 48, and 49).

[226] See Nikola L. Datzov, *The Role of Patent (In)Eligibility in Promoting Artificial Intelligence Innovation*, 92 UMKC L. Rev. 1, 41-42 (2023) (summarizing numerous studies as supporting conclusion that AI patenting activity is flourishing both in the U.S. and globally).

[227] 35 U.S.C. § 112.

[228] 35 U.S.C. § 271(a) ("Whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.").

[229] See Perritt, *Undressing AI*, supra note 99, 219.

[230] See Barclays Cap. Inc. v. Theflyonthewall.com, Inc., 650 F.3d 876, 887, 915 (2d Cir. 2011) (acknowledging that free riding "exists where a defendant invests little in order to profit from information generated or collected by the plaintiff at great cost"; holding that state tort claim under "hot news" doctrine was preempted by Copyright Act). The Barclays Capital court discussed free riding as thought it was an extra element that might save a state law claim from preemption; however, free-riding is implicitly present in all intellectual property infringement. See New Kids on the Block v. News Am. Publ'g, Inc., 971 F.2d 302, 305, 307 n.6, 308 (9th Cir. 1992) (discussing free riding as the harm that trademark protection seeks to prevent; affording defendant fair-use defense in trademark infringement case); Mark A. Lemley, Property, Intellectual Property, and Free Riding, 83 TEX. L. REV. 1031, 1039-46 (2005) (exploring the concept of free-riding as a justification for patents, copyrights, and trademarks).

not be able to steal the algorithms and may have to replicate much or all of the investment to re-create them.

Nevertheless, intellectual property protection in law is important to investors, if not to the entrepreneurs themselves. Inventors wanting to commercialize in an industry where patent protection is pervasive, as in the biosciences or semiconductor fields are likely to find investors unwilling to invest unless they see patent protection.[231]

Transparency, depending on the form it takes, threatens trade secret protection because information must not be generally available to the public in order to be a trade secret.[232] Even if an innovator applies for a patent, it takes some time before a patent is granted, and a patent may not be granted at all.[233] In the interim, information is protected only by trade secret, because patents are not retroactive in their effect.[234] This author's article, *Undressing AI: Transparency through patents,*[235] explores the possibility that the disclosure required by patent law might satisfy requirements for transparency and thus that creative's incentives for AI inventors to seek patent protection and give up their trade secret protection would satisfy demands for transparency.

But if the incentives to seek patent protection instead of trade secret protection are insufficient, perils may be associated with governmental mandates to give up trade secret protection and to disclose trade secrets to the public. The Supreme Court's decision in Ruckelshaus v. Monsanto, teaches the trade secrets are property protected against governmental taking by the Fifth Amendment.[236] To compel the disclosure of a trade secret is to destroy it and therefore to take the property. The Fifth Amendment prohibits such a taking unless accomplished for a public purpose and accompanied by just compensation. Monsanto involved trade secrets in pesticide chemicals, and the governmental taking was a requirement that the data with respect to those products be disclosed to competitors and to EPA. Forcing the owners of trade secrets and artificial intelligence technology to give them up to afford transparency matches the facts of Monsanto very closely. It is not unlikely that legislators or regulators can offer a plausible public purpose for compelling AI transparency. But that is not enough, they also must offer just compensation.

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[231] The justification for patents may vary by industry. See WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 316 (2003). "Whether a given degree of patent protection is socially desirable depends on the patentee's fixed costs, the inherent difficulty in inventing around the patent . . . , and the extra profits that the patentee can expect to receive from greater protection." Id. at 300. Inventors and venture capitalists in the Internet communication sector may find venture capitalists and potential commercial partners uninterested in patents. See Datzov, supra note 225, at 47. The evidence is mixed on whether patent protection attracts investors, notwithstanding the belief in some quarters that start up enterprises will not be able to obtain capital unless they can demonstrate intellectual property protection for their products and services. Compare Id. at 46 (questioning assertion that investor will withhold capital from those without patent rights, with some analysis) with Charlotte A. Tschider, Beyond the "Black Box", 98 Den. L. Rev. at 715-16 (asserting that patents valuable to investors, with no analysis).

[232] See PERRITT, supra note 218, at #, #, # (defining trade secrets; trade secrets law requirement of secrecy).

[233] See *Total Traditional Pendency: Last two years chart*, U.S. PAT. AND TRADEMARK OFF., https://www.uspto.gov/dashboard/patents/pendency.html (last visited on Oct. 12, 2024) (showing a 24-26 month delay between the application filing date and the final disposition date).

[234] An invention is not patented until the patent issues. See 35 U.S.C. § 271(a) (defining patent infringement with respect to "patented invention"); State Indus., Inc. v. A.O. Smith Corp., 751 F.2d 1226, 1237 (Fed. Cir. 1985) ("A patent has no retroactive effect.").

[235] Perritt, *Undressing AI*, supra notes 99, 219, 228.

[236] Ruckelhaus v. Monsanto, 467 U.S. 986, 1003-04 (1984).

Monsanto does not say that the government may not compel disclosure; it holds that if the government does compel disclosure, the owner of the former trade secrets may recover damages in the Court of Claims.[237]

Nevertheless the possibility of Court of Claims recovery for mandated disclosure of AI trade secrets would likely give pause to legislators considering such mandates.

But as the analysis in Part 0 shows, the information most likely to be clothed with trade secret status – information about learning databases and learning models – is least useful to the general public. Other forms of disclosure and transparency are likely to be far more useful and much less likely to constitute trade secrets.

Forcing developers and entrepreneurs to reveal the details of their black boxes—the statistical learning models and resulting algorithms—does little good to consumers and poses the greatest risk to legitimate intellectual property interests. Transparency with respect to the scope and content of machine learning databases, the fact of use, the purposes of use, the quality of results produced, and the availability of appeals to human beings and presents little threat to trade secrets. Encouraging patent protection for generative AI will result in greater disclosure and reinforce the desire for transparency.

The technology is far too new, however, for any form of command-and-control regulation. Would-be regulators need to take a deep breath and sit back for a while to see how the systems are used in the real world and what problems actually arise from their use, as opposed to rushing into action based on hypothetical nightmares.

[237] Id. at 1019.

BETWEEN PROMISE AND POWER: ARTIFICIAL INTELLIGENCE, SHAREHOLDER ACTIVISM, AND THE CORPORATE GOVERNANCE OF THE NEXT GENERATION

Pierluigi Matera[*]

ABSTRACT

Artificial intelligence (AI) is poised to influence the dynamics of corporate governance, with shareholder activism emerging as a particularly dynamic and contested domain of transformation.

Institutional investors are already leveraging sophisticated AI-powered tools to enhance decision-making and manage risk. At the same time, AI offers new possibilities for smaller and traditionally marginalized shareholders. By enabling real-time monitoring and strategic analysis, AI can amplify the power of individual investors—especially younger cohorts who combine technological fluency with values such as environmental sustainability and diversity—to shape identity-driven proxy campaigns. Although not AI-driven, the campaign led by Engine No. 1 against ExxonMobil illustrates how generational values and new generational challenges can blend with the pursuit of profit to support successful forms of insurgent activism.

This identity-driven activism is characterized by value alignment, strategic targeting, and campaign design centered on generational priorities. AI tools can be used to surface resonant causes and craft precise, data-enhanced proposals that rally dispersed shareholders around a common normative objective. This form of activism can be deployed not only for environmental or inclusivity campaigns but for any generational cause—so long as it fosters a shared sense of identity and purpose among investors.

However, empirical data from the 2022–2024 proxy seasons suggest that AI's democratizing promise remains largely aspirational. Benefits continue to accrue disproportionately to large, well-capitalized actors, while smaller investors face persistent structural and behavioral barriers.

Moreover, algorithmic opacity, ideological polarization, and the strategic adoption of AI by corporations to fortify defenses against activism may limit AI's transformative capacity. In fact, while AI tools could help insurgents spot vulnerabilities to leverage in identity-driven campaigns, they are increasingly used by corporations to anticipate activist efforts and shield incumbent management.

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I argue that realizing AI's potential will require both regulatory oversight and voluntary inclusion strategies from corporate actors—particularly boards of directors. Boards may play a strategic role in anticipating generational pressures by integrating younger voices into governance structures and proactively reflecting generational values in corporate strategy. In doing so, they might preempt identity-driven activism and channel AI's disruptive force toward inclusive, forward-looking reform.

If responsibly developed and deployed by corporate boards, AI could usher in a new paradigm of governance—one in which technological innovation drives social innovation, and generational values are actively integrated into corporate structures. This, in turn, could pave the way for a smoother transition as younger generations move into leadership roles in business and finance.

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I. Introduction

Artificial Intelligence (AI) is reshaping—and likely will continue to reshape—corporate governance, redefining the roles of all its constituents: directors, shareholders, regulators, and market operators. This transformation has the potential to significantly alter corporate dynamics, ultimately leading to new and possibly disruptive balances of power.

In this sense, Generative Artificial Intelligence (GenAI),[1] in particular, represents more than a mere technological breakthrough; it heralds a seismic shift akin to the Industrial Revolution, with the potential to reconfigure capital markets and the very foundations of the corporate form.[2]

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[1] In this paper, for brevity, the term "AI" will predominantly refer to GenAI, encompassing its specific applications and implications. GenAI is a subset of artificial intelligence that utilizes generative models to produce new content, such as text, images, or audio, based on learned patterns from existing data. *See* Luciano Floridi & Massimo Chiriatti, *GPT-3: Its Nature, Scope, Limits, and Consequences*, 30 Minds & Machines 681–694 (2020); Alejandro B. Arrieta et al., *Explainable Artificial Intelligence (XAI): Concepts, Taxonomies, Opportunities and Challenges Toward Responsible AI*, 58 Inf. Fusion 82-115 (2020); Pegah Salehi, Abdolah Chalechale, and Maryam Taghizadeh, *Generative Adversarial Networks (GANs): An Overview of Theoretical Model, Evaluation Metrics, and Recent Developments*, arXiv:2005.13178 (2020); Thilo Hagendorff, *The Ethics of AI Ethics: An Evaluation of Guidelines*, 30 Minds & Machines 99-120 (2020); Gary Marcus & Ernest Davis, Rebooting AI: Building Artificial Intelligence We Can Trust (2019); David Gunning et al., *XAI—Explainable Artificial Intelligence*, 4 Sci. Robotics eaay7120 (2019); Jean Tirole, *Digital Dystopia*, 111 Am. Econ. Rev. 2007-2048 (2021); Michael Wooldridge, A Brief History of Artificial Intelligence: What It Is, Where We Are, and Where We Are Going (2021); David Atkinson & Jacob Morrison, *Unsettled Law: Time to Generate New Approaches?,* arXiv:2407.01968v1 (2024).

[2] *See generally* Maria Goranova et al., *Corporate Governance and the Fourth Industrial Revolution, in* Handbook of Research on Strategic Leadership 475 (2024). *See also* the debate on DAOs and their legal wrappers: Jason G. Allen, *Bodies Without Organs: Law, Economics, and Decentralised Governance*, 4 Stan. J. Blockchain L. & Pol'y 53-78 (2020); Michael A Schillig, *Some Reflections on the Nature of Decentralized (Autonomous) Organizations*, in Transformation of Private Law: Principles of Contract and Tort as European and International Law 589 (Maren Heidemann ed., 2024); Aaron M. Lane, Darcy W.E. Allen & Chris Berg, *Towards Legal Recognition of Decentralised Autonomous Organisations*, Austl. Bus. L.Rev. (forthcoming 2024); Vanessa V. Collao, *Decentralized (?), But Far From Disorganized: A Comparative Analysis of Legal Wrappers and the Evolving Structure of DAOs* (forthcoming 2025), https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=5143035 [https://perma.cc/VL7S-9GWY]; Andrea J. Pagano, *The Implementation of the Decentralized Autonomous Organizations in the EU Corporate Governance System*, 46 Bus. L. Rev. 12-16 (2025).

This revolution is fueled by the convergence of big data, machine learning, and advanced decision-making tools, which enable the analysis of complex scenarios with unprecedented speed and precision.[3]

AI has already begun to gradually redefine boardroom dynamics, presenting itself as both a business opportunity to be seized and a strategic asset capable of reshaping decision-making processes and the resulting decisions.[4] At the same time, AI introduces significant and critical risks that boards must carefully manage.[5] A failure to do so may expose directors to oversight liability[6]—and, even more significantly, may give rise to serious societal risks if boards fail to address AI-related issues properly and ethically within their companies.[7]

Among the areas most sensitive to AI's influence are the interactions between public companies and their shareholders. This paper focuses on one of the most dynamic dimensions of that relationship: the evolving nature of shareholder activism—an arena where AI's effects are both promising and, at times, counterintuitive.

In particular, I explore how AI may empower identity-driven shareholder activism—activism animated not by traditional financial concerns alone, but by the generational priorities of millennial and Gen Z investors. As these younger cohorts use AI tools to organize, monitor, and communicate their values, a new form of activism may emerge—one that challenges existing governance frameworks while reflecting a broader shift in societal expectations. Yet, this potential may remain unfulfilled unless corporate boards not only anticipate but actively govern generational change—channeling it into institutional practices and forward-looking strategies.

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[3] *See* William Magnuson, *Artificial Financial Intelligence*, 10 HARV. BUS. L. REV. 337, 347-350 (2020) (discussing financial implications).

[4] *See* David F. Larcker et al., *The Artificially Intelligent Boardroom*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Apr. 8, 2025), https://corpgov.law.harvard.edu/2025/04/08/the-artificially-intelligent-boardroom/ [https://perma.cc/WK4W-WWB7].

[5] *See* Mikhail A. Tokmakov et al., *Corporate Governance Innovations*, in PROCEEDINGS OF THE INTERNATIONAL SCIENTIFIC CONFERENCE "SMART NATIONS: GLOBAL TRENDS IN DIGITAL ECONOMY" 219, 219-226 (Svetlana Igorevna Ashmarina et al. eds. 2022); Miriam H. Baer, *Corporate Compliance's Achilles Heel*, 78 BUS. LAW. 791, 814-815 (2023).

[6] *See* Leo E. Strine Jr. et al., *Caremark and EESG, Perfect Together: A Practical Approach to Implementing an Integrated, Efficient, and Effective* Caremark *and EESG Strategy*, 106 IOWA L. REV. 1885, 1896-97 (2021); Tara K. Giunta & Lex Suvanto, *Board Oversight of AI*, HARV. L. SCH. FORUM ON CORP. GOV. (Sept. 17, 2024), https://corpgov.law.harvard.edu/2024/09/17/board-oversight-of-ai/ [https://perma.cc/L4MV-CVAZ]; Joseph R. Tiano Jr. et al., *The Duty of Supervision in the Age of Generative AI: Urgent Mandates for a Public Company's Board of Directors and Its Executive and Legal Team*, AM. BAR ASS'N BUS. L. SEC. (Mar. 26, 2024), https://www.americanbar.org/groups/business_law/resources/business-law-today/2024-march/the-duty-of-supervision-in-the-age-of-generative-ai/; Robert G. Eccles & Miriam Vogel, *Board Responsibility for Artificial Intelligence Oversight*, HARV. L. SCH. F. ON CORP. GOV. (Jan. 5, 2022), https://corpgov.law.harvard.edu/2022/01/05/board-responsibility-for-artificial-intelligence-oversight/ [https://perma.cc/7E83-575L].

[7] For an insightful and timely contribution to the growing literature on corporate AI governance *see* Leo E. Strine Jr., *Using Experience Smartly to Ensure a Better Future: How the Hard-Earned Lessons of History Should Shape the External and Internal Governance of Corporate Use of Artificial Intelligence*, 2024 UNIV. PA. INST. FOR L. & ECON. (50TH ANNIVERSARY SYMPOSIUM ISSUE J. CORP. L.) (forthcoming), https://ssrn.com/abstract=4819611; Arun Sundararajan, *How Corporate Boards Must Approach AI Governance*, J. FIN. TRANSFORMATION (forthcoming) (2024) https://ssrn.com/abstract=5016014. To the extreme of AI fiduciaries serving as independent directors, *see* Zhaoyi Li, *Artificial Fiduciaries*, 81 WASH. & LEE L. REV. 1299 (2024).

In Part II, I argue that AI offers substantial opportunities for both institutional and non-institutional investors to influence corporate governance. For large funds, AI is a powerful tool that lowers the cost of analysis, supports more targeted investment decisions, and enables novel approaches—including the controversial ESG-driven strategies. For small investors, its potential could be even more profound.

I develop this argument in Part III, contending that AI may help identify and promote shared objectives and identity-driven values, serving as a common denominator to build consensus among otherwise dispersed shareholders. AI tools might enable a new form of "targeted activism," allowing investors to detect goals, challenges, and opportunities with such precision and timeliness that they increase the likelihood of success—whether in advancing a shareholder proposal or contesting management.

This potential is particularly salient for millennial investors and small funds, for whom AI can enhance analytical accuracy while dramatically reducing costs that would otherwise be prohibitive. The argument rests on a broader proposition: that Millennials increasingly rely on digital tools and algorithmic inputs not only to guide financial decisions, but also to align investments with their values. They are also more attuned to generational priorities, such as climate action, diversity, and social responsibility—as evidenced by the prominence of ESG frameworks, the perceived retreat of which does not negate their underlying resonance with this cohort.[8]

Indeed, the combination of technological fluency and renewed generational idealism may position millennials to harness AI as a powerful strategic tool. AI can help surface campaigns that are both personally resonant and broadly actionable—thereby facilitating a new form of identity-driven activism rooted in emerging values but enhanced by data, speed, and precision.

However, as I demonstrate in Part IV, data from the 2022–2024 proxy seasons show that the democratizing promise of AI in corporate governance remains largely aspirational. While AI tools have lowered entry barriers and accelerated tactical execution, their primary effect thus far has been to amplify the capabilities of institutional investors—rather than redistribute influence or disrupt entrenched corporate power dynamics. Indeed, AI is increasingly being deployed by corporations themselves to identify vulnerabilities, anticipate activist strategies, and make insurgent campaigns more difficult to advance.

In Part V, I examine these findings and explore a possible path forward. Realizing AI's full potential may require corporations to adopt voluntary inclusion strategies. From this perspective, AI's role in this transformation may extend beyond insurgent shareholder efforts: corporate boards—rather than merely resisting identity-driven pressures—might anticipate and incorporate these generational shifts by using AI proactively and inclusively. In doing so, they could not only defuse potential conflicts but also lead a broader evolution toward social innovation in corporate governance.

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[8] *See* Michal Barzuza et al., *Shareholder Value(s): Index Fund ESG Activism and the New Millennial Corporate Governance*, 93 S. CAL. L. REV. 1243, 1265, 1272 (2020). For an overview of proxy seasons and trends in shareholder proposals and values-driven activism, *see* Arnaud Cavé et al., *Unveiling Key Trends* in *AI Shareholder Proposals*, HARV. L. SCH. FORUM ON CORP. GOV. (Sept. 29, 2024), https://corpgov.law.harvard.edu/2024/09/29/unveiling-key-trends-in-ai-shareholder-proposals/ [https://perma.cc/5BZQ-58X8].

That is to say, boards of directors, in particular, may hold the key to transforming AI's disruptive force into constructive and inclusive governance.

In this view, AI could serve not only as a technical catalyst but also as a bridge to a more inclusive, forward-looking model of governance—where technological innovation drives social innovation and generational values are meaningfully integrated into corporate structures.

II. AI AND LARGE CORPORATE ENTITIES

A. AI IN GOVERNANCE, INVESTMENT, AND CONSULTING

1. AI Applications in Governance and Operations

Scholars and practitioners have increasingly documented the growing role of AI in the decision-making processes of large corporations—a trend marked by both continuity and innovation.[9]

The impact of AI on institutional investors' decision-making follows this same trajectory: financial institutions, as prominent players in the capital markets, exemplify this phenomenon, with their strategies frequently shaped by AI-driven analyses. In this respect, the use of AI in this area mirrors its broader adoption across public companies, albeit with sector-specific nuances and innovative adaptations.

For instance, JPMorgan Chase has developed and employed COiN (Contract Intelligence)—an AI platform that rapidly analyzes contracts and complex legal strategies, significantly reducing time and errors. COiN—often cited as a benchmark in AI's application to finance—can assess key contractual clauses, evaluate associated risks, and process 12,000 contracts and legal documents in mere seconds. By leveraging COiN, JPMorgan claims to have saved over 360,000 work hours in a single year, enhancing operational efficiency and substantially reducing associated costs[10].

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[9] *See* Muath Asmar & Ibrahim A.A. Al-Rob, *Application of Artificial Intelligence in Business Decision Making: Insight from Literature Review*, in ACHIEVING SUSTAINABLE BUSINESS THROUGH AI, TECHNOLOGY EDUCATION AND COMPUTER SCIENCE (STUDIES IN BIG DATA, VOL. 163) 125-35 (Ahmad Hamdan ed., 2024); Anniek Brink et al., *Decision-Making in Organizations: Should Managers Use AI?*, 45(4) J. BUS. STRATEGY 267 (2024); Kris Pederson et al., *Four Ways Boards Can Support the Effective Use of AI*, HARV. L. SCH. FORUM ON CORP. GOV. (May 16, 2024), https://corpgov.law.harvard.edu/2024/05/16/four-ways-boards-can-support-the-effective-use-of-ai/ [https://perma.cc/F4VB-92XP]; Holly J. Gregory, *AI and the Role of the Board of Directors*, HARV. L. SCH. FORUM ON CORP. GOV. (Oct. 7, 2023), https://corpgov.law.harvard.edu/2023/10/07/ai-and-the-role-of-the-board-of-directors/ [https://perma.cc/98QW-D3MM]; Roberto Tallarita, *AI Is Testing the Limits of Corporate Governance*, HARV. BUS. REV. (Dec. 5, 2023), https://hbr.org/2023/12/ai-is-testing-the-limits-of-corporate-governance [https://perma.cc/2JPR-EJEU]; Martin Reeves et al., *The Irreplaceable Value of Human Decision-Making in the Age of AI*, HARV. BUS. REV. (Dec. 11, 2024), https://hbr.org/2024/12/the-irreplaceable-value-of-human-decision-making-in-the-age-of-ai?ab=at_art_art_1x4_s01 [http://perma.cc/SBS8-P3CJ].

[10] *See* John Foley, *JPMorgan Rewrites Laws of Finance – With Some Help*, FIN. TIMES (Oct. 15, 2024), https://www.ft.com/content/2bfaf5f3-09ff-4e5b-a985-994454627518; Hugh Son, *JPMorgan Software Does in Seconds What Took Lawyers 360,000 Hours*, BLOOMBERG (Feb. 28, 2017), https://www.bloomberg.com/news/articles/2017-02-28/jpmorgan-marshals-an-army-of-developers-to-automate-high-finance.

JPMorgan's success with COiN—together with its use of LOXM for trade execution, IndexGPT for AI-based investment strategies, and other tools for fraud detection and risk modeling—has made the bank a touchstone for AI-driven innovation in finance and demonstrates how AI solutions can transform processes even in heavily regulated sectors[11].

This phenomenon, of course, is not unique to JPMorgan. For example, Goldman Sachs systematically integrates AI into its data analysis processes. Using AI, the firm identifies market opportunities, optimizes trading strategies, and enhances risk management[12].

Financial institutions leverage AI in their operations as extensively as companies such as Walmart or Amazon do it for inventory management, supply chain optimization, and risk mitigation[13].

No sector remains untouched by AI's growing influence. In the energy industry—to provide additional illustration—firms like BP and Shell use AI to optimize asset performance and predict maintenance needs, which not only reduces costs but also supports ESG-compliant operations[14]. Similarly, in the pharmaceutical industry, companies such as Pfizer and Novartis integrate AI tools into clinical trial design, regulatory reporting, and compliance tracking—enhancing both operational efficiency and governance integrity[15].

For both operating companies—such as Walmart, Shell, and Pfizer—and large institutional investors, the ability to predict and rapidly adapt to shifting market conditions through AI supports a more agile and data-driven approach to governance, enhancing efficiency and mitigating risk.

Another emerging field is RegTech—*i.e.*, regulatory technology—where companies use AI to automate compliance functions such as anti-money laundering checks, insider trading detection, and regulatory filings. This not only reduces the administrative burden on corporate officers but also strengthens oversight and mitigates liability risks.[16]

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[11] *See Trades and Payments with AI. What's Next?*, HARV. BUS. SCH. DIG. IN. (Nov. 13, 2018), https://d3.harvard.edu/platform-rctom/submission/j-p-morgan-trades-and-payments-with-ai-whats-next/; J.P. Morgan, *Quest IndexGPT: Harnessing Generative AI for Investable Indices*, J.P. MORGAN INSIGHTS (July 22, 2024), https://www.jpmorgan.com/insights/markets/indices/indexgpt; J.P. Morgan, *How AI will make payments more efficient and reduce fraud*, J.P. MORGAN INSIGHTS (Nov. 20, 2023), https://www.jpmorgan.com/insights/payments/payments-optimization/ai-payments-efficiency-fraud-reduction.

[12] *See* Sung Cho & Brooke Dane, *Artificial Intelligence: Data Is the Differentiator*, GOLDMAN SACHS ASSET MGMT. (Aug. 16, 2024), https://am.gs.com/it-it/advisors/insights/article/2024/ai-data-is-the-differentiator; Hania Schmidt & Joseph Kogan, *Harnessing the Power of AI to Enhance Investment Decision-Making*, GOLDMAN SACHS ASSET MGMT. (Dec. 2, 2024), https://am.gs.com/en-us/institutions/insights/article/2024/harnessing-the-power-of-ai-to-enhance-investment-decision-making. *See also* William Magnuson, *supra* note 3, at 348 (widely discussing the adoption of AI tools among large financial institutions).

[13] *See* Jayant Palan, *Walmart's Integration of AI, and AR Technologies*, 26 IOSR J. BUS. & MGMT. 36 (2024); Rohit Sharma et al., *The Role of Artificial Intelligence in Supply Chain Management: Mapping the Territory*, 60 INT'L J. PROD. RES. 7527 (2022).

[14] *See* Alina Cherepovitsyna, *Artificial Intelligence in the Energy Sector*, in HANDBOOK OF RESEARCH ON ARTIFICIAL INTELLIGENCE, INNOVATION AND ENTREPRENEURSHIP 173 (Elias G. Carayannis & Evangelos Grigoroudis eds., 2023); Kizzy Nkem Elliot & Levi Damingo, *Application of Artificial Intelligence in the Oil and Gas Industry*, 6 INT'L RSCH. J. MOD. IN ENG'G TECH. & Sci. 2582, 2582–88 (2024).

[15] *See* K.K. Mak & M.R. Pichika, *Artificial Intelligence in Drug Development: Present Status and Future Prospects*, 24 DRUG DISCOVERY TODAY 773 (2019); Lalitkumar K. Vora et al., *Artificial Intelligence in Pharmaceutical Technology and Drug Delivery Design*, 15 PHARMACEUTICS 1916 (2023).

[16] Financial Industry Regulatory Authority (FINRA), *AI Applications in the Securities Industry*, FINRA.org, https://www.finra.org/rules-guidance/key-topics/fintech/report/artificial-intelligence-in-the-securities-industry/ai-

Taken together, these developments signal a clear trend: AI is no longer limited to enhancing operational efficiency—it is also becoming integral to the architecture of corporate governance itself, and increasingly a topic of focus for boards and shareholders.[17]

2. AI and Investment Decisions

Institutional investors and their investment decisions are no exception to these mechanisms. Leveraging AI-based tools, these shareholders have begun adopting approaches in which data analysis provided by AI plays a notable role and may affect both the decision to invest and the decision to divest. On the one hand, AI tools and their analysis may persuade institutional investors to enter sectors they otherwise would not consider. On the other hand, AI can offer effective alternatives to the classic "exit" in responding to management decisions that funds oppose—and in this respect, AI has the potential to suggest forms of activism that challenge traditional strategies. For this reason, AI's potential impact goes beyond efficiency gains and enhanced risk management to potentially altering longstanding dynamics.

The Big Three asset managers—most notably BlackRock—provide a key example. They employ AI to assess various factors in investment decisions, including ESG metrics.

BlackRock's Aladdin platform, one of the most advanced in the industry, uses AI to analyze ESG risks and opportunities on a global scale. With Aladdin's sophisticated analytics, BlackRock's iShares ESG Aware MSCI USA ETF has been able to identify companies with high ESG scores while avoiding controversial sectors such as tobacco and non-renewable energy.[18]

State Street, for instance, employs its proprietary R-Factor methodology, which combines ESG data with AI algorithms to evaluate companies' sustainability performance. Funds such as the SPDR S&P 500 ESG ETF leverage this technology to construct portfolios with enhanced sustainability profiles. Other noteworthy examples include UBS's Climate Aware funds—which adopt an investment strategy that rewards companies aligned with the goal of limiting global temperature increases to below 2°C. Similarly, Amundi's AI-Powered Equity ETF uses AI

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apps-in-the-industry; Mário Cardoso, Pedro Saleiro & Pedro Bizarro, *LaundroGraph: Self-Supervised Graph Representation Learning for Anti-Money Laundering*, ARXIV.ORG, https://arxiv.org/abs/2210.14360 (Oct. 25, 2022).

[17] Subodh Mishra, *AI in Focus in 2025: Boards and Shareholders Set Their Sights on AI*, HARV. L. SCH. F. ON CORP. GOV. (Apr. 2, 2025), https://corpgov.law.harvard.edu/2025/04/02/ai-in-focus-in-2025-boards-and-shareholders-set-their-sights-on-ai/. The article documents a sharp rise in AI-related governance engagement among public companies: over 31% of S&P 500 companies disclosed some level of board oversight of AI in 2024, and 20% included at least one director with recognized AI expertise. It also reports a surge in shareholder proposals focused on AI, reflecting investors' growing interest in the risks, opportunities, and ethical implications of AI adoption at the corporate level.

[18] *See Technologies Set to Reshape the Financial Realm in 2025 and Beyond*, FIN. TIMES, https://www.ft.com/partnercontent/aladdin-by-blackrock/technologies-set-to-reshape-the-financial-realm-in-2025-and-beyond.html (last visited Apr. 22, 2025),. For a discussion on iShares ESG Aware MSCI USA ETF and the selection of companies with high ESG scores, *see* Chris Taylor, *The Best ESG ETFs* WALL ST. J., https://www.wsj.com/buyside/personal-finance/investing/best-esg-etfs (Aug. 15, 2024, 10:19 AM). *See also iShares ESG Aware MSCI USA ETF*, FIN. TIMES, https://markets.ft.com/data/etfs/tearsheet/summary?s=ESGU%3ANMQ%3AUSD (last visited Apr. 22, 2025) (provides updated iShares ESG information including top holdings); Larry Fink, *A Fundamental Reshaping of Finance*, BLACKROCK (2020), https://www.blackrock.com/corporate/investor-relations/2020-larry-fink-ceo-letter (BlackRock's Annual Letter to CEOs describing how climate change is reshaping investment risk),.

algorithms to analyze large volumes of unstructured data—such as sustainability reports and corporate news—to identify companies with strong ESG practices.[19]

In sum, AI-based tools allow large investors to integrate novel metrics into decision-making processes, thereby incorporating ethical and sustainability criteria with greater precision as well as creating new opportunities and enabling different approaches.

Certainly, investment decisions—even those of sustainable funds—remain primarily driven by economic and financial considerations[20]. Moreover, ESG-driven investments have often been the subject of controversy, have occasionally failed to meet their goals, and have recently faced a wave of divestment[21].

However, these circumstances do not undermine the argument I present here, which seeks to demonstrate the potential and growing influence of AI in these decision-making processes and, consequently, in the activism of the associated investors. In fact, given the primacy of financial return as a driver, AI enables large financial institutions to expand—both rapidly and cost-effectively—the range of factors they incorporate into their investment priorities. AI algorithms can be designed to optimize for strong financial returns, while also integrating additional criteria such as ESG considerations, among others. In this way, AI makes it possible to calibrate investments that pursue competitive performance while simultaneously addressing broader strategic or normative objectives.

3. Expanding AI's Reach in Shareholder Tools and Consulting Functions

Beyond investment strategies—and irrespective of the ongoing debates surrounding ESG's long-term efficacy—AI platforms are already being employed in areas such as consulting and auditing, which are integral to investment decisions.

Although the deployment of AI across industries and functions lies somewhat beyond the immediate scope of this paper, a few illustrative examples help to contextualize AI's growing

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[19] *See State Street ACS Multi-Factor Global ESG Index Equity Fund B2*, FIN. TIMES, https://markets.ft.com/data/funds/tearsheet/summary?s=GB00BJRJFB86%3AGBP (last visited Apr. 22, 2025); *UBS AM Launches Climate Aware Strategies,* FUNDS EUR. (Sept. 14, 2020), https://funds-europe.com/ubs-am-launches-climate-aware-strategies/; *UBS Life Climate Aware Wld Eq GBP Hdg*, FIN. TIMES, https://markets.ft.com/data/funds/tearsheet/summary?s=GB00BKY63S20%3AGBP;AMUNDI ASSET MANAGEMENT, ARTIFICIAL INTELLIGENCE SOLUTIONS TO SUPPORT ENVIRONMENTAL, SOCIAL, AND GOVERNANCE INTEGRATION IN EMERGING MARKETS (2021), https://research-center.amundi.com/article/artificial-intelligence-solutions-support-environmental-social-and-governance-integration-emerging; AMUNDI ASSET MANAGEMENT, ARTIFICIAL INTELLIGENCE AND ESG: HOW DO THEY FIT? (2022), https://research-center.amundi.com/article/artificial-intelligence-and-esg-how-do-they-fit..

[20] *See* Andreas G.F. Hoepner, Ioannis Oikonomou, Zacharias Sautner, Laura T. Starks & Xiaoyan Zhou, *ESG Shareholder Engagement and Downside Risk*, 28 REV. FIN. 483, 483–510 (2024); Rob Bauer et. al., MENTAL MODELS IN FINANCIAL MARKETS: HOW DO EXPERTS REASON ABOUT THE PRICING OF CLIMATE RISK?, IZA Discussion Paper No. 17030 (May 2024), https://ssrn.com/abstract=4849689; Alex Edmans et. al., *Sustainable Investing: Evidence from the Field*, FEB-RN Research Paper No. 18/2024, HKU Jockey Club Enterprise Sustainability Global Research Inst. – Archive, European Corp. Governance Inst. – Fin. Working Paper No. 1028/2025 (Nov. 15, 2024), https://ssrn.com/abstract=4963062.

[21] *See* Editorial Board, *An ESG Asset Manager Exodus*, WALL ST. J. (Feb. 15, 2024), https://www.wsj.com/articles/climate-action-100-exodus-j-p-morgan-state-street-blackrock-esg-investing-b78d2a06; Patrick Temple-West et. al., *Investors Pull Cash from ESG Funds as Performance Lags*, FIN. TIMES (June. 5, 2024), https://www.ft.com/content/cf9001ab-e326-4264-af5e-12b3fbb0ee7b.

influence and potential—particularly as a prelude to examining its effects on shareholder activism, especially for small investors.

For example, KPMG's Clara platform optimizes audit processes and enhances compliance by providing boards with real-time data on financial health, internal controls, and risk management[22].

Similarly, Deloitte's Omnia suite leverages AI to automate audit testing, flag anomalies, and streamline workflows across vast datasets—enabling auditors to focus on high-risk areas and strategic insights[23]. Ernst & Young (EY) has introduced Canvas AI, an online platform hosted on EY private cloud that reviews large volumes of contracts and financial documents and has improved audit accuracy and transparency[24].

More generally, AI-powered analytics are being integrated across a wide range of services—from algorithmic scanning of financials, board records, and ESG data to scenario modeling, objectives identification, and the generation of strategic predictions and recommendations[25]. These tools are not merely enhancing decision-making and operational efficiency; they are beginning to reshape how companies are evaluated, monitored, and held accountable by investors and advisors alike.

Put another way, AI's influence could extend well beyond the realm of decision-making efficiency, shaping strategic priorities that influence activism and governance. And it is precisely in the domain of shareholder activism that AI may reveal some of its most intriguing—yet still largely unexplored—potential.

III. AI, Identity-Driven Activism, and Empowerment of the Next Generation

A. Notes on Dynamics and Constraints of Shareholder Activism

1. Traditional Shareholder Activism: Constraints, Elitism, and Strategic Barriers

As is well known, shareholder activism generally refers to the efforts of equity holders to influence a company's behavior by exercising their rights as owners. This influence may be exerted through informal dialogue, public campaigns, shareholder proposals, or contested proxy fights. While activism can take many forms—ranging from calls for strategic realignment to

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[22] *See* Mark Maurer, *KPMG Plans $2 Billion Investment in AI and Cloud Services*, Wall St. J. (July 11, 2023), https://www.wsj.com/articles/kpmg-plans-2-billion-investment-in-ai-and-cloud-services-e4fd0dd5; Larry Bradley, *KPMG Announces AI Integration into Global Smart Audit Platform, KPMG Clara*, KPMG Press Release (July 19, 2024), https://kpmg.com/xx/en/media/press-releases/2024/07/kpmg-announces-ai-integration-into-global-smart-audit-platform-kpmg-clara.html.

[23] *See* Chris Griffin, *Questions About Implementing GenAI? Deloitte Provides Insights from Its Own AI Journey*, Deloitte (Nov. 13, 2024), https://www2.deloitte.com/us/en/blog/accounting-finance-blog/2024/answering-ai-questions-in-audit-assurance.html; James Booth, *Deloitte Triples Number of Auditors Using AI Chatbot*, Fin. News (Apr. 7, 2025), https://www.fnlondon.com/articles/deloitte-triples-number-of-auditors-using-ai-chatbot-42086859.

[24] *See* Dante D'Egidio et. al., *EY Canvas*, EY, https://www.ey.com/en_us/services/audit/technology/canvas.

[25] *See* Cary Coglianese et. al., *Regulating by Robot: Administrative Decision Making in the Machine Learning Era*, 105 Geo. L.J. 1147, 1170–76 (2017) (discussing AI's use in predictive analytics and decision automation).

proposals for board refreshment or improved ESG performance—it is typically distinguished by its adversarial posture and its ambition to alter the status quo of corporate governance[26].

It is well documented how, historically, shareholder activism has been the domain of well-capitalized hedge funds or institutional investors, often characterized by short-termism and driven by financial motives. Classic activist strategies included pushing for divestitures, balance sheet optimization, and cost-cutting measures aimed at boosting stock prices in the near term. These efforts, while sometimes effective in unlocking value, have drawn criticism for eroding long-term stakeholder commitments and prioritizing market gains over sustainable corporate performance.[27]

Despite its visibility, activism has long been constrained by structural and behavioral barriers: dispersed ownership, coordination problems, and the collective action dilemma often inhibit retail investors from meaningfully participating. Free-rider problems and rational apathy—rooted in the costs of monitoring and the perceived futility of individual action—compound these obstacles. Even among institutional players, regulatory uncertainty and reputational risk frequently temper the willingness to engage assertively.[28]

Furthermore, activist campaigns can be highly resource-intensive, requiring legal expertise, market research, and substantial financial backing. As a result, participation in activism has historically been limited to actors with significant scale and access to specialized tools and networks. This dynamic has preserved a degree of elitism in corporate governance, leaving smaller or retail shareholders marginalized from key decisions affecting the direction of firms in which they are invested.[29]

Nonetheless, shareholder activism plays an important role in the corporate governance ecosystem. By introducing external scrutiny and challenging managerial entrenchment, activism can enhance accountability, catalyze reform, and align company strategy with evolving market or

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[26] *See* Lucian Bebchuk et. al., *The Long-Term Effects of Hedge Fund Activism*, 115 COLUM. L. REV. 1085 (June 2015); Ronald J. Gilson et. al., *The Agency Costs of Agency Capitalism: Activist Investors and the Revaluation of Governance Rights*, 113 COLUM. L. REV. 863 (Mar. 11, 2013); John C. Coffee Jr. & Darius Palia, *The Wolf at the Door: The Impact of Hedge Fund Activism on Corporate Governance*, 41 J. CORP. L. 545 (2016).

[27] *See* Strine, *supra* note 7. *Compare* Marcel Kahan & Edward B. Rock, *Hedge Funds in Corporate Governance and Corporate Control*, 155 U. PA. L. REV. 1021, 1083-87 (2007) (pointing to activist shareholder pressures leading to "short-termism" on the part of management which may contribute to missing long-term investments), *with* Roberta Romano, *Less is More: Making Institutional Investor Activism a Valuable Mechanism of Corporate Governance*, 18 YALE J. REG. 174, 187-92 (2001) (discussing the historically insignificant impact of shareholder activism on corporate performance).

[28] *See* Bernard S. Black, *Shareholder Passivity Reexamined*, 89 MICH. L. REV. 520, 526-30 (1990) (describing the assorted reasons behind the "passivity story" of both individual and institutional investors); Mark J. Roe, *Corporate Short-Termism—In the Boardroom and in the Courtroom*, 68 BUS. LAW. 977, 983-85, 990-91 (2013) (describing how concerns connected to short-termism lead to court decisions, corporate governance and media pressure leading to less activist voting). *See generally*, FRANK H. EASTERBROOK & DANIEL R. FISCHEL, THE ECONOMIC STRUCTURE OF CORPORATE LAW (1991).

[29] *See* Edward B. Rock, *Institutional Investors in Corporate Governance*, in THE OXFORD HANDBOOK OF CORPORATE LAW AND GOVERNANCE, at 382-84 (2015) (discussing how even activist hedgefunds rely on investment from large institutional investors to carry out costly activism); John Armour & Brian R. Cheffins, *The Past, Present, and Future of Shareholder Activism by Hedge Funds*, 37 J. CORP. L. 51, 53, 56-58 (2011) (discussing the prominence of large activist hedge funds before and after the 2008 financial crisis). *See generally,* Jill Fisch, *The Destructive Ambiguity of Federal Proxy Access*, 61 EMORY L.J. 435 (2012) (discussing the lack of shareholder access to proxy ballots impacting shareholders).

societal expectations. It is particularly potent in environments where other checks—such as regulatory oversight or board independence—may be insufficient.[30]

Activist investors have, at times, succeeded in driving changes that would have been unlikely to emerge through traditional governance channels—including improved capital allocation and corporate governance enhancements. Accordingly, activism, despite its flaws, remains a vital—if controversial—mechanism for shareholder influence.[31]

Over the past two decades, shareholder activism has evolved significantly. Campaigns have grown in number and sophistication, with activists increasingly collaborating with proxy advisors and leveraging media narratives.[32]

At the same time, institutional investors—once reluctant to challenge management—have become more active, if selectively so. BlackRock, Vanguard, and State Street have developed stewardship teams and voting guidelines that signal a growing awareness of investor influence on corporate purpose. Yet these evolutions remain uneven, and many retail investors continue to be sidelined in the governance conversation.[33]

Against this backdrop, AI offers a novel pathway to reinvigorate shareholder activism, potentially expanding its reach beyond traditional actors and enabling new forms of activism. AI's capacity to aggregate data, identify actionable opportunities, and streamline campaign strategy could reduce costs, democratize access, and empower new participants—including values-driven retail investors and emerging generational voices[34].

2. Institutional Consolidation: AI in the Shadow of Ownership Concentration

Nevertheless, in evaluating AI's role in activism, a broader transformation already underway should also be considered: the consolidation of shareholder power among a small number of institutional giants. Stated differently, the impact of AI is unfolding against the backdrop of deeper structural changes that, according to some, have already reshaped the traditionally limited activism of large investors. Combined with a rising trend of private equity firms taking companies private, these developments are transforming market dynamics and corporate governance. From

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[30] *See* Bebchuk, Brav & Jiang, *supra* note 26, at 1088; Gilson & Gordon, *supra* note 26, at 867. *Cf.* Ian Appel et al., *Passive Investors, Not Passive Owners*, 121 J. FIN. ECON. 111, 113, 133-34 (2016) (discussing how even just the presence of large institutional investors that are considered passive still impacts corporate structure).

[31] *See* Alon Brav et al., *Hedge Fund Activism, Corporate Governance, and Firm Performance*, 63 J. FIN. 1729, 1729, 1773-74 (2008) (utilizing empirical analysis to demonstrate positive changes resulting form two thirds of hedge fund activism campaigns). See generally, DAVID F. LARCKER & BRIAN TAYAN, CORPORATE GOVERNANCE MATTERS: A CLOSER LOOK AT ORGANIZATIONAL CHOICES AND THEIR CONSEQUENCES (3d ed. 2021); Lucian Bebchuk & Scott Hirst, *Index Funds and the Future of Corporate Governance: Theory, Evidence, and Policy*, 119 COLUM. L. REV. 2029, 2096, 2133-35 (2019) (discussing how hedge-fund activism can encourage, supplement and sometimes replace institutional investor stewardship).

[32] *See generally,* Ryan Bubb & Emiliano M. Catan, *The Party Structure of Mutual Funds*, 35 REV. FIN. STUD. 2839 (2022) (discussing the partisan nature of mutual fund voting based on an analysis of voting patterns by mutual funds).

[33] *See* Jill E. Fisch, *The Uncertain Stewardship Potential of Index Funds*, GLOBAL SHAREHOLDER STEWARDSHIP (Dionysia Katelouzou & Dan W. Puchniak eds., Cambridge Univ. Press 2022); Edward Rock, *The Logic and (Uncertain) Significance of Institutional Investor Voice*, 79 Geo. Wash. L. Rev. 445, 451, 505-06 (1991). Evidence can also be found in the Vanguard Investment Stewardship Reports (2021–2023) as well as BlackRock Stewardship Annual Reports.

[34] *See* Coglianese & Lehr, *supra* note 25, at 1155-60.

this perspective, the effect is a growing trend toward large investors' intrusion in corporate management and a reduction in public accountability. This phenomenon and its consequences have been investigated in a recent work by John Coates and compellingly termed "the problem of twelve" [35].

In this view, the traditionally passive role of large institutional investors is giving way to a more active—and, in some cases, interventionist—stance. This purported shift is attributed to changes in ownership structures, with the new landscape now presenting only a few dominant players—most notably BlackRock, State Street, and Vanguard—that manage enormous investments and own significant stock in virtually all public companies. As a result, they effectively wield—and, as Coates suggests, exercise—unprecedented lobbying power that significantly influences management decisions. At the same time, private equity (PE) firms, by taking companies private—whether to effect a bust-up or a round trip—remove them from public accountability, despite the size and importance of these companies to workers and communities.[36]

Against this backdrop, the potential impact of AI on shareholder activism must be assessed with caution. In other words, the boost provided by AI to shareholder activism might be diluted within this broader trend or should at least be analyzed within this new scenario.

That said, this scholarship's conclusions are not without controversy. It can be argued that the Big Three— or other similarly large asset managers—rarely intervene in the management of a company they have invested in unless that company faces significant market value losses or fails to distribute profits without valid justification.

Empirical evidence supports this critique: the Big Three have consistently supported management in proxy contests, showing low levels of support for dissident campaigns and shareholder activism more broadly. Despite their expanding ownership influence, their voting behavior remains largely passive, with a marked tendency to align with management—revealing a persistent bias toward the *status quo.*[37]

Moreover, the Big Three have shown a tendency to shift with the political winds. Their approach to ESG, for example, has notably evolved in recent years, as ESG considerations have become increasingly politicized and unpopular in U.S. capital markets. BlackRock CEO Larry

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[35] *See* JOHN COATES, THE PROBLEM OF TWELVE: WHEN A FEW FINANCIAL INSTITUTIONS CONTROL EVERYTHING: WHEN A FEW FINANCIAL INSTITUTIONS CONTROL EVERYTHING (2023).

[36] *See id*.

[37] This pattern is often criticized as a failure of stewardship, raising concerns about whether such concentrated power is being exercised in a way that promotes accountability or long-term value creation. *See* Lucián A. Bebchuk & Scott Hirst, *The Power of the Big Three and Why It Matters*, 102 B.U. L. REV. 1547, 1587-91 (2022) (contending that BlackRock, Vanguard, and State Street overwhelmingly support management in proxy voting and rarely side with dissidents); Dhruv Aggarwal, Lubomir P. Litov & Shivaram Rajgopal, *Big Three (Dis)Engagements* 30-31 (Nw. L. & Econ. Res. Paper, Working Paper No. 23-17 & 23-53, 2024), https://dx.doi.org/10.2139/ssrn.4580206 (showing that the Big Three maintain high levels of alignment with corporate managers in contested proxy votes despite public rhetoric on stewardship); Alon Brav et al., *Shareholder Monitoring Through Voting: New Evidence from Proxy Contests*, 37 REV. FIN. STUD. 591, 608 (2024), (providing empirical evidence that Big Three index funds rarely vote against incumbents in proxy contests, even when activism may enhance value); Dorothy S. Lund, *The Past, Present, and Future of Proxy Voting Choice*, J. CORP. L (2025) (highlighting Big Three's consistent support for corporate management) Nathan D. Herrmann, John M. McInnis, Brian Monsen, & Laura T. Starks, *Decentralizing Proxy Voting Power*, SSRN (Nov. 13, 2024), https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=5007107 (analyzing legislative reforms like the INDEX Act aimed at reducing the Big Three's dominant voting influence due to their pro-management bias).

Fink has publicly distanced himself from the term "ESG," acknowledging its weaponization in public discourse, and both BlackRock and Vanguard have significantly reduced their support for ESG-related shareholder proposals[38].

Regardless of whether Coates's thesis ultimately proves correct, the broader point remains: the validity of the argument I advance in this paper does not depend on that structural outcome. This is because the most intriguing and potentially transformative role of AI in shareholder activism lies with small investors and millennial shareholders—a focus I explore in the following section.

In any case, it is beyond dispute that even among sophisticated investors, AI is becoming a key driver of the strategic changes likely to define the next decade.

Indeed, in this emerging landscape, AI may prove to be not only a tool of optimization but a force multiplier—enhancing the strategic reach of dominant actors while subtly redrawing the contours of corporate accountability.

B. AI, Millennials, and the Strategic Reimagining of Shareholder Activism

1. Generational Priorities, Technological Fluency, and Identity-Driven Activism

I now turn to the core focus of this paper: one of the potentially most significant implications for shareholder activism—namely, the novel and intriguing opportunities that AI may unlock for relatively small investors. Within the broader argument of this work, this development stands out as one of the most compelling and potentially transformative aspects of AI's impact on corporate governance.

AI is not only enhancing the strategic capabilities of large institutional investors—such as BlackRock, Vanguard, and State Street—but may also open new pathways for smaller, values-driven investors to exert meaningful influence.

Put another way, AI's potential holds particular significance for investors led by, attracting, or aligning with younger cohorts—especially Gen Z and Millennials. These generations often champion causes like sustainability, diversity, and corporate ethics; and AI may substantially increase the likelihood of success for initiatives grounded in these values.

The distinctive interplay among AI's analytical capacities, the normative priorities of younger generations, and their technological fluency may constitute the foundation of a powerful emerging

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[38] *See* Cheyenne Ligon, *Blackrock CEO Larry Fink Says He No Longer Uses Term "ESG": "It's Been Totally Weaponized"*, Pensions & Investments (June 26, 2023), https://www.pionline.com/esg/blackrock-ceo-larry-fink-says-he-no-longer-uses-term-esg; Laurence Fink, *Larry Fink's 2024 Letter to CEOs*, BlackRock (last visited Apr. 25, 2025), https://www.blackrock.com/corporate/investor-relations/2024-larry-fink-annual-chairmans-letter [https://perma.cc/N64D-573J]; Jon McGowan, *BlackRock's Fink Calls For Energy Pragmatism, Omits ESG From Annual Letter*, Forbes (Mar. 27, 2024), https://www.forbes.com/sites/jonmcgowan/2024/03/27/blackrocks-fink-calls-for-energy-pragmatism-omits-esg-from-annual-letter/ [https://perma.cc/UZF5-FVHZ] (noting that BlackRock CEO Larry Fink avoided using the term "ESG" in his 2024 annual letter, acknowledging that the term had been "weaponized" and had become politically divisive in the U.S.). *See also* Cheyenne Ligon, *BlackRock Voted Against a Record 91% of All Shareholder Proposals in 2023 Proxy Season*, Pensions & Investments (Aug. 23, 2023), https://www.pionline.com/esg/blackrock-voted-against-record-91-shareholder-proposals-2023-proxy-season (noting BlackRock's decreased support for environmental and social proposals during the 2023 proxy season).

trend—a unique combination of three factors that may empower Gen Z and Millennials in corporate governance and financial markets as never before. AI can help surface campaigns that are both personally resonant and broadly actionable, thereby facilitating a new form of identity-driven activism rooted in emerging values but enhanced by data, speed, and precision.

In this light, AI offers the tools to elevate these generational values from personal preferences into scalable, strategic interventions. Indeed, the coordinated actions and communications that may result among traditionally disaggregated shareholders—enabled by the strategic use of AI tools—have the potential to give rise to a completely novel form of shareholder activism[39].

Importantly, it is worth noting that, by leveraging AI tools, small investors can monitor—usually on a real-time basis—corporate performance and assess commitments not only to ESG values, but also to a range of other causes. In fact, this potential is not limited to ESG initiatives. AI has already been used to support grassroots shareholder mobilization around so-called "meme stocks,"[40] and could just as easily be deployed to aggregate otherwise disaggregated shareholders around virtually any "issue of the day"—including positions in favor of, or in opposition to, companies that support particular political candidates or social causes. AI enables these investors to develop timely and informed strategies, based on the analysis of vast amounts of complex data, thereby aligning their investment decisions with their objectives, whatever those may be.

In short, AI platforms possess the capacity to perform accurate predictive analyses, process and index data in real time, and significantly reduce costs. These capabilities could empower the aggregation of individual preferences and amplify the collective voice of small investors. AI's ability to identify trends, predict achievable goals, and guide actionable strategies might unlock the latent potential of small shareholders in ways previously unthinkable. Notably, this argument remains unaffected by the ongoing challenges facing ESG investments for two reasons. First, AI can transcend these hurdles by identifying common threads, reducing costs, and crafting actionable strategies—regardless of the specific cause or agenda pursued. Second, as discussed, AI's potential to aggregate traditionally disaggregated shareholders can operate across a wide spectrum of generational priorities, not just ESG.

The implications of these advancements could be profound, as they have the potential to reshape traditional power dynamics in corporate governance. By identifying shared objectives that align with the next generation's agenda, AI can unite individuals who would otherwise remain

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[39] Of course, such coordinated actions and communications must comply with applicable regulations, and the possibility that shareholder coordination using AI tools could trigger group status—and thereby implicate disclosure obligations under Section 13(d) of the Securities Exchange Act of 1934—is a non-trivial issue. However, questions and considerations related to this point lie beyond the scope of this paper. *See generally* Lucian A. Bebchuk & Robert J. Jackson, Jr., *The Law and Economics of Blockholder Disclosure*, 2 HARV. BUS. L. REV. 39, 53–55 (2012) (discussing the scope and enforcement of group formation under Section 13(d)); Ulf von Lilienfeld-Toal & Jan Schnitzler, *The Anatomy of Block Accumulations by Activist Shareholders*, 62 J. CORP. Fin. 101620 (2020) (analyzing block acquisitions and their implications for Section 13(d) disclosures).

[40] *See* Sergio Alberto Gramitto Ricci & Christina M. Sautter, *Corporate Governance Gaming: The Collective Power of Retail Investors*, 22 NEV. L.J. 51, 84-87 (2021) (discussing how new generations of retail investors utilize technologies and online forums to coordinate actions, exemplified by the GameStop saga and meme stock phenomenon). *See also* Jill E. Fisch, *GameStop and the Reemergence of the Retail Investor*, 102 B.U.L. REV. 1799, 1854-56 (2022); Dhruv Aggarwal, Albert H. Choi & Yoon-Ho Alex Lee, *The Meme Stock Frenzy: Origins and Implications*, 96 S. CAL. L. REV. 1387, 1396-1400 (2024) (analyzing the structural digital transformations in trading and investing that contributed to the emergence of meme stocks and their impact on corporate governance).

disaggregated and passive[41]. Furthermore, AI reduces costs and saves time, empowering unstructured investors, whose resources and tools differ significantly from those of large institutional players[42]. This allows them to adopt activist strategies that meaningfully amplify their influence.

In this sense, AI introduces a new player into shareholder activism—one capable of exerting substantive influence on board decisions.

For instance, a group of young investors might leverage AI to advocate for more inclusive corporate policies or to promote climate strategies aligned with their values. These avenues, previously inaccessible due to cost and logistical barriers, could reveal unprecedented opportunities for impactful activism. Millennials, through this technological empowerment, may not only participate in the market but also position themselves as strategic players within it. Their influence should not be prematurely dismissed as a fleeting trend or negligible phenomenon. Instead, it represents a potentially meaningful innovation in the traditional dynamics of shareholder activism.

2. The Case of Engine No. 1

The Engine No. 1 campaign against ExxonMobil—widely regarded as a surprise victory—serves as a powerful case in point: while not AI-driven, it illustrates the kind of identity-aligned activism that AI could help support or scale in future scenarios.

As is well known, in 2021, the small hedge fund Engine No. 1 launched a proxy campaign and succeeded in securing three seats on ExxonMobil's board, despite holding only a minimal fraction of the company's shares (approximately $40 million worth of ExxonMobil stock, representing about 0.02% of the company's outstanding shares)[43].

This achievement was largely the result of a carefully designed strategy that—amid significant financial losses experienced by ExxonMobil—leveraged concerns over unsustainable corporate practices, with a particular focus on ESG principles, and successfully garnered widespread

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[41] *See* Bilal Hafeez, M. Humayun Kabir & Unyanee Wongchoti, *Are Retail Investors Really Passive? Shareholder Activism in the Digital Age*, 49 J. BUS. FIN. & ACCT. 423, 423-55 (2022) (discussing the use of digital tools by small investors to influence corporate decisions).

[42] *See* Ilya Ivaninskiy, Irina Ivashkovskaya & Joseph A. McCahery, *Does Digitalization Mitigate or Intensify the Principal-Agent Conflict in a Firm?*, 25 J. MANAG. & GOV. 1,1 (2021) (discussing the mitigation of principal-agent conflicts through digital innovation in corporate governance). The empowerment of unstructured investors and the reduction of the influence gap between individual and institutional investors is highlighted in Arnaud Cavé & Niamh O'Brien, *Next-Gen Governance: AI's Role in Shareholder Proposals*, HARV. L. SCH. F. ON CORP. GOV. (May 6, 2024) https://corpgov.law.harvard.edu/2024/05/06/next-gen-governance-ais-role-in-shareholder-proposals/ [https://perma.cc/2B4W-HWT5]; Nur Uysal, *Resolved: Exploring the Role of Dialogic Engagement in Shareholder Activism for Diversity, Equity, and Inclusion*, 35 J. PUB. REL. RSCHE. 300 (2023). *See also* Zhibin Wang & Zelei Li, *Does Minority Shareholder Activism Enhance Corporate Innovation? Evidence from China*, *in* 54 FINANCE RESEARCH LETTERS. 1 (2023); Kevin Chuah, Mark R. DesJardine, Maria L. Goranova & Witold J. Henisz, *Shareholder Activism Research: A System-Level View,* 18 ACAD. MGMT. ANNALS. no. 1, 2023.

[43] *See* Robert P. Bartlett III & Ryan Bubb, *Corporate Social Responsibility Through Shareholder Governance*, 97 S. CAL. L. REV. 417, 489-91 (2024) (discussing the Engine No. 1 case); Stuart Gillan & Laura T. Starks, *Corporate Governance, Corporate Ownership, and the Role of Institutional Investors: A Global Perspective*, 13(2) J. APPLIED CORP. FIN. 4, 4–22 (2021); Alexander I. Platt, *Beyond "Market Transparency": Investor Disclosure and Corporate Governance*, 74 STAN. L. REV. 1393, 1439 (2022).

support[44]. Through well-targeted arguments and data-rich analyses—though not specifically enabled by AI—Engine No. 1 managed to influence major institutional investors like BlackRock, convincing them to support its claims.

The case marked a significant shift in how generationally sensitive topics can shape corporate agendas and gain support: a hedge fund virtually unknown before the campaign successfully leveraged a sustainability issue to challenge management and install directors on ExxonMobil's board—with backing from the Big Three.

It is true that the campaign—although centered on environmental concerns—benefited from widespread dissatisfaction with ExxonMobil's financial performance in the preceding period[45]. However, this context does not detract from the argument: generational values can act as a powerful catalyst for new proxy campaigns, and AI can act as an empowering tool for a new generation of investors.

More than a one-off, this campaign highlights how activism—when it aligns with both investor values and institutional leverage—can breach traditional barriers to influence. Against this backdrop, AI can help overcome the limitations that have traditionally hindered effective proxy campaigns by groups that once viewed such endeavors as virtually unattainable.

In this sense, AI and its new potential for shareholder activism can also help to mitigate the longstanding skepticism that major investors often harbor toward insurgent campaigns[46]—a dynamic exemplified by BlackRock's decision to back Engine No. 1's efforts.

Simply put, beyond the specific reasons or circumstances underlying this case, the unique combination it reveals is not necessarily episodic. The technological proficiency of this generation, its values and commitment to promoting them decisively, the potential of AI in financial markets, the attention of major funds and proxy advisors—along with contingent opportunities and factors—may create a new dynamic in corporate governance and herald a novel form of generational activism[47].

C. Unlocking Potential: AI, Small Investors, and the Challenge of Shareholder Apathy

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[44] *See* Matt Phillips, *Exxon's Board Defeat Signals the Rise of Social-Good Activists*, N.Y. Times (June 9, 2021) https://www.nytimes.com/2021/06/09/business/exxon-mobil-engine-no1-activist.html. *See also* Robert G. Eccles & Svetlana Klimenko, *The Investor Revolution*, Harv. Bus. Rev., May-June 2019, at 107, 108-16 (discussing how institutional investors and proxy advisors are influenced by ESG issues, often supported by advanced technologies); Geeyoung Min, *Shareholder Direct Democracy*, 74 Emory L. J. 381, 395-96 (2024). *See generally* Lucian A. Bebchuk & Scott Hirst, *Private Ordering and the Proxy Access Debate*, 65 The Bus. Law., Feb. 2010, at 329, 329–360.

[45] *See* Mark Kramer, Shawn A. Cole, & Vikram Gandhi, *ESG Activists Met the Moment at ExxonMobil, But Did They Succeed?* Harv. Bus. Sch. (February 16, 2023), https://www.library.hbs.edu/working-knowledge/esg-activists-met-the-moment-at-exxon-mobil-but-did-they-succeed?utm [https://perma.cc/JKE5-D4UN].

[46] *See* Bebchuk, Brav & Jiang, et al., supra note **Error! Bookmark not defined.**, at 1085–1156.

[47] *See* Colin Mayer, Prosperity: Better Business Makes the Greater Good 125–45, 215–35, 280–90 (2018) (discussing a direct connection between generational changes, social and environmental pressures, and the adoption of technological tools to transform capitalism into a more sustainable and inclusive system).

While the potential of AI to empower smaller investors and reshape activism is compelling, some skepticism is warranted as to whether these new possibilities can truly overcome the shareholder apathy that has traditionally defined shareholder engagement.

To begin with, as is well known, the concept of shareholder apathy—where individual shareholders, particularly smaller ones, often refrain from active participation due to perceived inefficacy or high costs—has historically been a defining characteristic of corporate governance. This apathy stems from the separation between ownership and control in large corporations[48].

A vast literature attributes this phenomenon to rational disincentives: individual shareholders have little incentive to bear the costs of monitoring or participation, given their minimal influence over corporate outcomes[49].

From this viewpoint, even with AI's promise to lower entry barriers, it remains uncertain whether technological tools can reverse the entrenched rationales for passivity—such as the tendency of dispersed shareholders to free ride on others' efforts or the widespread perception that individual votes carry little weight.[50]

Studies demonstrate that retail shareholder participation correlates positively with ownership size and potential benefits, and negatively with participation costs. However, even shareholders with minimal influence tend to vote against management in underperforming firms—suggesting that, in such cases, their motivations are not purely financial but also rooted in oversight concerns. In essence, they might actively use their voting rights to monitor and communicate with boards.[51] This pattern indicates that shareholders are more likely to vote when the underlying issue is personally or normatively salient.[52]

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[48] *See* A. BERLE & GARDINER C. MEANS, THE MODERN CORPORATION AND PRIVATE PROPERTY 4-33 (1932).

[49] *See* Easterbrook & Fischel, *supra* note **Error! Bookmark not defined.**, at 66–70 (explaining that shareholders are rationally apathetic because the expected benefit of active participation is outweighed by its costs); Lucian Bebchuk, *The Case for Shareholder Access to the Ballot*, 59 BUS. LAW. 43 *passim* (2003) (arguing that structural barriers and rational apathy undermine shareholder participation and accountability); Jill E. Fisch, Assaf Hamdani & Steven Davidoff Solomon, *The New Titans of Wall Street*: *A Theoretical Framework for Passive Investors*, 168 U. PA. L. REV. 17, 23–26 (2019) (noting that individual investors tend to remain passive, especially relative to institutional investors).

[50] *See generally* John C. Coffee Jr., *Liquidity Versus Control: The Institutional Investor as Corporate Monitor*, 91 COLUM. L. REV. 1277 *passim* (1991) (exploring the dynamics of shareholder monitoring and the limitations faced by smaller investors). *See also* Stephen M. Bainbridge, *Shareholder Activism and Institutional Investor Capitalism*, UCLA SCH. L., Law & Econ. Research Paper 05-20 at 14 (September 2005) (discussing the free-rider problem and shareholder apathy in the context of modern governance); Dorothy S. Lund, *The Case Against Passive Shareholder Voting*, 43 J. CORP. L. 493 (2018) (criticizing the passive nature of institutional voting, thereby indirectly emphasizing the importance of active participation).

[51] *See* Alon Brav, Matthew D. Cain & Jonathon Zytnick, *Retail Shareholder Participation in the Proxy Process: Monitoring, Engagement, and Voting*, 144 J. FIN. ECON. 492 (2022).

[52] The 2024 proxy contest between The Walt Disney Company and Nelson Peltz's Trian Partners is emblematic in this respect. As widely reported, in an effort to secure a board seat, Peltz launched a campaign under the name "Restore the Magic," criticizing Disney's strategic direction, cost structure, and executive leadership. Disney responded with a comprehensive and sophisticated communications strategy to mobilize shareholder support. The company's campaign included social media outreach, a dedicated investor relations website, and endorsements from prominent stakeholders—ultimately defeating the insurgent bid. *See* Brooks Barnes, *Disney Fends Off Activist Investor for Second Time in 2 Years*, N.Y. TIMES (Apr. 3, 2024), https://www.nytimes.com/2024/04/03/business/disney-peltz-trian-proxy-vote.html; Andrew Ross Sorkin et al., *The Takeaways From Disney's Board Fight with Nelson Peltz*, N.Y. TIMES (Apr. 4, 2024), https://www.nytimes.com/2024/04/04/business/disney-iger-peltz-proxy-battle.html; Alex Sherman, Rohan Goswami & Sarah Whitten, *Disney Wins Proxy Fight Against Activist Investor Nelson Peltz, as Shareholders*

In this respect, AI tools may assist by identifying and amplifying both the importance of such issues and the perceived significance of casting a vote—thereby empowering shareholders through the mechanisms discussed above. Simply put, AI has the potential to make it much easier for investors to have influence, which in turn may make them more likely to vote.[53]

In addition to economic rationales, behavioral economics provides further insight. Research suggests that even when tools are readily available, cognitive biases—combined with time constraints, information overload, and lack of confidence or expertise—often discourage active participation by individual investors. Whether AI can meaningfully overcome these psychological and systemic barriers remains an open question.[54] Nevertheless, in light of the mechanisms described above, there is reason for cautious optimism.

A further objection may be raised regarding AI's potential to engage small stockholders: traditional activism has often been dominated by institutional players with significant resources, leaving smaller shareholders in a marginal role, despite AI's potential to level the playing field.[55] Critics might argue that, without structural reforms to the corporate voting system, enhanced proxy processes, or regulatory shifts, the transformation AI could bring to shareholder activism may remain incremental rather than revolutionary—that is, limited in scope and insufficient to overcome the entrenched norms of passivity.[56]

Finally, it is possible that some of those skeptical of a fundamental shift in activism—and, more broadly, of the reduced public accountability of large corporations and capitalism itself, as described by Coates in his abovementioned work—might downplay the prospective transformative impact of AI in generational activism. At the very least, such critics are likely to remain cautious about predicting structural and lasting changes.

That said, even while aligning with skeptics regarding Coates's broader predictions of activism's transformation, I contend that the potential of AI for smaller investors remains both significant and underexplored. AI offers tools that not only reduce costs and barriers but also enable new forms of engagement for actors who have traditionally been sidelined in corporate

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Reelect Full Board, CNBC (Apr. 3, 2024), https://www.cnbc.com/2024/04/03/disney-annual-meeting-shareholders-vote-on-nelson-peltz-and-bob-iger.html [https://perma.cc/JDS8-5HZX]. The contest highlighted how widespread individual investor participation—enabled in part by improved access to information and strategic messaging—has become increasingly influential in board elections.

[53] *See* Taha Havakor et al., *Tech-Enabled Financial Data Access, Retail Investors, and Gambling-Like Behavior in the Stock Market*, 71 MGMT. SCI. 1646 (2025); He He, Laurence Jones, Yun Lu & Adrian Gepp, *Technology-Enabled Innovation in Financial Markets and Retail Investors: A Systematic Literature Review* (2024), https://ssrn.com/abstract=4953621 (reviewing literature on how digital technologies—such as the Internet, mobile platforms, and social media—have reshaped retail investor behavior and increased their influence in financial markets).

[54] *See* Oliver Hart & Luigi Zingales, *Companies Should Maximize Shareholder Welfare Not Market Value,* 2 J.L. FIN. & ACCT. 247 (2017) (discussing shareholder preferences and the challenges of aligning activism with broader goals like ESG). *See also* Kobi Kastiel & Yaron Nili, *In Search of the "Absent" Shareholders: A New Solution to Retail Investors' Apathy*, 41 DEL. J. CORP. L. 55, 61 (2016).

[55] *See* Luca Enriques & Alessandro Romano, *Institutional Investor Voting Behavior: A Network Theory Perspective*, 2019 U. ILL. L. REV., 223 (investigating the impact of institutional investors' voting behavior and how networks might shape activism); Armour & Cheffins, *supra* note 29, at 51 (describing historical trends and the evolving landscape of shareholder activism as well as providing context for the role of smaller investors).

[56] *See* infra Part IV.B (discussing empirical evidence relevant to this point).

governance—particularly when they succeed in securing institutional support for their value-driven campaigns.

These tools democratize access to data, facilitating the aggregation of preferences, the identification of actionable goals, and the timely mobilization of resources.[57] In essence, AI might empower smaller investors to move beyond passivity, transforming them into strategic participants capable of garnering support from large funds and, ultimately, influencing corporate decision-making.

I argue that this empowerment is not merely theoretical but holds tangible potential. AI's predictive analytics and real-time data capabilities allow small investors to detect trends and align their strategies with broader movements or values, regardless of whether these are rooted in financial efficiency, sustainability, or other priorities. Such alignment may not only amplify their individual influence but also foster collaboration among like-minded shareholders—thereby serving as a catalyst for coordinated action. The result might be a collective force that has the potential, in time, to challenge traditional power dynamics, making smaller investors meaningful players in shareholder activism.

This remains true as long as younger generations maintain their focus on their priorities and integrate them into market practices. Put differently, as long as these investors view activism not merely as a pursuit of financial returns but as a means of aligning corporate behavior with their identity-driven values and societal priorities, this form of identity-driven activism has the potential to overcome, at least in part, the traditional challenges faced by small investors.

D. Features and Challenges of AI-Enabled Identity-Driven Activism

1. Value Alignment, Strategic Targeting, and Campaign Design

Building on the intersection of AI's capabilities and the sociological priorities of younger generations, I now turn to outline the defining characteristics that this novel phenomenon in shareholder engagement—AI-enabled identity-driven activism—may assume. Naturally, this section explores the potential contours of such a development, while the following part of the paper examines whether empirical data support its actual emergence. Accordingly, the features discussed here should be understood as prospective rather than established.

As previously discussed, identity-driven activism is rooted, first and foremost, in the distinctive values of millennials and Gen Z, who prioritize causes such as environmental sustainability, diversity, equity, and corporate ethics. Put differently, for these investors, the focus often extends beyond financial returns, centering instead on aligning corporate behavior with deeply held societal priorities and generational values.

A brief sociological observation supports the argument: unlike previous generations, millennials often seek more than purely financial returns. They frequently demand that their

[57] *See also* Michael Hilb, *Toward Artificial Governance? The Role of Artificial Intelligence in Shaping the Future of Corporate Governance*, 24 J. Mgmt. & Governance 851, 862-63 (2020); Martin Petrin, *The Impact of AI and New Technologies on Corporate Governance and Regulation*, 2024 Sing. J. Legal Stud. 90 (2024).

investments—and their consumption habits— reflect personal and ethical commitments, such as combating climate change or advocating for minority rights.[58]

AI has the potential to empower this transformation by turning these preferences into actionable strategies, lowering the barriers to traditional proxy mechanisms. In doing so, it sets the stage—at least potentially—for a new paradigm of generational activism. This dynamic holds true for the pursuit of any value-aligned causes that resonates deeply with this generation.

If such a form of activism emerges, it will likely revolve around values bearing these generational characteristics.

Moreover, as discussed, this identity-driven engagement would be powered by AI, which may serve a dual function: both as an analytical engine and a practical enabler. Indeed, by processing vast datasets—from corporate reports to social media sentiment—AI can identify companies, issues, and strategies that align with these values while also resonating with broader stakeholder groups. This precision could allow investors to target initiatives with a higher probability of success, transforming individual preferences into impactful, coordinated efforts.[59]

As noted above, these characteristics serve two strategic functions. First, they help define an "identity profile" around which to frame a proposal. Second, they facilitate the execution of proxy campaigns tailored to exploit the identified "weak point" in a company's governance or strategy.[60]

A campaign developed along these lines could act as the initial spark—one that triggers a broader mobilization effort, either by aggregating retail proxies or, more likely, by attracting support from major institutional funds.

For example, AI tools can flag companies with high carbon emissions and assist investors in designing initiatives to address those impacts. Similarly, algorithms can assess board composition, uncover diversity gaps, and propose tailored solutions to improve inclusion.[61] Beyond environmental and diversity issues, AI can also be used to monitor human rights compliance along supply chains, enabling investors to push for greater transparency and ethical practices.[62]

Additionally, the integration of social and traditional media can significantly amplify these campaigns, generating momentum and drawing the attention of institutional investors who might otherwise remain disengaged.[63] Put another way, AI also enables micro-targeting and message

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[58] *See* Robert V. Kozinets & M. Seraj-Aksit, *Everyday Activism: An AI-Assisted Netnography of a Digital Consumer Movement*, 40 J. MARKETING MGMT. 347 (2024) (discussing how AI supports consumer movements in aligning consumption with shared values).

[59] *See* Karen K. Myers & Kamyab Sadaghiani, *Millennials in the Workplace: A Communication Perspective on Millennials' Organizational Relationships and Performance*, 25 J. BUS. PSYCHOL. 225, 228–30 (2010) (discussing millennials' prioritization of values in workplace and investment choices).

[60] *See* Chen Wang, *Outsourcing Voting to AI: Can ChatGPT Advise Index Funds on Proxy Voting Decisions?*, 29 FORDHAM J. CORP. & FIN. L. 113 (2023) (discussing the potential role of AI in advising index funds on proxy voting decisions).

[61] *See* Uysal, *supra* note 42, at 300; Chris Brummer & Leo E. Strine, Jr., *Duty and Diversity*, 75 VAND. L. REV. 1, 1-3 (2022) (discussing the pursuit of shareholder value through diversity, equity, and inclusion policies). *See also* J. KIRANMAI & R. K. MISHRA, *Recent Advances in Corporate Governance: A Global View*, *in* CORPORATE GOVERNANCE - RECENT ADVANCES AND PERSPECTIVES (O. L. Emeagwali & F. Bhatti eds., 2022).

[62] *See* Barzuza, Curtis & Webber, *supra* note 8, at 1300-1301.

[63] *See* Yazhou Ellen He & Tao Li, *Social Networks and Hedge Fund Activism*, 26 REV. OF FIN. 1267 (2022) (discussing the influence of social media on the strategies and success of hedge fund activism campaigns); Paul Calluzzo & Tanja Artiga González, *Clustered Shareholder Activism*, 27 CORP. GOV. INT'L REV. 210 (2019). *See also* Armour & Cheffins, *supra* note 29, at 51.

personalization—allowing activist proposals to resonate with specific shareholder blocs while simultaneously gauging institutional appetite for change. This synergy has the potential to transform identity-driven activism into a powerful force—capable of disrupting corporate inertia and sparking tangible reform.

In this light, the case of Engine No. 1 may not be merely episodic but potentially anticipatory—or even emblematic—of new and plausible forms of activism uniquely attuned to the tools, values, and aspirations of a new generation of investors.

Importantly, AI-driven shareholder activism need not vast financial resources. Rather, it relies on digital fluency and strategic use of existing platforms—traits that are particularly characteristic of millennials.

This evolution may be seen as a new mode of social mobilization—or, more precisely, its reflection in capital markets. Millennials are already employing AI to coordinate digital petitions, voting initiatives, and other forms of collective engagement—thereby amplifying their impact. In this context, they appear poised to become pivotal actors in this emerging form of identity-driven activism. Their ability to harness advanced technologies, particularly AI, provides a unique strategic advantage in this space.[64]

Political polarization can be a crucial variable. Depending on the issue, context, or timing, it may operate in opposing ways: as a force multiplier that heightens public attention, galvanizes consensus, and facilitates proxy aggregation; or conversely, as a deterrent that dissuades institutional investors wary of extreme positions or divisive agendas.

2. Polarization, Influence Imbalances, and Algorithmic Opacity

The rise of AI and the potential paradigm shift driven by younger generations' activism undoubtedly present a series of challenges for both investors and corporations.[65] To some extent, these challenges are also the conditions necessary for AI to drive the described shift and for the resulting change to be significant.

Foremost among these is the mentioned risk of fragmentation and polarization within shareholder bases. While AI may empower smaller investors and amplify their voices, it also carries the risk of magnifying diverse and potentially conflicting preferences. This can lead to fractured shareholder groups advocating for divergent or even opposing agendas. For instance, one group of investors might prioritize aggressive climate action, while another focuses on short-term financial returns or entirely different values, such as advancing technological innovation. These divisions can undermine corporate cohesion, placing management in the difficult position

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[64] Ben Manski, Hillary Lazar & Suren Moodliar, *The Millennial Turns and the New Period: An Introduction*, 34(1) SOCIALISM & DEMOCRACY 1 (2020) (highlighting generational activism as an expression of shared values and its role in contemporary social mobilization).

[65] For an analysis of the impact of AI on corporate governance regulation, including its challenges and opportunities, *see* Martin Petrin, *The Impact of AI and New Technologies on Corporate Governance and Regulation*, SING. J. LEGAL STUD. 90, 101-03 (2024); *see also* Paul Weitzel, *AI Governance Through Corporate Theory*, 92 TENN. L. REV. 169, 183 (2024). *See generally* Strine, *supra* note **Error! Bookmark not defined.**, at 15-18.

of navigating competing priorities, which risks diluting decision-making and reducing overall efficiency.[66]

Put another way, as generational values become a defining motive for certain investors, what resonates with one group may alienate another. This tension risks fragmenting shareholder bases and introducing dynamics that disrupt the unified support necessary for effective corporate governance.

Additionally, polarization may exacerbate conflicts between activist groups and boards, increasing the prevalence of adversarial shareholder meetings and proxy contests. The efficiency of AI, while empowering minority voices, can disproportionately elevate groups with strongly divergent priorities, overshadowing broader, consensus-driven strategies. While the diversity of shareholder priorities can contribute to more comprehensive and enriched corporate decision-making, unchecked polarization poses a significant risk of creating deadlock scenarios where no clear strategic direction emerges.

A second challenge posed by AI-enabled identity-driven activism stems from the very efficiency that makes AI so impactful. While its benefits are widely recognized, this efficiency also carries the risk of disproportionately amplifying the voice of small, narrowly focused activist groups. As was debated during the initial wave of ESG activism, the heightened influence of specific agendas can disrupt the balance between shareholder interests and corporate priorities, potentially leading to strategic inefficiencies and undermining value creation. For example, excessive pressure on CEOs may drive overinvestment in particular causes, diverting resources away from broader corporate objectives—and even harming long-term goals. Alternatively, it could provoke superficial responses—such as greenwashing or its equivalents for other identity-based causes—thereby eroding the authenticity of efforts to address stakeholder concerns and undermining trust in corporate commitments.[67]

Prominent scholars during the ESG wave warned of these dynamics, highlighting the risks of overreach and the potential for backlash when activism appears misaligned with sustainable corporate strategies.[68] These lessons remain highly instructive for addressing similar challenges in the context of identity-driven activism fueled by AI.

Political shifts in the opposite direction—like those currently unfolding—may reduce the risk of disproportionate amplification of certain causes but exacerbate the challenges of conflict and polarization. As ideological divides deepen, the potential for AI to amplify opposing views among shareholders grows, potentially leading to more adversarial relationships between boards and activists and hindering effective corporate governance. This delicate balancing act calls for

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[66] *See* Suren Gomtsian, *Different Visions of Stewardship: Understanding Interactions Between Large Investment Managers and Activist Shareholders*, 21 J. CORP. L. STUD. 151, 162 (2021); *see also* Stephen Choi, Jill Fish, & Marcel Kahan, *The Power of Proxy Advisors: Myth or Reality?*, 59 EMORY L. J. 869, 875 (2010) (discussing how diverging shareholder priorities impact corporate governance).

[67] *See* Barzuza et al., *supra* note **Error! Bookmark not defined.**, at 1310-11. *See generally* Doron Levit, *Soft Shareholder Activism*, 32 REV. FIN. STUD. 2775, 2782, 2794 (2019) (discussing the threats posed by public and 'media-driven' activism).

[68] *See* Barzuza et al., *supra* note **Error! Bookmark not defined.**, at 1311-12; *see also* Brandon, Krueger, & Schmidt, *ESG Rating Disagreement and Stock Returns*, 77 FIN. ANALYSTS J. 104, 124 (2021). *See generally* Lucian A. Bebchuk & Roberto Tallarita, *The Illusory Promise of Stakeholder Governance*, 106 CORN. L. REV. 91, 107-108 (2020).

thoughtful approaches to mitigate these risks while fully harnessing the transformative potential of AI-driven activism.

Finally, the issue of algorithmic transparency presents perhaps the most pressing challenge—associated with AI-enabled identity-driven activism. Ensuring that AI platforms are clear about their training processes, data collection, and decision-making methodologies is crucial to prevent manipulation or bias. Put differently, a certain degree of transparency in this respect is not a technical requirement but a critical safeguard against manipulation, bias, and unintended consequences.[69]

The inherent trust often placed in GenAI, combined with its opaque processes, creates a potentially devastating mix where critical errors may go unnoticed until they cause significant harm. While these platforms are celebrated for their ability to process and analyze vast amounts of data with unprecedented speed and accuracy, the opacity of their underlying algorithms—the so-called "black box" problem—poses significant risks. Users may unknowingly rely on outputs that reflect inherent biases or faulty logic embedded in the algorithm's design or training data.[70]

This limited guarantees of transparency and verifiability deriving from the nature of GenAI algorithms raises broader concerns about its role in governance and activism. Unlike traditional decision-making processes, which can often be audited or reconstructed, the inner workings of GenAI algorithms frequently resist explanation, even to their developers. If decisions influenced by GenAI cannot be adequately scrutinized, stakeholders may question their legitimacy, potentially eroding trust in the systems designed to democratize decision-making.[71]

Notwithstanding the risks outlined above, AI's potential to empower this transformation—by translating generational preferences into actionable strategies and lowering the barriers to traditional proxy mechanisms—rests on sound theoretical foundations and internal logic. Put another way, despite existing challenges, AI may indeed set the stage, at least in theory, for a new paradigm of generational activism.

Yet the extent to which this paradigm is materializing in practice remains an open question. As I now explore in Part IV, empirical trends from recent proxy seasons suggest a more complex picture—one in which AI's empowering potential for smaller investors is constrained by structural realities and institutional dominance.

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[69] *See* Alexander Buhmann & Christian Fieseler, *Deep Learning Meets Deep Democracy: Deliberative Governance and Responsible Innovation in Artificial Intelligence*, 33 BUS. ETHICS Q. 146, 153-55 (2023); Simon Chesterman, *Through a Glass, Darkly: Artificial Intelligence and the Problem of Opacity*, 69 AM. J. COMP. L. 271, 271–294 (2021); Felix T.H. Lo, *The Paradoxical Transparency of Opaque Machine Learning*, 39 AI & SOC. 1397, 1397–1409 (2022). *See also* Sandra Wachter, Brent Mittelstadt & Luciano Floridi, *Transparent, Explainable, and Accountable AI for Robotics*, 2(6) SCI. ROBOTICS EAAN6080 (2017) (analyzing transparency challenges in AI systems and their implications for trust).

[70] *See* FRANK PASQUALE, THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION 3–27 (2015) (examining the opacity of AI systems and their societal impact).

[71] *See* Nan Tang, Chenyu Yang, Ju Fan, Lei Cao, Alen Halevy & Yuyu Luo, *VerifAI: Verified Generative AI*, ARXIV:2307.02796 (Oct. 11. 2023), https://arxiv.org/abs/2307.02796; Mohammed Salah, Fadi Abdelfattah, & Hussam Al Halbusi. *Generative Artificial Intelligence (ChatGPT & Bard) in Public Administration Research: A Double-Edged Sword for Street-Level Bureaucracy Studies*, 96 INT'L J. PUB. ADMIN. 1 (2023).

IV. Evidence from Data: Trends in Shareholder Activism and Generational Engagement (2022–2024)

A. Research Questions and Data

In the preceding sections, I have argued that AI holds the potential to reshape shareholder activism by empowering smaller investors—particularly millennials—and catalyzing identity-driven engagement.

A brief analysis of empirical data from recent proxy seasons may clarify whether this transformation is materializing or whether AI's role remains largely aspirational. This section seeks to evaluate that thesis by examining trends from the 2022, 2023, and 2024 proxy seasons, assessing whether AI is already influencing shareholder participation and activism in a material way. The analysis draws upon publicly available proxy season reports, voting statistics, campaign data, and governance studies published by leading academic and industry observers.[72]

However, direct empirical data on the deployment of AI in shareholder activism remains scarce. As such, AI's influence must be inferred from correlated developments—such as changes in activist strategy, growing retail investor access, and evolving proxy voting patterns. This section addresses four guiding questions: (1) Has there been an increase in shareholder proposals reflecting generational values, such as environmental, social, and governance (ESG) criteria, board diversity, and corporate ethics? (2) Is there evidence of increased millennial participation in proxy voting and activist campaigns? (3) Are insurgent shareholder proposals and proxy fights gaining traction? and (4) To what extent is AI actively shaping the architecture of modern shareholder activism?

Preliminary findings suggest that while AI is increasingly integrated into activist strategies, its democratizing effect remains uncertain. The current political landscape—including mounting resistance to ESG and DEI frameworks—further complicates longitudinal comparisons.

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[72] See generally Elina Tetelbaum, *Shareholder Activism – 2024 Review and 2025 Outlook*, Harv. L. Sch. F. on Corp. Gov. (Mar. 14, 2025), https://corpgov.law.harvard.edu/2025/03/14/shareholder-activism-2024-review-and-2025-outlook/; Arthur B. Crozier, Gabrielle E. Wolf & Jonathan L. Kovacs, *2025 Proxy Season Trends: The Pendulum Swings Toward Management*, Harv. L. Sch. F. on Corp. Gov. (Mar. 14, 2025), https://corpgov.law.harvard.edu/2025/03/14/2025-proxy-season-trends-the-pendulum-swings-toward-management/; Neil Whoriskey et al., *Activism in the 2024 Proxy Season and Implications for 2025*, Harv. L. Sch. F. on Corp. Gov. (Mar. 14, 2025), https://corpgov.law.harvard.edu/2025/03/14/activism-in-the-2024-proxy-season-and-implications-for-2025/ ; Brian V. Breheny et al., *Prepare for Changes to the Shareholder Engagement Process*, Harv. L. Sch. F. on Corp. Gov. (Mar. 11, 2025), https://corpgov.law.harvard.edu/2025/03/11/prepare-for-changes-to-the-shareholder-engagement-process/; Matteo Tonello, *2025 Proxy Season Preview*, Harv. L. Sch. F. on Corp. Gov. (Mar. 10, 2025), https://corpgov.law.harvard.edu/2025/03/10/2025-proxy-season-preview/; Eric Juergens, William D. Regner & Amy Pereira, *Proxy Advisors and Institutional Shareholders Revise Voting Guidelines on Board Diversity*, Harv. L. Sch. F. on Corp. Gov. (Mar. 11, 2025), https://corpgov.law.harvard.edu/2025/03/11/proxy-advisors-and-institutional-shareholders-revise-voting-guidelines-on-board-diversity/; Kai H. E. Liekefett & Derek Zaba, *Another "Super Year" for Activism*, Harv. L. Sch. F. on Corp. Gov. (Mar. 11, 2025), https://corpgov.law.harvard.edu/2025/03/11/another-super-year-for-activism/; Dan Burch, Bob Marese & Jillian DeMarco, *U.S. Shareholder Activism Review 2024 and a Look Toward 2025*, Harv. L. Sch. F. on Corp. Gov. (Mar. 12, 2025), https://corpgov.law.harvard.edu/2025/03/12/u-s-shareholder-activism-review-2024-and-a-look-toward-2025/; Joyce Chen, *An Early Look at Trends From Proxy Season 2025*, Harv. L. Sch. F. on Corp. Gov. (Mar. 13, 2025), https://corpgov.law.harvard.edu/2025/03/13/an-early-look-at-trends-from-proxy-season-2025/; Institutional Shareholder Services, *2024 U.S. and European Proxy Season Reviews* (2024), https://www.issgovernance.com/library/.

Institutional investors and established activist hedge funds continue to dominate the field, and evidence of millennial-led, AI-enabled activism remains limited and difficult to quantify.[73]

B. Four Relevant Trends

1. Shareholder Proposals on Generational Values

An analysis of the last three proxy seasons indicates that shareholder proposals reflecting generational or identity-based values—including ESG concerns, board diversity, and corporate ethics—have risen modestly in volume, but now face markedly stronger resistance.

In 2024, a record 1,015 shareholder proposals were filed across the Russell 3000, representing a 27% increase since 2021. Of these, ESG-related proposals rose by approximately 3% year-over-year, continuing a slow upward trajectory.[74]

Yet this increase has been eclipsed by a sharp rise in anti-ESG proposals, which made up 13% of all shareholder proposals in 2024, and as much as 25% of early 2025 filings—up from 21% in 2023. This shift reflects deepening ideological polarization— particularly within U.S. capital markets—and highlights that AI-enabled activism is unfolding within a broader contest over corporate governance priorities.[75]

Investor support for ESG proposals has simultaneously declined, dropping from an average of 35% in 2021 to 23% in 2024, with early 2025 data suggesting just 20% support on average. By contrast, governance-focused proposals—especially those targeting board accountability and executive pay—enjoyed a resurgence, with average support rebounding to 39%.[76]

These trends suggest that identity-driven activism continues to develop—but within an increasingly contested terrain. While proposals rooted in generational priorities persist, their success now depends more heavily on how effectively they are framed and whether they align

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[73] *See* Tonello, *supra* note 72 (noting the continued dominance of institutional players and the mixed success of new activist entrants); Tetelbaum, *supra* note 72 (observing that while first-time activists increased in number, established funds remained the primary drivers of successful campaigns); Paul Rose*, Shareholder Proposals in the Market for Corporate Influence*, 66 Fla. L. Rev. 2179 (2014) (discussing structural and behavioral barriers that limit retail and generational investor engagement in proxy processes).

[74] *See* Tonello, *supra* note 72 (reporting 1,015 shareholder proposals filed in 2024); Lindsey Stewart, *2024 Proxy Season in Three Charts*, Morningstar (2024), https://www.morningstar.com/sustainable-investing/2024-proxy-season-three-charts (reporting a 3% increase in ESG-related submissions and documenting sharp decline in average support for ESG proposals); Whoriskey et al., *supra* note 72 (highlighting increased investor support for proposals targeting board performance and executive accountability).

[75] *See* Tonello, *supra* note 72 (reporting that anti-ESG proposals accounted for 13% of all proposals in 2024 and 25% of early 2025 filings, up from 21% in 2023; and noting that the volume and visibility of anti-ESG proposals is increasingly shaping proxy season dynamics); Amelia Miazad & Stavros Gadinis, *The ESG Information System*, 47 Seattle U. L. Rev. 695 (2024) (discussing the integration of ESG in corporate governance politics); Elizabeth Pollman & Dorothy S. Lund, *The Corporate Governance Machine*, 121 Colum. L. Rev. 2563 (2021) (highlighting the partisan polarization of ESG debates and its implications for shareholder engagement).

[76] *See* Tonello, *supra* note 72 (reporting that average support for ESG proposals declined from 35% in 2021 to 23% in 2024, with early 2025 data indicating an average of 20% support and noting that shareholder support has shifted toward more traditional governance matters, including board oversight and executive compensation); Crozier et al., *supra* note 72, (arguing that ESG framing has become increasingly contested and must be strategically aligned with broader shareholder priorities to gain traction).

with broader institutional or financial interests—a domain where AI-powered strategy and messaging tools may offer a significant advantage, albeit one not yet quantifiably measured.

Put differently, although the volume of generationally motivated proposals has increased, their declining success rates highlight that the effectiveness of AI in reshaping corporate governance through such activism remains uncertain.

2. Millennial Participation in Shareholder Activism

As discussed above, another lens through which to evaluate AI's democratizing potential lies in assessing the participation of younger generations—particularly millennials—in shareholder activism.

Despite theoretical expectations that AI would help overcome participation barriers, empirical evidence of increased millennial engagement remains scarce. Although AI tools may reduce informational and logistical frictions through real-time data analysis and streamlined interfaces, proxy voting data are not disaggregated by age, making it difficult to quantify generational impact.[77]

Some indicators point to greater accessibility for younger investors. Retail investment platforms such as Robinhood and Public now integrate AI-assisted voting recommendations, dashboard analytics, and simplified interfaces that may help lower barriers to engagement. Reports also show a moderate increase in retail investor participation in proxy voting via these platforms, suggesting that AI may indeed be facilitating entry.[78]

Still, major activist campaigns continue to be spearheaded by institutional investors and large hedge funds—not grassroots, AI-enabled millennial actors. While 2024 data show that first-time activists accounted for nearly half of all campaigns, most of these were neither clearly generational in origin nor evidently driven by AI—a circumstance that does not diminish the growing

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[77] *See* Alon Brav, Matthew Cain & Jonathon Zytnick, *Retail Shareholder Participation in the Proxy Process: Monitoring, Engagement, and Voting*, 144 J. FIN. ECON. 492 (2022); Whoriskey et al., *supra* note 72 (observing that first-time activists increased but without clear generational attribution); Demi Derem, *Proxy Voting Trends to Watch in 2025*, BROADRIDGE, https://www.broadridge.com/article/bbd/proxy-voting-trends-to-watch-in-2025; Dorothy S. Lund, *Nonvoting Shares and Efficient Corporate Governance*, 71 STAN. L. REV. 687, (2019) (highlighting the informational, motivational, and structural barriers faced by retail and younger investors in shareholder engagement). *See also* Jill E. Fisch, *Standing Voting Instructions: Empowering the Excluded Retail Investor*, 102 MINN. L. REV. 11 (2017) (noting that proxy voting data is not age-disaggregated and calling for more granular disclosure to assess generational participation trends).

[78] *See* Dhruv Aggarwal, Albert H. Choi & Yoon-Ho Alex Lee, *Retail Investors and Corporate Governance: Evidence from Zero-Commission Trading* (Nw. L. & Econ. Res. Paper No. 24-01 2024), https://ssrn.com/abstract=4708496 (noting increased use of retail platforms and pass-through voting initiatives by large institutional investors); Whoriskey et al., *supra* note 72 (reporting that nearly 30% of 2024 campaigns involved first-time activists, though few were retail-led); Tonello, *supra* note 72 (discussing the limited uptake of retail voting authority in Vanguard's pass-through voting program); Lund, *supra* note 77, at 695-97 (arguing that retail investors face coordination and engagement challenges even when voting tools are provided); Andrey Malenko & Nadya Malenko, *Voting Choice*, NBER Working Paper No. 31636 (Aug. 2023), https://www.nber.org/papers/w31636 (emphasizing the practical limitations of pass-through voting mechanisms for non-institutional investors).

importance of AI in campaign strategy, but nonetheless fails to provide conclusive evidence of its empowerment of younger investors.[79]

Efforts to empower retail voting through pass-through programs at BlackRock, Vanguard, and State Street have thus far produced limited engagement. For example, only 40,000 of 2 million eligible Vanguard retail investors opted to direct their votes in 2024, with the vast majority deferring to institutional defaults.[80]

In short, while AI-powered tools are increasing technical access to shareholder processes, the evidence of a meaningful generational shift in activism remains, at present, more aspirational than realized.

3. Success of Insurgent Shareholder Proposals and Proxy Fights

With respect to the third guiding question—whether insurgent shareholder proposals and proxy fights are gaining traction—recent data confirm an uptick in activist interventions. The 2024 proxy season saw a 6% increase in companies targeted by activist demands, with a notable rise in campaigns challenging CEO leadership and advocating for strategic alternatives, including divestitures and breakups.[81]

These patterns have been reaffirmed by early 2025 data: in Q1, global campaign activity remained strong, with 70 campaigns year-to-date—representing a 17% increase from the 60 campaigns launched during the same period in 2024.[82]

Despite this growth in activity, insurgent campaigns have had mixed results. In 2024, activists won fewer board seats (155) than in 2022 (176), and the success rate in contested director elections fell to 38%, its lowest point since 2021—even as the total number of campaigns reached record

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[79] *See* Whoriskey et al., *supra* note 72 (reporting that nearly 50% of 2024 activist campaigns were initiated by first-time entrants, without indicating generational characteristics or technological drivers); Arnaud Cavé & Niamh O'Brien, *Next-Gen Governance: AI's Role in Shareholder Proposals*, HARV. L. SCH. F. ON CORP. GOV. (May 6, 2024), https://corpgov.law.harvard.edu/2024/05/06/next-gen-governance-ais-role-in-shareholder-proposals/ (noting the increased integration of AI into strategic planning by institutional activists); Tetelbaum, *supra* note 72 (reporting that, although established activists maintained a dominant role, approximately half of all 2024 campaigns were initiated by first-time activists, signaling a diversification in the activist landscape). *See also* Lund, *supra* note 37.

[80] *See* John Galloway, *Investor Choice*, HARV. L. SCH. F. ON CORP. GOV. (Oct. 9, 2024), https://corpgov.law.harvard.edu/2024/10/09/investor-choice/ (reporting that Vanguard's pass-through voting pilot saw participation from only 40,000 out of approximately 2 million eligible retail investors in 2024); Tonello, *supra* note 72 (noting similarly low engagement in BlackRock and State Street pass-through voting initiatives, with most retail investors defaulting to institutional voting recommendations); Fisch, *Standing Voting*, *supra* note 77, at 41–44 (arguing that while pass-through voting offers formal enfranchisement, practical barriers continue to suppress retail participation).

[81] *See* Whoriskey et al., *supra* note 72 (documenting a 6% increase in targeted companies, with a rise in CEO-focused and break-up-related campaigns); Tonello et al., *supra* note 72 (reporting decline in contested election success rates to 38% in 2024, despite record campaign volumes); Tetelbaum, *supra* note 72 (noting the global expansion of shareholder activism, the growing incidence of campaigns explicitly challenging CEO leadership, an increased interest in corporate breakups, and an observable shift toward private settlements following the adoption of the universal proxy rules in 2022).

[82] *See* Jim Rossman, Chris Ludwig & Quinn Pitcher, *Q1 2025 Review of Shareholder Activism*, HARV. L. SCH. F. ON CORP. GOV. (Apr. 8, 2025), https://corpgov.law.harvard.edu/2025/04/08/q1-2025-review-of-shareholder-activism/ (adding that agitation for breakups or divestitures emerged as the most frequent M&A-related objective in Q1—appearing in approximately 10% of all campaigns and continuing a trend observed in prior proxy seasons).

levels.[83] These figures suggest that while activist engagement is expanding, its effectiveness may be diminishing in relative terms.

However, early 2025 data point to a potential reversal of this trend: in Q1 alone, activists secured 51 board seats—representing a 34% increase over the same period in 2024—indicating a notable improvement in campaign outcomes.[84]

That said, the Engine No. 1 campaign against ExxonMobil continues to serve as a landmark case of successful identity-aligned activism. Though not AI-assisted *per se*, the campaign remains illustrative of the type of effort that AI could support going forward.[85] Still, its success appears more symbolic than typical: campaigns tend to succeed only when backed by substantial financial capital and institutional alignment.

4. Strategic Adoption of AI in Shareholder Activism

As to the final question—whether AI is fundamentally reshaping shareholder activism—the available data are broadly consistent with prior findings: AI is increasingly influential, but not as a democratizing force—or at least not yet in a demonstrable way.

Rather, AI has emerged primarily as a strategic enhancer for established players. Several developments illustrate this dynamic.

First, AI-powered sentiment analysis, scenario modeling, and predictive analytics have become core features of institutional activist campaigns. These tools enable actors to optimize timing, framing, and targeting of proposals with greater speed and precision.[86]

Second, sophisticated investors—including large hedge funds and asset managers—are leveraging AI to refine ESG risk modeling, monitor board performance, and automate aspects of shareholder engagement. The integration of these capabilities not only boosts efficiency but also

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[83] *See* Diligent Market Intelligence, *Shareholder Activism Annual Review 2025* (2025), https://www.olshanlaw.com/assets/htmldocuments/Diligent_ShareholderActivismAnnualReview2025.pdf (noting that the number of activist demands increased in 2024, but that activists secured only 155 board seats, down from 176 in 2022); Tonello et al., *supra* note 72 (reporting that the success rate in contested board elections fell to 38%—its lowest since 2021—despite the record volume of campaigns); Liekefett et al., *supra* note 72 (noting that despite record-high activism levels in 2024, the number of board seats won declined and success rates in contested elections reached a multi-year low); Tetelbaum, *supra* note 72 (observing a continued post-pandemic rise in hedge fund activism, both in the U.S. and internationally, and noting that the average number of board seats obtained per campaign declined in 2024).

[84] *See* Rossman, Ludwig & Pitcher, *supra* note 82 (adding that activists have continued to rely on proxy fights as a key mechanism for effectuating change—launching 13 such contests year-to-date, compared to 10 in the first quarter of the previous year).

[85] As previously discussed, the fund leveraged advanced analytics to support an ESG-focused strategy and successfully secured three board seats despite holding just 0.02% of the company's stock. *See supra* Sec. III.A.2.

[86] *See* Sean Collins & Kristen Sullivan, *Advancing ESG Investing: A Holistic Approach for Investment Management Firms,* HARV. L. SCH. F. ON CORP. GOVERNANCE, https://corpgov.law.harvard.edu/2020/03/11/advancing-esg-investing-a-holistic-approach-for-investment-management-firms/ (describing the integration of AI into ESG analysis and risk frameworks by hedge funds and asset managers); Mustafa Kenan Ustahaliloğlu, *Artificial Intelligence in Corporate Governance*, 7 CORP. L. & GOVERNANCE REV. 123 (2025), https://doi.org/10.22495/clgrv7i1p11 (AI reinforces institutional governance power by enabling superior data analysis and decision-making).

reinforces their strategic advantage and market dominance, thereby limiting broader participation.[87]

Finally, while retail-facing platforms have incorporated AI features—such as algorithmic voting recommendations and simplified user interfaces—there is little empirical evidence that these innovations have significantly increased engagement among millennial investors. Thus, while accessibility has improved in form, the underlying participatory gap remains largely unaddressed.[88]

To summarize, AI is increasingly embedded in the architecture of modern campaigns. Hedge funds and proxy advisors now use AI to analyze sentiment, predict vulnerabilities, simulate voting scenarios, and tailor communications to target shareholder blocs. These tools are enabling faster, more strategic responses, yet they remain disproportionately available to large, well-resourced actors.[89]

Ultimately, while insurgent activism is expanding in scope, the benefits of AI-enabled strategies remain concentrated among traditional, well-capitalized activist institutions—rather than emerging millennial-led movements.

C. Empirical Insights and the Limits of Generational Transformation

1. Corporate Adoption of AI: Enhancing Shareholder Communication and Activism Defense

I turn now to a development which can work against AI's potential to enable retail shareholders and their coordinated value-driven campaigns: the adoption by public companies of AI tools to communicate with their shareholders—or, perhaps even more importantly, to help determine when they are vulnerable to an activist attack and how best to prevent or defend against it.

The AI-driven enhancement of shareholder communication is increasingly recognized as a strategic tool for proactively defending against activist investors. This adoption is often aimed at

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[87] *See* Tonello, *supra* note 72 (noting that hedge funds and asset managers have adopted AI tools to enhance ESG analytics, board evaluation, and campaign planning); Ustahaliloğlu, *supra* note 86 (describing how data asymmetries and AI capabilities consolidate governance influence in institutional investors and highlighting the use of AI-driven dashboards and risk engines in campaign execution); Tunmise Adewale, *Integration of ESG (Environmental, Social, Governance) Criteria into AI-Based Portfolio Management* (Dec. 2024), https://www.researchgate.net/publication/387558652 (explaining how AI allows institutional investors to algorithmically integrate ESG and board performance metrics into portfolio-level decision-making).

[88] *See* Steve Lipin & Keilley Banks, *Getting Out the Retail Vote: Targeting Reddit and New Social Tools in Proxy Solicitations,* Harv. L. Sch. F. on Corp. Gov. (Sept. 3, 2022) https://corpgov.law.harvard.edu/2022/09/03/getting-out-the-retail-vote-targeting-reddit-and-new-social-tools-in-proxy-solicitations/; Fisch, *Standing Voting*, *supra* note 77, at 34 (arguing that although technological advances have improved usability, they have not yet translated into widespread retail investor engagement) at 14-16, 25 (documenting the persistence of low turnout among retail investors despite proxy system reforms); Malenko et al., *supra* note 78, (emphasizing the structural limitations of pass-through voting and the limited behavioral uptake by individual investors, especially younger cohorts).

[89] *See* Chen Wang, *Outsourcing Voting to AI: Can ChatGPT Advise Index Funds on Proxy Voting Decisions?*, SSRN (2023), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4413315 (discussing use of AI by institutional investors to inform proxy voting and strategic engagement); Ustahaliloğlu, *supra* note 86 (describing how sophisticated data systems, including AI, amplify the governance power of large institutional investors).

strengthening investor relations, anticipating potential activism, and safeguarding incumbent directors and their policies against insurgent campaigns.[90]

As is well knows, effective communication with shareholders is pivotal for maintaining trust and transparency, and companies are now notably integrating AI into their investor relations activities to streamline processes and deliver more personalized engagement. For instance, firms like Skechers USA and Ciena have employed AI to draft earnings commentary, anticipate analysts' questions, and refine messaging for clarity and impact during earnings calls.[91]

This approach not only enhances efficiency but also ensures consistency in corporate messaging and helps prevent shareholder dissatisfaction—dissatisfaction that might otherwise become a focal point for activist attack.

Put another way, by utilizing AI-powered sentiment analysis, companies can monitor shareholder attitudes across various platforms, enabling them to address concerns promptly and tailor communications to investor priorities. This proactive engagement fosters stronger relationships with shareholders and can mitigate misunderstandings that might otherwise escalate into activism.

Beyond communication, AI also serves as a critical tool in identifying and predict risks associated with activist investors and their strategies. Predictive analytics leverage data analysis and machine learning algorithms to forecast potential activist campaigns, allowing companies to proactively address vulnerabilities.[92]

Just as activists may use AI to spot these weaknesses, so too can companies deploy AI to analyze financial performance, governance structures, and market positioning to identify areas likely to attract activist scrutiny. By addressing these areas in advance, companies can reduce the appeal for activists and demonstrate a commitment to continuous improvement and long-term shareholder value.

For example, UBS developed the Global Utility for Activism Risk and Defense (GUARD), a data tool designed to assess the likelihood of a company facing activist attention.[93] In addition, research efforts have been directed toward developing machine learning models capable of predicting potential targets of activist investment funds: one such study, using Russell 3000 data from 2016–2022, achieved an AUC-ROC of 0.782—suggesting strong predictive capacity.[94] These tools could be adapted by corporations to forecast threats and implement defense strategies.

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[90] *See* Minwu Kim, Sidahmed Benabderrahmane & Talal Rahwan, *Interpretable Machine Learning Model for Predicting Activist Investment Targets*, 10 J. FIN. & DATA SCI. 100146 (2024); Jason Frankl, Brian G. Kushner & Ryan Chiang, *Activism Vulnerability Report*, HARV. L. SCH. F. ON CORP. GOV. (Oct. 1, 2024), https://corpgov.law.harvard.edu/2024/10/01/activism-vulnerability-report-3.

[91] *See* Mark Maurer et al., *When IR Met AI: How the Technology Is Shaping Earnings-Day Prep*, WALL ST. J. (Nov. 19, 2024), https://www.wsj.com/articles/when-ir-met-ai-how-the-technology-is-shaping-earnings-day-prep-5054a057.

[92] *See* David Woodcock, Vivek Mohan & Hugh N. Danilack, *Using Data Analytics and Artificial Intelligence for Public Disclosures*, HARV. L. SCH. F. ON CORP. GOV. (Feb. 4, 2024), https://corpgov.law.harvard.edu/2024/02/04/using-data-analytics-and-artificial-intelligence-for-public-disclosures/; Acuity Knowledge Partners, *Activist investors – mapping the current landscape and the role of predictive analytics*, ACUITY KNOWLEDGE PARTNERS BLOG (Aug. 2024), https://www.acuitykp.com/blog/activist-investors-predictive-analytics-landscape/.

[93] *See* Frankl et al., *supra* note 90.

[94] *See* Kim et al., *supra* note 90.

The deployment by large corporations of AI tools to protect incumbent management from insurgents could, at least in part, offset the benefits activists may obtain by using AI to spot vulnerabilities and craft effective campaigns.

In response, activists are increasingly focusing on companies' AI practices, demanding greater transparency and ethical guidelines governing AI usage. In recent proxy seasons, numerous AI-related shareholder proposals have been submitted, reflecting growing investor concern over how companies deploy AI technologies. This trend highlights the necessity for companies to not only adopt AI responsibly but also to communicate their AI strategies effectively to shareholders, balancing innovation with ethical considerations.[95]

2. A Structurally Constrained Democratization

The empirical analysis paints a nuanced picture of AI's role in shareholder activism. While AI is undoubtedly transforming the mechanics of activist strategies—lowering analytical costs, accelerating engagement, and enabling more precise targeting—its democratizing effect remains limited. The principal beneficiaries of these innovations currently appear to be institutional investors and well-resourced activist funds, rather than a decentralized base of smaller or generational shareholders.

To be sure, shareholder proposals reflecting generational values—such as ESG and DEI—have grown in volume. Yet they now face heightened ideological resistance, contributing to an increasingly polarized governance environment. In this context, AI's strategic contribution is apparent, but its impact on actual millennial engagement remains uncertain and unquantified. Similarly, while insurgent proposals and proxy contests have increased in frequency, their success continues to hinge on financial capital, institutional backing, and tactical precision.

Thus, while these findings support portions of the central thesis—especially AI's expanding strategic role—they stop short of confirming that AI is driving a generational shift in shareholder power.[96] The broader ideal of millennial-led, AI-empowered identity activism remains, for now, more aspirational than actualized.

Looking ahead, key determinants will include: the emergence of granular datasets on retail investor participation; regulatory reforms such as Schedule 13D/13G modernization and the broader rollout of pass-through voting mechanisms; and the capacity of generational values to resonate beyond identity politics and attract broader investor support.

Future research should monitor these developments to assess whether AI will ultimately serve as a democratizing force in corporate governance—or whether it will primarily amplify existing structural asymmetries.

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[95] *See* Cavé, Hearon & O'Brien, *supra* note 8; Cavé & O'Brien, *supra* note 75; Nancy B. Hammer, *AI-Related Shareholder Proposals Up Threefold Since 2023*, HR POLICY ASS'N (June 7, 2024), https://www.hrpolicy.org/insight-and-research/resources/2024/hr_workforce/public/06/ai-related-shareholder-proposals-up-threefold-sinc/.

[96] *See* Tonello, *supra* note 72 (documenting the rising volume of identity-aligned proposals and anti-ESG backlash); Whoriskey et al., *supra* note 72 (noting that activist success remains contingent on financial and institutional support); Burch et al., *supra* note 72 (highlighting the concentration of campaign effectiveness among repeat players). *See generally* Lucian A. Bebchuk & Scott Hirst, *The Specter of the Giant Three*, 99 B.U. L. REV. 721 (2019).

For now, the evidence suggests a cautiously optimistic but structurally constrained trajectory—one in which AI's promise is real, but unevenly realized.

V. A Possible Path Forward

A. Channeling Technological Innovation into Social Innovation: The Role of Corporate Boards

The question is then: is there a possible path forward? Stated differently: is there a future for AI-powered identity-driven activism, and will these generational values make their way in corporate structures through AI?

In addition to structural constrains that makes this potential, for now, untapped, I mentioned above the challenges posed by this novel and potentially transformative form of generational activism. Data and related inferences demonstrate that AI-powered activism is struggling. Moreover, the logic and other observations suggest that AI's potential for new generations might be offset by countervailing factors. The limitations arising from traditional dynamics of activism, the uneven distribution of resources in the field, and the capacity of large companies to strategically leverage the opportunities provided by AI—combined with the risks that AI itself poses—could ultimately stifle the potential for Gen Z and Millennials discussed in this paper.

In fact, activists may even need to push back against the deployment of AI tools by large corporations that are designed to protect incumbent management from insurgents—a development I discussed above.

Yet AI's potential for Gen Z and Millennials is real, and the momentum generated by generational values should not be underestimated. Polarization and political shifts might even become sources of energy—enabling new generations to push back against the carefully crafted strategies adopted by corporations. As findings from proxy seasons suggest, retail shareholders tend to vote when the vote is normatively important to them and when they perceive the salience of their participation. I understand that this consideration might sound a bit idealistic, but from ideals stem revolutions.

Of course, a new generation may, in time, become or reveal itself to be more conservative than some of the values that emerged in the last decade might suggest. But, as I have argued, the validity of this paper's central thesis remains intact: the potential of AI lies in the combination of technological fluency and generational priorities—whatever those priorities may be, to the extent that they create common ground.

In any case, while we wait to see whether and how this potential will develop, lawmakers, regulators, and corporate boards should proactively address the broader issues associated with AI's integration into corporate governance, financial markets, and society at large. This calls for a multifaceted approach involving the development of regulatory frameworks, standards for algorithmic auditing, and mechanisms for third-party oversight. Transparency must not only be embedded as a technical feature but also upheld as a fundamental principle of ethical AI use.

Ensuring that AI tools empower investors and enhance governance, rather than inadvertently undermining these objectives, remains critical.[97]

In the meantime, corporations could take proactive measures by collaborating with regulators to establish clear and consistent frameworks for the deployment of AI in shareholder activism and investment strategies. At the same time, non-institutional investors must receive targeted education and training on the ethical, strategic, and effective use of AI.[98]

The most promising path forward, however, for unlocking the generational opportunities that AI offers in the context of shareholder activism, might come—somewhat surprisingly—from corporate boards themselves. Boards of directors could play a pivotal role: they might consider integrating representatives from younger generations, particularly experts in technology and sustainability, to ensure that governance practices reflect the evolving priorities of millennial and Gen Z stakeholders.

The strategic decision to make the "first move"—to anticipate this possible new wave of generational activism by incorporating its demands into corporate strategy and governance structures—would align naturally with the use of AI to identify vulnerabilities, predict activist challenges, and reinforce defensive measures.[99]

Put another way, boards could absorb the risk posed by AI-enabled young shareholders by eliminating a key gear in the activist machinery: motivation. If generational demands are acknowledged and represented within forward-looking strategies and governance, they may cease to fuel opposition. After all, the recognition of Gen Z and Millennial values in corporate strategies is already a common tactic among companies seeking alignment with market trends, users, and consumers.

These efforts would not only mitigate risks but also enable responsible and meaningful engagement in corporate governance processes, fostering a more inclusive and forward-looking approach to corporate decision-making.

Importantly, while mitigating risks, these practices could also catalyze meaningful change within the corporate ecosystem—a further evolution of particular interest. The need to adapt to new forms of AI-driven shareholder activism may spur broader social innovation. In this context, AI could act as a democratizing force within governance by offering historically underrepresented groups—such as Millennials and other non-institutional investors—a more substantive voice in corporate decision-making.

While such "democratization" operates within the inherent constraints of a fundamentally plutocratic framework, it nonetheless represents a shift toward greater inclusivity in governance structures.

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[97] *See* Sandra Wachter, Brent Mittelstadt & Chris Russell, *Counterfactual Explanations Without Opening the Black Box: Automated Decisions and the GDPR*, 31 HARV. J.L. & TECH. 841 (2018) (discussing the need for transparency).
[98] *See* Anne Lafarre & Christoph Van der Elst, *Blockchain Technology for Corporate Governance and Shareholder Activism*, 25 EUR. BUS. ORG. L. REV. 1 (2018) ECGI WORKING PAPER NO. 390/2018, TILBURG L. SCH. RSCH. PAPER NO. 2018-7, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3135209 (discussing blockchain's democratizing potential in governance). *See also* Bob Herr & Luke Pryor, *The Case for Multigenerational Corporate Boards*, HARV. L. SCH. F. ON CORP. GOV. (Nov. 3, 2024), https://corpgov.law.harvard.edu/2024/11/03/the-case-for-multigenerational-corporate-boards/ (emphasizing that only 5% of board directors are under the age of 50 and highlighting the potential business advantages of having a more age-diverse board).
[99] Discussed in Sec IV.C.1.

Viewed from this perspective, AI's transformative potential extends beyond technological advancement to encourage social progress. By proactively engaging with the values and priorities of younger generations, corporations could channel technological innovation into social innovation.[100]

This dynamic has the potential to drive governance structures to anticipate and integrate the perspectives of emerging stakeholders, paving the way for a smoother transition when these younger actors ultimately take their place within corporate leadership. Such an evolution would not only reflect but actively shape the broader integration of ethical, sustainable, and innovative practices in corporate governance. Ultimately, by aligning technology with generational priorities, corporations might create opportunities for a more equitable and adaptive corporate landscape.

VI. CONCLUSION

Artificial intelligence is rapidly reshaping the landscape of corporate governance, bringing with it transformative opportunities as well as complex challenges. By empowering both institutional and non-institutional investors, AI has the potential to redefine the contours of shareholder activism—enabling strategies that are not only more sophisticated, but potentially more inclusive. Identity-driven activism, in particular, exemplifies how AI tools could, at least in theory, amplify the voices of smaller investors—especially millennials and Gen Z—while aligning corporate priorities with emerging societal and generational values.

These advancements, however, are not without risk. Fragmentation, polarization, and the disproportionate influence of narrowly focused activist groups may pose serious threats to corporate cohesion, strategic clarity, and long-term efficiency. Moreover, the opacity of AI algorithms raises significant ethical and operational concerns, making transparency and accountability essential conditions for their legitimate use in governance.

As is often the case, opportunity comes hand in hand with risk—and the value of the potential AI offers will depend on how these risks are addressed by lawmakers, regulators, and, above all, corporate boards. But a critical question remains: is this potential still largely theoretical, or is it already driving meaningful change in corporate governance?

Evidence from recent proxy seasons suggests that AI's promise remains, for now, unevenly realized.

In parallel, large companies are strategically adopting AI to enhance shareholder communication, monitor investors' sentiment, proactively address potential vulnerabilities, anticipate activists' campaigns, and fortify defenses against attacks. As AI continues to evolve, its role in corporate governance and activism defense will undoubtedly expand—and could even offset the advantages AI offers to activist shareholders. This dynamic clearly demands ongoing ethical scrutiny and transparent communication with stakeholders.

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[100] *See* Mariana Mazzucato, *Mission-Oriented Innovation Policies: Challenges and Opportunities*, 27 INDUS. CORP. CHANGE 803 (2018) (discussing the interplay between technological and social innovation in governance).

In the meantime, institutional actors continue to dominate the activist space, while the participation of millennials and retail investors—though increasingly supported by AI-enabled tools—has yet to scale meaningfully. In this light, AI's role as a catalyst for identity-driven activism remains compelling, but ultimately aspirational rather than realized.

The path forward requires a balanced and intentional approach—one that embraces AI's transformative capabilities while directly confronting its limitations. Regulatory oversight, ethical standards, and algorithmic auditing will be crucial, but equally important are initiatives to educate and empower investors of all backgrounds.

Corporate boards will play a pivotal role. If they treat AI not merely as a technical instrument but as a potential catalyst for broader social innovation, they may help drive meaningful change. That is to say, by proactively engaging with the values and priorities of younger generations, corporations can channel technological disruption into constructive and inclusive governance reform.

Ultimately, AI's integration into shareholder activism and corporate governance may mark not only a technological evolution, but a deeper societal shift. If employed responsibly, it could serve as a democratizing force—reshaping governance into a more inclusive, participatory, and value-responsive domain. Aligning innovation with generational priorities and ethical imperatives may enable tomorrow's corporate structures to reflect not just technological advancement, but the ideals of a more equitable and sustainable future.

As Shakespeare eloquently wrote in The Tempest, "What's past is prologue."[101] The transformative potential of AI may indeed represent a new chapter in corporate governance—one built upon the foundations of what has come before, yet oriented toward a future rich with possibility. While the data remain inconclusive, and the fulfillment of this promise may ultimately depend on whether directors anticipate rather than resist generational change, with foresight and responsibility, this next chapter could well be one of innovation, inclusivity, and enduring progress.

[101] William Shakespeare, THE TEMPEST act 2, sc. 1, l. 253 (Stephen Orgel ed. 2008)