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ABSTRACT

Intellectual Property (IP) rights in the United States are constitutionally prescribed for the express purpose of encouraging human innovation. The patent and copyright systems fulfill this purpose by incentivizing authors and inventors to disclose their efforts to the public, which disseminates the knowledge to the public and thereby works to maximize the creative potential of humanity. In turn, human creativity has sparked successive eras of technological and industrial revolution, altering every aspect of human experience and redefining our everyday experiences and our vision of the future. However, the old guard of established industry—whose market is most susceptible to displacement by revolutionary technology—utilize the IP systems to police the innovative efforts of others and consequently stem the tides of progress. Seeds of discontent have sprouted among a public who increasingly regard IP with ambivalence, and the march of progress is certain to stumble if these seeds are left unchecked.

The digital age in particular revealed a deficiency of the current IP system, as the increasingly efficient exchange of information was countered by using IP as a regulatory system, rather than an incentive. This has revealed how the rights granted by successive amendments to the copyright system may be exploited by a select few while burdening society far longer than objectively justifiable. Moreover, the sum of human knowledge follows a course of exponential acceleration, far faster than our existing laws and intellectual property systems are prepared to accommodate. Proactive policies are necessary to mitigate the legal implications of new industries, and existing systems of all types must be prepared to change alongside the society in which they operate. However, recent government inquiries and international discussions reveal a misguided belief that our current system can adapt to this revolution, despite decades of litigation that suggest the

opposite conclusion. The resulting legal uncertainty among inventors counteracts IP's express purpose of "promot[ing] the Progress of Science and useful Arts," and failure to rectify the situation renders the current system both unconstitutional and harmful to society.

Modern technological advancements in data-intensive fields such as machine learning and artificial intelligence show both great potential for societal benefit and immense conflict with the current IP system. These technologies challenge our conceptions about innovation and creativity and foreshadow a future where the current IP system is not only undesirable, but also unenforceable. Regardless of whether the products of these technologies would fit within the current system, their very existence provides an ultimatum for policymakers—the time for change is upon us. While IP rights do not have to be entirely sacrificed to accommodate this new paradigm, they must be lessened. Their existence is only constitutionally justified to the extent that their benefit to society is proportional to the burden imposed. Furthermore, the relationship between creators and the public is certain to shift significantly over the coming decades, and our policies must be prepared to adapt to the demands of the coming age. The United States should not continue to warp IP into a regulatory web that counteracts its constitutional purpose of encouraging human innovation.

AUTHOR

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COMMENT

A PREMIER PARADIGM SHIFT: THE IMPACT OF ARTIFICIAL INTELLIGENCE ON U.S. INTELLECTUAL PROPERTY LAWS

Dustin J. Corbett[†]

ABSTRACT

Intellectual Property (IP) rights in the United States are constitutionally prescribed for the express purpose of encouraging human innovation. The patent and copyright systems fulfill this purpose by incentivizing authors and inventors to disclose their efforts to the public, which disseminates the knowledge to the public and thereby works to maximize the creative potential of humanity. In turn, human creativity has sparked successive eras of technological and industrial revolution, altering every aspect of human experience and redefining our everyday experiences and our vision of the future. However, the old guard of established industry—whose market is most susceptible to displacement by revolutionary technology—utilize the IP systems to police the innovative efforts of others and consequently stem the tides of progress. Seeds of discontent have sprouted among a public who increasingly regard IP with ambivalence, and the march of progress is certain to stumble if these seeds are left unchecked.

The digital age in particular revealed a deficiency of the current IP system, as the increasingly efficient exchange of information was countered by using IP as a regulatory system, rather than an incentive. This has revealed how the rights granted by successive amendments to the copyright system may be exploited by a select few while burdening society far longer than objectively justifiable. Moreover, the sum of human knowledge follows a course of exponential acceleration, far faster than our existing laws and intellectual property systems are prepared to accommodate. Proactive policies are necessary to mitigate the legal implications of new industries, and existing systems of all types must be prepared to change alongside the society in which they operate. However, recent government inquiries and international discussions reveal a misguided belief that our current system can adapt to this

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revolution, despite decades of litigation that suggest the opposite conclusion. The resulting legal uncertainty among inventors counteracts IP's express purpose of "promot[ing] the Progress of Science and useful Arts," and failure to rectify the situation renders the current system both unconstitutional and harmful to society.

Modern technological advancements in data-intensive fields such as machine learning and artificial intelligence show both great potential for societal benefit and immense conflict with the current IP system. These technologies challenge our conceptions about innovation and creativity and foreshadow a future where the current IP system is not only undesirable, but also unenforceable. Regardless of whether the products of these technologies would fit within the current system, their very existence provides an ultimatum for policymakers—the time for change is upon us. While IP rights do not have to be entirely sacrificed to accommodate this new paradigm, they must be lessened. Their existence is only constitutionally justified to the extent that their benefit to society is proportional to the burden imposed. Furthermore, the relationship between creators and the public is certain to shift significantly over the coming decades, and our policies must be prepared to adapt to the demands of the coming age. The United States should not continue to warp IP into a regulatory web that counteracts its constitutional purpose of encouraging human innovation.

I. INTRODUCTION

The United States Patent and Copyright Systems stem from a singular constitutional purpose, "to promote the Progress of Science and useful Arts."[1] However, the course of technological advancement since the Digital Revolution has placed Intellectual Property (IP) at odds with societal progress. With exponentially accelerating innovation and the commoditization of data for training advanced algorithms, the monopolies granted to patent and copyright holders (rightsholders) serve as arbitrary barriers to "the Progress of Science and useful Arts." Examining the fundamental purpose of IP makes it evident that the current system is unable to fulfill its constitutional directive and impedes, rather than incentivizes, technological innovation. Stress fractures in the IP system have been developing since the emergence of digital technology, and new

[1] U.S. CONST. art. I, § 8, cl. 8.

technologies pose a challenge that will cause the IP system to either become unenforceable or cease to be rationally related to its purpose. It is both undesirable and unconstitutional for the nation to sacrifice new and useful technology to preserve a system that is increasingly incompatible with modern technology and everyday activity.

Part II of this Comment analyzes the constitutional purpose of IP in the United States and the ways that the patent and copyright systems were designed to effectuate that purpose. It observes the role of the courts in shaping these systems and in balancing the burdens imposed on society by Intellectual Property Rights (IPR) against the benefits purportedly gained. Part III examines the clash between IP systems and digital technologies, the compromises made, and the problems unearthed. Part IV analyzes the likely impact of the emerging industry of artificial intelligence (AI) on the current IP systems and the societal consequences of enforcing IPR as they currently exist. Part V examines current inquiries, both domestic and international, regarding how to prepare for the impact of future AI on the IP system. Part VI discusses key policy guidelines to direct future changes to the IP system.

II. FOUNDATIONS OF INTELLECTUAL PROPERTY RIGHTS IN THE UNITED STATES OF AMERICA

Intellectual Property Rights (IPR) in the United States are authorized by Article I, Section 8, Clause 8 of the Constitution, which grants Congress the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[2] This clause—the Patent and Copyright Clause—distinguishes between the *purpose* of IPR and the *means* by which Congress may achieve that goal. The Supreme Court has recognized that "[t]he clause is both a grant of power and a limitation. This qualified authority . . . is limited to the promotion of advances in the 'useful arts.'"[3] Therefore, the underlying policy of IPR is a utilitarian balancing of the benefit gained from public access to qualified inventions and works of authorship weighed against the burden imposed on society by the granted

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[2] *Id.*

[3] Graham v. John Deere Co., 383 U.S. 1, 5 (1966); *see also* Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 349 (1991) ("The primary objective of copyright is not to reward the labor of authors, but 'to promote the Progress of Science and useful Arts.'" (quoting U.S. CONST. art. I, § 8, cl. 8.)).

monopoly.[4] In furtherance of this policy, Congress crafted two separate systems—patent and copyright—each directed at a particular type of knowledge and providing different limitations upon the monopoly granted.

A. Constitutional Purposes: Creation and Propagation

The patent system aims to encourage "both the creation and the public disclosure of new and useful advances in technology."[5] These "twin purposes of encouraging new works and adding to the public domain apply to copyrights as well as patents."[6] However, these purposes of encouraging creation and propagation of human knowledge manifest differently in each system. The basis for these differences is that patent and copyright seek different types of knowledge and address different motivations in an effort to make that knowledge available to the public.

1. Creation of Useful Knowledge

The U.S. IP system encourages the creation of new knowledge by using different criteria and rewards according to the relative social utility of the two categories of innovation and expression. The focus of patents—innovation—incentivizes useful ideas that are new to all of humankind, whereas the focus of copyright—expression—incentivizes creative works original to the author that produced them.

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[4] *Graham*, 383 U.S. at 10–11 ("[T]he underlying policy of the patent system [is] that 'the things which are worth to the public the embarrassment of an exclusive patent,' . . . must outweigh the restrictive effect of the limited patent monopoly." (quoting Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), in 6 WRITINGS OF THOMAS JEFFERSON 181 (H. Washington ed.)); *see also* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 146 (1989) ("The Patent Clause itself reflects a balance between the need to encourage innovation and the avoidance of monopolies which stifle competition without any concomitant advance in the 'Progress of Science and useful Arts.'"); Bilski v. Kappos, 561 U.S. 593, 649 (2010) ("[A]mbiguous patent laws [are] a set of rules . . . that 'embod[y]' the 'careful balance between the need to promote innovation and the recognition that imitation and refinement through imitation are both necessary to invention itself and the very lifeblood of a competitive economy.'" (quoting *Bonito Boats, Inc.*, 489 U.S. at 146)); Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 577 (2013) ("Patent protection strikes a delicate balance between creating 'incentives that lead to creation, invention, and discovery' and 'imped[ing] the flow of information that might permit, indeed spur, invention.'" (quoting Mayo Collab. Servs. v. Prometheus Labs., Inc., 566 U.S. 66, 92 (2012))).

[5] Pfaff v. Wells Elecs., Inc. 525 U.S. 55, 63 (1998).

[6] Eldred v. Ashcroft, 537 U.S. 186, 227 (2003) (Stevens, J., dissenting).

a. Patentable innovation

Patent protection is restricted to (1) "inventions and discoveries which further[] human knowledge, and" are both are (2) "new" and (3) "useful."[7] U.S. patent law specifies that patentable subject matter (inventions) exclusively consists of "any new and useful process, machine, [article of] manufacture, or composition of matter, or any new and useful improvement thereof . . . ."[8] Within those categories, the Court has declared that "[l]aws of nature, natural phenomena, and abstract ideas are not patentable."[9] This is because "'they are the basic tools of scientific and technological work' that lie beyond the domain of patent protection."[10] This prohibition furthers the underlying purpose of patent law by acknowledging that, "if patented, [they] would stifle the very progress that Congress is authorized to promote."[11]

The condition that the invention be "new" requires novelty,[12] meaning that it has not been described in a "prior art," which encompasses the "knowledge and use existing in a manner accessible to the public."[13] The subsequent condition that the invention be "useful" requires utility, although claimed inventions are afforded a presumption of usefulness.[14] There is also the inherent requirement that the claimed invention be conceptually "reduced to practice"[15]—fully "complete, and capable of

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[7] *Graham*, 383 U.S. at 9.

[8] 35 U.S.C. § 101; *see also* Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 483 (1974) ("[N]o patent is available for a discovery, however useful, novel, and nonobvious, unless it falls within one of the express categories of patentable subject matter.").

[9] Mayo Collab. Servs. v. Prometheus Labs., Inc., 566 U.S. 66, 70 (2012) (internal quotation marks omitted).

[10] Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 589 (2013) (quoting *Mayo Collab. Servs.*, 566 U.S. at 71).

[11] Bilski v. Kappos, 561 U.S. 593, 649 (2010) (Stevens, J., concurring).

[12] 35 U.S.C. § 102.

[13] Gayler v. Wilder, 51 U.S. 477, 497 (1851).

[14] Diamond Rubber Co. v. Consol. Rubber Tire Co., 220 U.S. 428, 442 (1911) ("[T]o the utility and use of an article the law assigns a definite presumption of its character . . . .").

[15] "Conception," "enablement," and "reduction to practice" are distinct concepts in patent analysis but are sufficiently intertwined to justify their grouping for purposes of the foundational requirement described here. MPEP §§ 2138.04–05. Reduction to practice required a physical prototype or application of the process to produce the intended result and therefore served as an evidentiary requirement for proving conception. *See* Scott v.

producing the result sought to be accomplished"[16]—insomuch that "the metes and bounds of th[e] monopoly are . . . capable of precise delineation."[17]

Finally, in 1952, Congress added the additional requirement that a claimed invention could not be patented if its innovative elements "as a whole would have been obvious . . . to a person having ordinary skill in the art to which the claimed invention pertains."[18] In making this determination, "secondary characteristics" concerning the invention's origin may be considered.[19] This requirement is constitutionally appropriate because it ensures that patents are only granted to inventions that provide enough of a public benefit to justify the monopoly.

b. Copyrightable expression

Copyright protection is designed to facilitate "free expression."[20] Protectable expression is defined by U.S. copyright law as "original works of authorship fixed in any tangible medium of expression."[21] Like patents, copyright is extended only to certain enumerated categories (works), including various types of written, auditory, and visual arts.[22] Copyright also

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Finney, 34 F.3d 1058, 1061–63 (Fed. Cir. 1994). Before the Leahy-Smith America Invents Act took effect in 2013, this required analyzing whether an invention was reduced to practice for determining "priority of invention." 35 U.S.C. § 102(g) (2010), *amended by* Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284, 285–87. The America Invents Act changed the U.S. Patent system to a "first to file" system that rendered prior "reduced to practice" analysis moot. *Id.* at 285. However, these concepts persist in the enablement requirement of the patent specification, particularly because "constructive reduction to practice" existed simply by filing the patent application and meeting the requirements of 35 U.S.C. § 112(a). *See* Yasuko Kawai v. Metlestics, 480 F.2d 880, 885–86 (C.C.P.A. 1973).

16 Coffin v. Ogden, 85 U.S. 120, 124 (1874).

17 Brenner v. Manson, 383 U.S. 519, 534 (1966).

18 35 U.S.C. § 103.

19 Graham v. John Deere Co., 383 U.S. 1, 17–18 (1966) ("Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.").

20 Eldred v. Ashcroft, 537 U.S. 186, 219 (2003) ("[C]opyright's purpose is to *promote* the creation and publication of free expression.").

21 17 U.S.C. § 102(a).

22 *Id.* § 102(a)(1)–(8).

denies protection to the ideas underlying a creative work, which both serves to keep the subject matter of copyright and patent distinct and to prevent the stifling of the very creative expression that copyright is designed to promote.[23]

The requisite originality in this context is a low threshold, requiring only that the work is "independently created" and exhibits a "modicum of creativity."[24] Although the minimal standard of creativity ensures that most works meet the standard, the precise boundaries of the concept are undefined (e.g., whether the creative element is in the author's original mental conception or the method they use to give it form). Finally, copyright law specifically requires that the work be "fixed" in a physical copy for more than a transitory period of time.[25] This mirrors the same practical considerations of patent's reduction to practice requirement.

2. Propagation[26] of Useful Knowledge

New knowledge must be made available to the public to maximize societal benefit and enable the entire community to improve upon the idea instead of (quite literally) reinventing the wheel. Because patentable inventions derive their value from their utility, a bargain must be struck to entice the inventor to disclose the details of the invention instead of maintaining exclusivity through secrecy. In contrast, copyrighted works must be exchanged before any value can be realized, so copyright provides a mechanism to utilize market forces to make copies of the work readily available.

a. Disclosure by patent

Patent protection is only granted upon issuance of a patent following approval of an application to the United States Patent and Trademark

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[23] *Id.* § 102(b).

[24] Feist Publ'ns, Inc. v. Rural. Tel. Serv. Co., 499 U.S. 340, 345–46 (1991).

[25] 17 U.S.C. § 101.

[26] Historically, "propagation" is the most accurate term because it conveys the physical reproduction required in addition to geographic spread. Additionally, it conveys the ripple effects that the spread of ideas and expression have in spurring further creation by the informed public. With the rise of digital technology, the Internet, and freedom to information as a social norm, the term "dissemination" or even "access" is equally applicable and will be used interchangeably with "propagation" in later sections of this Comment.

Office (USPTO).[27] The Court has repeatedly described the grant of patent protection as a bargain struck between the inventor and the public—a quid pro quo—granting a limited monopoly in exchange for disclosing the invention to the public so that it may be exploited once the patent term expires.[28] The level of disclosure required in a patent application is a "full, clear, concise, and exact" description of the claimed invention in writing.[29]

Although this exchange is "intended to encourage the creativity" of inventors, the requirement that the granted monopoly be for "limited Times" ensures that the patent "serves the ultimate purpose of promoting the 'Progress of Science and useful Arts' by guaranteeing that those inventions will enter the public domain as soon as the period of exclusivity expires."[30] The patent system thus serves both to "promote creation"[31] and to "encourage dissemination of information concerning discoveries and inventions."[32] These twin purposes are closely intertwined, as new knowledge must be sought to fuel further propagation, and neither is paramount over the other.

The significance of the propagation function of patent law is illustrated by the strict application of the "novelty" requirement, as patent protection was originally denied even if the inventors *themselves* made the invention available to the public before filing for protection.[33] As the inventor no longer had secret knowledge to disclose, there was nothing to exchange in a quid pro quo. The Court has reinforced the utilitarian nature of this exchange by dispelling the notions of a natural right of inventors in their discoveries[34] or to remuneration for the invested labor.[35]

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[27] 35 U.S.C. §§ 111, 154.

[28] Eldred v. Ashcroft, 537 U.S. 186, 225 (2003) (Stevens, J., dissenting) ("The issuance of a patent is appropriately regarded as a quid pro quo—the grant of a limited right for the inventor's disclosure and subsequent contribution to the public domain.").

[29] 35 U.S.C. § 112(a).

[30] *Eldred*, 537 U.S. at 223 (Stevens, J., dissenting) (quoting U.S. CONST. art. I, § 8, cl. 8.).

[31] Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576, 589 (2013).

[32] Brenner v. Manson, 383 U.S. 519, 533 (1966).

[33] Most foreign patent systems bar patent protection immediately upon the unpatented invention being made available to the public, although the U.S. now provides a grace period of one year if the disclosure was made by the inventor. 35 U.S.C. § 102(b).

[34] Graham v. John Deere Co., 383 U.S. 1, 9 (1966) ("The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge.").

b. Dissemination by copyright

Contrary to patent registration, if a work meets the requirements for copyright protection, the author automatically enjoys the exclusive right to control the reproduction and distribution of their work as well as the creation of derivative works.[36] This is because patents and copyrights do not entail the same exchange since "immediate disclosure is not the objective of, but is *exacted from*, the patentee," whereas "disclosure is the desired objective" of the author seeking copyright protection.[37] Instead of the direct quid pro quo of patent law, copyright fulfills its constitutional purpose by facilitating the dissemination of authors' works.

In practice, IPR historically served both to allow authors and inventors the ability to pursue their crafts without the need for a financial sponsor and to encourage the distribution of new writings and technology by providing a financial incentive sufficient to overcome the significant investment required to construct and operate factories and printing presses.[38] Both the author and the distributor needed an incentive to invest in producing and distributing creative works: even if the author had an intrinsic motivation to create, the distributor needed a financial incentive to offset the investment required. Law, by artificially rendering works scarce and exclusive through copyright, provided the market value needed for both parties to benefit from their labors.[39] However, while the "immediate effect" of copyright is the remuneration of the author's labor,[40] the author's labor alone—the "sweat of the[ir] brow"—is not enough to entitle their

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[35] *Brenner*, 383 U.S. at 536 ("[A] patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion.").

[36] 17 U.S.C. § 106.

[37] Eldred v. Ashcroft, 537 U.S. 186, 216 (2003) ("[P]atents and copyrights do not entail the same exchange, and [the Court's] references to a *quid pro quo* typically appear in the patent context.").

[38] Raymond Shih Ray Ku, *The Creative Destruction of Copyright: Napster and the New Economics of Digital Technology*, 69 UNIV. CHI. L. REV. 263, 266–67 (2002). *But see Eldred*, 537 U.S. at 262 (Breyer, J., dissenting) ("[I]t is difficult to accept . . . that extension, rather than limitation, of the grant will, by rewarding publishers with a form of monopoly, promote, rather than retard, the dissemination of works already in existence.").

[39] Ku, *supra* note 38, at 279.

[40] Twentieth Century Music Corp. v. Aiken, 422 U.S. 151, 156 (1975).

work to copyright protection.[41] Although copyright protection may serve to *incentivize* authors to expend their labor, it is not to be mistaken for the purpose. Only works that further the aim of copyright—"to stimulate artistic creativity for the general public good"—are granted protection.[42]

B. Constitutional Means

First and foremost, the monopoly granted "is a means, not an end."[43] For patents, the courts are very conscious of this distinction and the constitutional requirement to keep the scope of the monopoly aligned with its express purpose.[44] In contrast, the courts have excused themselves from evaluating the connection between copyright's granted monopoly and its effect on furthering the "Progress of Science and useful Arts," and have chosen to defer to Congress's judgment instead.[45]

1. Monopolies: A Necessary Evil

The "exclusive Right" enjoyed by authors and inventors is a temporary monopoly granting them a "legally protected interest . . . in the potential financial returns [to be] deriv[ed] from the lay public's approbation of [their] efforts."[46] This monopoly is often justified as a necessary evil, tolerated *only* in exchange for the societal benefit that might accrue by compensating authors and inventors for their contributions.[47] The prudential balancing of IPR must always be mindful that "the evil effects of the monopoly are proportioned to the length of its duration,"[48] and an

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41 Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 359–60 (1991).

42 *Aiken*, 422 U.S. at 156.

43 Eldred v. Ashcroft, 537 U.S. 186, 245 (2003) (Breyer, J., dissenting).

44 Graham v. John Deere Co., 383 U.S. 1, 5–6 (1966) ("The Congress in the exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose."); Bilski v. Kappos, 561 U.S. 593, 648 (2010) (Stevens, J., concurring) ("This is the standard expressed in the Constitution and it may not be ignored. And it is in this light that patent validity 'requires reference to [the] standard written into the Constitution.'" (quoting *Graham*, 383 U.S. at 6)).

45 *Eldred*, 537 U.S. at 204, 208.

46 Arnstein v. Porter, 154 F.2d 464, 473 (2d Cir. 1946).

47 Thomas Babington Macaulay, First Speech to the House of Commons on Copyright (Feb. 5, 1841), *in* JAMES BOYLE & JENNIFER JENKINS, INTELLECTUAL PROPERTY: LAW & THE INFORMATION SOCIETY—CASES AND MATERIALS 262, 265 (5th ed. 2021).

48 *Id.* at 265.

unnecessary monopoly or otherwise disproportionate exchange causes a net harm.[49] Insufficient IPR may fail to incentivize sufficient innovation, but overly broad IPR will restrict rights, scientific progress, and secondary innovation[50] or enable a few powerful rightsholders to dominate industries by benefiting from powerful network effects.[51]

2. The IPR of Patents

Because the knowledge sought through patent protection is so valuable, the rights granted for the quid pro quo are extensive. Patent protection grants an exclusive property right to "all the uses and advantages" of the invention as claimed in the published patent application.[52] Therefore, the patent holder is entitled to a royalty from any person who makes, sells, imports, or uses the patented invention or products made by the patented process as claimed.[53] Additionally, whoever utilizes a patented invention without a license from the patent holder is strictly liable for patent infringement.[54] Liability further extends to secondary contributors, as patent law statutorily imposes liability for contributory infringement.[55] The extensive scope and strict liability of the patent monopoly are only mitigated by the fact that the monopoly is only temporary, limited to twenty years from filing the patent application.[56]

3. The IPR of Copyright

Because the expression incentivized by copyright protection has less directly utilitarian value than patentable inventions, the rights granted are far more limited in scope—restricted to enumerated rights[57] and prohibiting only expression that is substantially similar to the protected

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[49] Bilski v. Kappos, 561 U.S. 593, 650 (2010) (Stevens, J., concurring).

[50] *Id.* at 653 (Stevens, J., concurring) (citing Lab'y Corp. of Am. Holdings v. Metabolite Lab'ys, Inc., 548 U.S. 124, 126–27 (2006) (Breyer, J., dissenting from dismissal of certiorari)).

[51] JAMES BOYLE, THE PUBLIC DOMAIN: ENCLOSING THE COMMONS OF THE MIND 68 (Yale Univ. Press, 2008) [hereinafter THE PUBLIC DOMAIN].

[52] Stow v. Chicago, 104 U.S. 547, 550 (1882).

[53] 35 U.S.C. § 154(d)(1)(A).

[54] *Id.* § 271(a).

[55] *Id.* § 271(b)–(c).

[56] *Id.* § 154(a)(2).

[57] 17 U.S.C. § 106.

work.[58] However, while originally lasting for only fourteen years with the option to renew for another fourteen years, copyright protection has been extended to last the life of the author and seventy years after the author's death.[59] Works made for hire, which are owned by a legal entity rather than a natural person, are protected for at least ninety-five years (instead of the indefinite "life" of the entity) and up to 120 years depending on the time of creation and publication.[60]

This significantly expanded timeframe has been widely criticized and was subject to highly discouraging economic estimates.[61] Nevertheless, Western legislative bodies have continuously voted to extend the duration of copyright, influenced by persuasive lobbying[62] and efforts to harmonize copyright law with the international community.[63] While society bears the burden of not freely utilizing copyrighted works for the duration of the copyright, few authors actually reap any reward from this lengthy monopoly—only 2% of works between fifty-five and seventy-five years old still retain any commercial value.[64] Even if an author were to reap some reward from the latter years of the monopoly over their work, their post-mortem copyright protection has been criticized as imposing unreasonable burdens on society while offering no noticeable benefit.[65]

For works where the author is unknown, a copyright provides no benefit at all to the author, and these "orphaned works" have no means of being legally licensed for use.[66] Copyright protection over orphaned works prevents a significant amount of works from being utilized, with reports

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[58] Apple Comput., Inc. v. Microsoft Corp., 35 F.3d 1435, 1442–43 (9th Cir. 1994).

[59] 17 U.S.C. § 302(a).

[60] *Id.* § 302(c).

[61] Eldred v. Ashcroft, 537 U.S. 186, 254–55, 267–68 (2003) (Breyer, J., dissenting).

[62] See IAN HARGREAVES, DIGITAL OPPORTUNITY: A REVIEW OF INTELLECTUAL PROPERTY AND GROWTH 6, 93 (2011) (discussing reports of lobbying efforts in the UK that are mirrored throughout the Western world).

[63] *See, e.g.*, U.S. DEP'T. OF STATE, OFF. OF TREATY AFFAIRS, TREATIES IN FORCE, SECTION 2: MULTILATERAL TREATIES AND OTHER AGREEMENTS 22–23 (2020).

[64] Jennifer Jenkins, *In Ambiguous Battle: The Promise (and Pathos) of Public Domain Day*, 2014, 12 DUKE L. & TECH. REV. 1, 4 (2014).

[65] HARGREAVES, *supra* note 62, at 93 ("[N]o one has yet discovered a mechanism for incentivi[z]ing the deceased.").

[66] *Id.* at 38.

from the European Union archives suggesting orphaning rates of 40%.[67] Such excessive burdens incentivize individuals to circumvent IPR protection and destigmatizes infringement.[68] Despite these burdens, and in stark contrast to the patent system, the Court has chosen to "defer substantially to Congress," regardless of "however debatable or arguably unwise they may be."[69] However, this ignores the central purpose of copyright and relinquishes the "duty of the judicial department to say what the law is" to Congress.[70]

Concerns about the burden of overly broad copyright protection have primarily been placated by the "equitable rule of reason" of fair use, which "permits the courts to avoid rigid application of the copyright statute when . . . it would stifle the very creativity which the law is designed to foster."[71] Fair use balances the public's right to expression with the copyright holder's exclusive rights by permitting uses which have "no demonstrable effect upon the potential market for, or the value of, the copyrighted work."[72] While other factors concerning the expressive quality of the use are also considered, the "single most important" factor is the effect on the market (i.e., balancing the incentive of the copyright against the infringer's First Amendment rights).[73] This doctrine is of utmost importance for new technologies that "render[] an aspect or application of the Copyright Act ambiguous."[74]

One such example of technological ambiguity resulted in "non-expressive" fair use, which authorized otherwise infringing activity that is merely incidental to accessing the non-expressive elements of a work—

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[67] *Id.*

[68] Macaulay, *supra* note 47, at 267 ("[I]n attempting to impose unreasonable restraints on the reprinting of the works of the dead, you have, to a great extent, annulled those restraints which now prevent men from pillaging and defrauding the living.").

[69] Eldred v. Ashcroft, 537 U.S. 186, 204, 208 (2003).

[70] *Id.* at 242 (Stevens, J., dissenting) (quoting Marbury v. Madison, 5 U.S. 137, 177 (1803)).

[71] Google LLC v. Oracle Am., Inc., 141 S. Ct. 1183, 1196 (2021) (quoting Stewart v. Abend, 495 U.S. 207, 236 (1990)); *see also* 17 U.S.C. § 107.

[72] Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 450 (1984).

[73] Harper & Row, Publ'rs v. Nation Enters., 471 U.S. 539, 566 (1985) ("[The effect on the market] is undoubtedly the single most important element of fair use.").

[74] Sega Enters. Ltd. v. Accolade, Inc., 977 F.2d 1510, 1527 (9th Cir. 1992).

which are not protectable by copyright.[75] This is mostly applicable to machinery and computer code because it prevents a copyright holder from shielding a non-protectable element of their code by requiring other, protected elements to be "reproduced" by a device reading the code in order for someone to access the non-protectable element.[76] Non-expressive fair use presumes "that machinery cannot, by itself, consume the copyrighted expression in an infringing manner," and that these uses do not affect works' potential markets in a material way.[77] However, as technology continues to become more advanced, such a presumption may no longer be sound.

II. DIGITAL REVOLUTION

Each successive industrial revolution challenges IPR with the new possibilities and technologies that they usher in, fueling a process of "creative destruction" as existing methods and markets are revolutionized by the introduction of new technology.[78] Modern society has been shaped by the Digital Revolution, traceable to the invention of transistors in 1947 and the integrated circuit in 1959, thereby sparking the transition from analog to digital electronics.[79]

As digital electronics become widespread, Congress enacted the 1976 Copyright Act, amending copyright law to address new technology and providing computer code copyright protection as a literary work.[80] This sparked an ongoing issue for the courts, who were tasked with resolving the conflict between traditional copyright principles and this new technology, with significant litigation occurring in the 1990s and continuing today.[81]

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[75] *Id.* at 1524 (citing Baker v. Selden, 101 U.S. 99, 102–04 (1879)).

[76] *Id.* at 1518.

[77] Benjamin L.W. Sobel, *Artificial Intelligence's Fair Use Crisis*, 41 COLUM. J.L. & ARTS 45, 57 (2017).

[78] Daryl Lim, *AI & IP: Innovation & Creativity in an Age of Accelerated Change*, 52 AKRON L. REV. 813, 875 (2018).

[79] Robert I. Scace, *Electronics*, ENCYCLOPEDIA BRITANNICA, https://www.britannica.com/technology/electronics (last visited Jan. 19, 2023).

[80] 17 U.S.C. § 101.

[81] *See* Comput. Assocs. Int'l, Inc. v. Altai, Inc., 982 F.2d 693, 706–11 (2d Cir. 1992) (reviewing conflicts of determining what aspects of computer programs are protected by copyright, and establishing a test of abstraction, filtration, and comparison to determine what is copyright protected in a particular program); *see also* Lotus Dev. Corp. v. Borland

Unfortunately, as the Second Circuit has observed: "Thus far, many of the decisions in this area reflect the courts' attempt to fit the proverbial square peg in a round hole."[82] A significant issue results from attempts to distinguish between the computer code itself and the machine that carries out the commands contained within that code. While practically useful only in combination, computer code is expressly protected under copyright while the machine that fulfills the instructions contained in the code is protected under patent, although differences in patentable machines is largely attributable to the underlying operating code.[83] The resulting confusion is also due to the existing tools of evaluating patentability, designed around "inventions grounded in a physical or other tangible form," likely being inadequate in modern times.[84]

A. Ambiguous Subject Matter

As both patent and copyright are tailored to different types of information, courts have been confronted with copyright claims that attempt to expand the scope of copyright protection into the more regulated realm of patents. Over time, concepts such as the idea-expression dichotomy,[85] merger doctrine,[86] useful articles,[87] and methods of operation[88]

Int'l, Inc., 49 F.3d 807, 816 (1st Cir. 1995) (recognizing the functional utility inherent in computer programs, noting that the "methods of operation" of the program are not protectable by copyright); MAI Sys. Corp. v. Peak Comput., Inc., 991 F.2d 511 (9th Cir. 1993) (concluding that the necessary use and copying of a computer program to operate third-party repairs infringed copyright, prompting Congress to enact 17 U.S.C. § 117 in response).

[82] *Altai*, 982 F.2d at 712.

[83] 17 U.S.C. § 101 (literary works); 35 U.S.C. § 101 (machines).

[84] Bilski v. Kappos, 561 U.S. 593, 605 (2010) ("The machine-or-transformation test may well provide a sufficient basis for evaluating processes similar to those in the Industrial Age—for example, inventions grounded in a physical or other tangible form. But there are reasons to doubt whether the test should be the sole criterion for determining the patentability of inventions in the Information Age.").

[85] Mazer v. Stein, 347 U.S. 201, 217 (1954) ("Unlike a patent, a copyright gives no exclusive right to the art disclosed; protection is given only to the expression of the idea—not the idea itself.").

[86] Herbert Rosenthal Jewelry Corp. v. Kalpakian, 446 F.2d 738, 742 (9th Cir. 1971) ("When the 'idea' and its 'expression' are thus inseparable, copying the 'expression' will not be barred, since protecting the 'expression' in such circumstances would confer a monopoly of the 'idea' upon the copyright owner free of the conditions and limitations imposed by the patent law."); *see also* Morrissey v. Procter & Gamble Co., 379 F.2d 675, 678 (1st Cir. 1967)

have been articulated by the courts and incorporated into the statutory language to clarify the boundaries of copyright.

Computer code (software) enters murky waters for the IP system because it is statutorily protected as a literary work[89] but has an inherent utilitarian function because it is a series of instructions for a computer.[90] Protection is extended "to a computer program's object code (the binary code—a series of zeros and ones—that computers can read) and its source code (the spelled-out program commands that humans can read)."[91] Software lies betwixt the boundaries of copyright and patent, and the uncertainty surrounding the scope of applicable IPR frustrates the purpose of IP, as "clarity is essential to promote progress."[92] Legal battles stemming from this uncertainty have prompted the courts to draw arbitrary lines to approximate the distinction between protectable and unprotectable subject matter.[93]

("When the uncopyrightable subject matter is very narrow, so that 'the topic necessarily requires,' if not only one form of expression, at best only a limited number, to permit copyrighting would mean that a party or parties, by copyrighting a mere handful of forms, could exhaust all possibilities of future use of the substance." (quoting Sampson & Murdock Co. v. Seaver-Radford Co., 140 F. 539, 541 (1st Cir. 1905))).

[87] 17 U.S.C. § 101 (stating that the form of an article having an intrinsic utilitarian function may only be protected if it is "capable of existing independently of, the utilitarian aspects of the article.").

[88] Lotus Dev. Corp. v. Borland Int'l, Inc., 49 F.3d 807, 816 (1st Cir. 1995) ("'Methods of operation' . . . are the means by which a user operates something. If specific words are essential to operating something, then they are part of a 'method of operation' and, as such, are unprotectable.").

[89] H.R. REP. NO. 94–1476, at 54 (1976) ("The term 'literary works' . . . includes computer data bases, and computer programs to the extent that they incorporate authorship in the programmer's expression of original ideas, as distinguished from the ideas themselves.").

[90] Sega Enters. Ltd. v. Accolade, Inc., 977 F.2d 1510, 1524 (9th Cir. 1992) ("[C]omputer programs are, in essence, utilitarian articles . . . . [T]hey contain many logical, structural, and visual display elements that are dictated by the function to be performed, by considerations of efficiency, or by external factors such as compatibility requirements and industry demands. In some circumstances, even the exact set of commands used by the programmer is deemed functional rather than creative for purposes of copyright.").

[91] Lexmark Int'l, Inc. v. Static Control Components, Inc., 387 F.3d 522, 533 (6th Cir. 2004).

[92] Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 730–31 (2002).

[93] *See* Nichols v. Universal Pictures Corp., 45 F.2d 119, 122 (2d Cir. 1930) ("Whereever [sic] [the line] is drawn, [it] will seem arbitrary.").

Despite patent law's stricter eligibility threshold, for many years it also failed to properly constrain the scope of protection afforded software to reasonable bounds. Prior to 2014, so-called "software patents" were rarely challenged even though they merely recited the use of a conventional computer in the claims to implement the otherwise unprotectable abstract idea or process detailed by the computer code.[94] The Supreme Court addressed these software patents by ruling that "if a patent's recitation of a computer amounts to a mere instruction to 'implemen[t]' an abstract idea 'on . . . a computer,' that addition cannot impart patent eligibility."[95] However, the application of this ruling has proven highly unpredictable, inconsistent, and chaotic throughout the courts, resulting in software patent invalidation under this ruling falling below 50% of challenges in 2019.[96] Although this rule aligns with the pre-existing limitations on patents,[97] the digital age concept of a "machine" is proving incredibly difficult for the USPTO and courts to separate from the code that instructs the machine.

B. A Fundamental Revolution

The U.S. patent and copyright systems have cleaved the twin purposes of IPR asunder and chosen to sacrifice one to fuel the other. As digital technology made the dissemination of information both instantaneous and essentially without cost, IPR became an impediment—rather than an incentive—to the propagation of knowledge. Instead of reexamining the patent and copyright system and revising these systems to fulfill both their purposes in this new environment, the U.S. has clung to the existing system of IPR to the detriment of emerging industries.

1. The Propagation Purpose and the Internet

The creation of the Internet and the instantaneous exchange of digital information across the globe revolutionized the availability of knowledge

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[94] Joseph Saltiel, *In the Courts: Five Years After Alice: Five Lessons Learned from the Treatment of Software Patents in Litigation*, WIPO MAG., no. 4, Aug. 2019, at 35.

[95] Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 223 (2014) (quoting Mayo Collab. Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 84 (2012)).

[96] Saltiel, *supra* note 94, at 37–38.

[97] *Alice Corp.*, 573 U.S. at 223 ("Stating an abstract idea 'while adding the words "apply it"' is not enough for patent eligibility. Nor is limiting the use of an abstract idea '"to a particular technological environment."'") (citations omitted).

and free expression to the public, yet IP continues to operate under the outdated, pre-digital model. The artificial scarcity imposed by IPR is only justified to the extent that the incentives it creates are needed to make works publicly available.[98] Therefore, IPR have an objective ceiling determined by the optimal level of protection, which is the point immediately before the high cost of infringement suppression, administration, and enforcement outweighs the benefit conferred by IPR.[99]

Throughout history, higher copying costs naturally precluded the need for powerful IPR because the economic investment and scarcity of source material disincentivized copying.[100] However, distributing *digital* works and technology incurs negligible costs and is borne by Internet users through the purchase of computer equipment and Internet connections.[101] This paradigm shift necessitates severing the public's IP interests in *creation* from *distribution*.[102] As technologies developed to reproduce and transmit information at lower costs than previously possible, governments strengthened IPR as a counterbalance.[103] Thus, the strength of intellectual property rights has always been fundamentally tied to the difficulty of copying the expression of the intellectual property.[104] As "[t]he strength of intellectual property rights must vary inversely with the cost of copying," the Internet became viewed as a threat to rightsholders rather than as a tool to further IP's goal of promoting and propagating human knowledge.[105]

In the context of the digital age, where copying costs approach zero, this argument results in rightsholders needing perfect control over their IP, resulting in multiple bills such as the Digital Millennium Copyright Act, the No Electronic Theft Act, and the Sonny Bono Copyright Term Extension Act being passed to further protect copyright holders.[106] Patent protection is

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98 Ku, *supra* note 38, at 293.

99 *Id.* at 318.

100 BOYLE, *supra* note 51, at 60–61; *see also* INNOVATION, SCI. & ECON. DEV. [ISED] CANADA, A CONSULTATION ON A MODERN COPYRIGHT FRAMEWORK FOR ARTIFICIAL INTELLIGENCE AND THE INTERNET OF THINGS, 4 (2021).

101 Ku, *supra* note 38, at 268.

102 *Id.* at 267.

103 BOYLE, *supra* note 51, at 60.

104 *Id.*

105 *Id.* at 60–61.

106 *Id.* at 61.

already broadly reaching and operates under strict liability, so amendments to U.S. patent law have focused on further defining patentable subject matter[107] and harmonizing U.S. patent law with the patent laws of the international community.[108]

IPR stifle innovation most significantly where transaction costs are high, or where IPR are fragmented among various parties or overlapping, which obstructs licensing efforts.[109] These transaction costs are incurred by creators in the administration, monitoring, and enforcement of the creators' exclusive rights.[110] As digital technologies were adopted and the cost of distribution was minimized, transaction costs increased due to the broader scope and quantity of activity that must be monitored in order to effectively protect their IPR.[111] Because digital technology fundamentally relies on the copying of copyrighted content, the IP system is becoming a regulation, rather than an incentive, on the industry.[112]

In light of IPR's twin purposes, the result is that the current IP systems sacrifice one—encouraging the propagation of knowledge—for the alleged benefit of the other—encouraging the creation of new knowledge. However, the current system harms both goals as poorly designed IP rules allow markets to be obstructed by established players who may disproportionately impede competitor access to technology and content, resulting in a burden on society by limiting competition and inflating prices.[113]

2. The Creation Purpose and Cumulative Technology

"Patents 'can discourage research by impeding the free exchange of information,' . . . by forcing people to 'avoid [using] potentially patented

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[107] *See, e.g.*, Patent Act of 1952, Pub. L. No. 82-593, § 103, 66 Stat. 792, 798 (codified as amended at 35 U.S.C § 103).

[108] *See, e.g.*, Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 3(p), 125 Stat. 284, 293 (2011).

[109] HARGREAVES, *supra* note 62, at 10. Fragmentation most commonly occurs in complex electronics, where each individual component is covered by a patent and rarely consolidated in a single company. Individual IP can also be fragmented as the result of derivative works, joint authorship or inventorship, and the sale or exchange of rights.

[110] *Id.* at 11.

[111] *Id.* at 13.

[112] *Id.* at 14.

[113] *Id.* at 10, 12.

ideas, by [prompting] costly and time-consuming searches of existing or pending patents, by requiring complex licensing arrangements, and by raising the costs of using the patented' methods."[114] The potential for IPR having a negative effect on the "Progress of Science and useful Arts" is especially significant in areas where "[i]nnovation . . . is often a sequential and complementary process in which imitation may be a 'spur to innovation' and patents may 'become an impediment.'"[115] This is particularly an issue for digital technology, which is inherently cumulative, where each invention builds upon those before it and results in a relationship of interlocking interdependence among rights owners that causes new technologies to infringe upon many other protected IP.[116] This high likelihood of infringement and uncertainty regarding liability, with potentially devastating damages, burdens innovative efforts in this field "with fears and apprehensions of concealed liens and unknown liabilities to lawsuits and vexatious accountings for profits made in good faith."[117]

The extensive potential for infringement and overlap encourages strategic or defensive patenting behavior, weaving an increasingly complex web of patent rights, and resulting in the underuse of new knowledge due to concerns about likely infringement, thus perpetuating a "tragedy of the anticommons" as technological gridlock delays or prevents innovation.[118] Clusters of overlapping sets of IPR require inventors to reach licensing deals for multiple IP from multiple sources, but new data-intensive technologies that aggregate content from multiple sources are unlikely to determine or procure the entire scope of licensing required to avoid infringement.[119] Attempting to identify and acquire sufficient IP licenses is a cumbersome

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[114] Bilski v. Kappos, 561 U.S. 593, 653 (2010) (Stevens, J., concurring) (quoting Lab'y Corp. of Am. Holdings v. Metabolite Lab'ys, Inc., 548 U.S. 124, 127 (2006) (Breyer, J., dissenting from dismissal of certiorari)).

[115] *Id.* at 654 (quoting Bessen & Maskin, *Sequential Innovation, Patents, and Imitation*, 40 RAND J. ECON. 611, 613 (2009)); *see also* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 146 (1989) ("[I]mitation and refinement through imitation are both necessary to invention itself and the very lifeblood of a competitive economy.").

[116] Lim, *supra* note 78, at 866–67.

[117] Atl. Works v. Brady, 107 U.S. 192, 200 (1883).

[118] HARGREAVES, *supra* note 62, at 13, 57 (describing the "tragedy of the anticommons" as a situation where a certain field has numerous rightsholders who can block others from utilizing the technologies in that field, stifling innovation).

[119] *Id.* at 29.

and costly exercise, often criticized as inefficient, with good-faith efforts being insufficient to properly clear the necessary rights.[120] Yet for IPR to be an effective incentive, they cannot be disregarded or too expensive to enforce. "Ineffective rights regimes are worse than no rights at all."[121]

Additionally, patent holders possess significant leverage over subsequent inventors seeking to obtain a license and market their inventions, which operates to exclude new inventions from entering the market.[122] These issues have led inventors to independently enter into cooperative agreements, such as "patent pledges" and "patent pools," with other rightsholders to enable the use of certain IP among either the general public or the members of the agreement.[123]

These concerns about patenting the fundamental tools of future innovation underlie the current prohibition on patent protection to laws of nature, natural phenomena, and abstract ideas.[124] Excluding such fundamental concepts from patentable subject matter avoids the considerable danger that the grant of patents would "tie up" the use of such tools and thereby "inhibit future innovation premised upon them . . . ."[125] If the temporary monopoly granted by patent protection is denied to such "basic tools" to prevent inhibiting "future innovation premised upon them," such rationale should have equal weight in industries where "future innovation [is] premised upon" prior inventions in a continuous series of incremental advancements.[126]

C. Imperfect Incentives

The current IP system is poorly suited to industries that rely on sequential innovation and cumulative growth. The faster the industry

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120 *Id.* at 18, 29, 56; *see also* ISED CANADA, *supra* note 100, at 8.

121 HARGREAVES, *supra* note 62, at 5.

122 Bilski v. Kappos, 561 U.S. 593, 656 (2010) (Stevens, J., concurring) ("Even if a . . . patent is ultimately held invalid, patent holders may be able to use it to threaten litigation and to bully competitors, especially those that cannot bear the costs of a drawn out, fact-intensive patent litigation."); *see also* HARGREAVES, *supra* note 62, at 18.

123 Leslie Spencer & Marta Belcher, *Blockchain Intellectual Property Considerations for Innovators and Investors*, ROPES & GRAY (June 22, 2018), https://s3.amazonaws.com/documents.lexology.com/013c886f-713b-486d-9a35-a24446cd315f.pdf.

124 Gottschalk v. Benson, 409 U.S. 63, 67 (1972).

125 Mayo Collab. Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 86 (2012).

126 *Id.* at 71, 86.

innovates, the less incentive IPR provide because they must be offset by licensing fees owed to the holders of the previous IP. Without waiting for the previous IPR to expire, the subsequent inventor is undercompensated for their intellectual contribution, but the alternative would be to delay each subsequent innovation until the former IPR have expired. Clearly, limiting human society to several subsequent innovations each generation is contrary to the purpose of IPR. In addition, IPR today rarely provide compensation directly to the author or inventor, instead being exploited by intermediaries who, in turn, compensate the author or inventor at a much lower rate. Moreover, the empirical evidence suggests that the protection of IPR is less valuable to the market than many would believe. Some inventors have chosen to abandon IPR entirely, relying on market forces, secrecy, contracts, or private means to establish an advantage over competitors.

1. Initial and Subsequent Inventors

The incentivizing effect of patents is inversely correlated with the extent to which an industry operates on sequential innovation. In such industries, it is more likely that "higher welfare and more innovation [will] result from the absence of patenting opportunities."[127] Patenting sequential, cumulative technologies has led to modern devices being covered by hundreds of patents owned by tens of rightsholders.[128] The financial incentive for the incremental innovation of these industries is thus greatly reduced by the cost of licensing owed to every active patent.[129] Indeed, IPR's protections seem difficult to reconcile with rapidly developing, cumulative industries from an economic perspective: Current protections cannot give the intended incentives to both the first inventor and subsequent inventors; however, broader protections would discourage subsequent development and could undermine entire research lines when licensing is not viewed as profitable.[130]

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[127] HARGREAVES, *supra* note 62, at 58.

[128] *Id.* at 56.

[129] *See* Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. ECON. PERSPECTIVES 29, 30, 34–35 (1991); *see also* HARGREAVES, *supra* note 62, at 55, 58.

[130] Scotchmer, *supra* note 129, at 35.

2. Creators and Intermediaries

In practice, intermediaries—not the original creators—exploit most content rights, with most individual rightsholders being rewarded through such intermediaries.[131] Particularly for copyright, the incentive for the creation of new works was most useful throughout history for remunerating the investment of these intermediaries instead of the efforts of the individual rightsholders.[132] A modern example is the music industry, where the vast majority of musical artists do not earn income in the form of royalties from the sale of music and thus receive no financial incentive from ensuring scarcity of their work.[133] Instead, recording companies deduct expenses from artists' royalties for the costs of production, marketing, promotion, and other expenses which are inconsistent with the practically non-existent costs of digital distribution.[134] Artists typically must sell a million copies of an album before earning profit from royalties, meaning that less than 1% of musicians will receive any profits from their IPR.[135]

For patents, the same situations exist in different forms because many named inventors on the patent application sign over the rights to their inventions as part of their employment contracts, and independent inventors are frequently bought out before they can exploit their property rights fully.[136]

3. Overall Necessity

The effectiveness of IP protection can be evidenced by examining the effect on industries where IPR suffer from rampant infringement. For digital works, estimates of digital downloads that infringe upon copyright

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131 HARGREAVES, *supra* note 62, at 28.

132 Ku, *supra* note 38, at 267.

133 *Id.* at 306–07.

134 *Id.* at 307.

135 *Id.* at 307–08.

136 *See* Vinod Iyengar, *Why AI Consolidation Will Create the Worst Monopoly in U.S. History*, TECHCRUNCH (Aug. 24, 2016, 9:00 PM), https://techcrunch.com/2016/08/24/why-ai-consolidation-will-create-the-worst-monopoly-in-us-history/; *see also* 17 U.S.C. §§ 101, 201(b) (works made for hire); Russ Pearlman, *Recognizing Artificial Intelligence (AI) as Authors and Inventors under U.S. Intellectual Property Law*, 24 RICH. J.L. & TECH. 1, 18 (2018) (regarding assignment of patents in IP-intensive industries).

range from 13%–65% in the United Kingdom alone.[137] However, even using the most extreme estimates, copyright infringement appears to only account for under 0.1% of economic activity, with the total cost of infringement amounting to 0.1%–0.5% of global economic activity.[138] Also, there is no evidence that digital copyright infringement has weakened the incentive to create new works.[139] Indeed, for some industries innovation is *stimulated* by copying, especially where products have a shelf-life of one or two years and where the imitation is so rampant that enforcement is nearly prohibitive.[140]

This evidence demonstrates that economic mechanisms are only one factor in a process that considers policy change, economic crisis, and social upheaval among the set of incentives that a society presents its creators which are likely to determine society's ability to innovate.[141] In fact, companies have ample incentives from the competitive marketplace to innovate even without patent protection.[142] They "often capture advantages . . . notwithstanding the risk of others copying their innovation . . . [and] often capture long-term benefits from doing so, thanks to various first mover advantages, including lockins, branding, and networking effects."[143]

D. Issues With Enforcement

There are several significant issues that have emerged regarding the enforcement of IPR in the digital age: the trend towards strengthening IPR, growing ambivalence toward IPR by the consuming public, and the difficulty of enforcing national laws in an increasingly international society. The first stems from new technologies being developed that undermine the market for works or inventions currently protected by IPR. Even where these technologies do not necessarily infringe upon IPR, existing rightsholders act to defend their market interests by litigation and lobbying.

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137 HARGREAVES, *supra* note 62, at 6.

138 *Id.* at 73–74.

139 *Id.* at 75.

140 Lynn Bristol, Book Review, 96 J. PAT. & TRADEMARK OFF. SOC'Y 257, 258 (2014) (reviewing KAL RAUSTIALA & CHRISTOPHER SPRIGMAN, THE KNOCKOFF ECONOMY: HOW IMITATION SPARKS INNOVATION (2012)).

141 Josef Taalbi, *What Drives Innovation? Evidence from Economic History*, 46 RSCH. POL'Y 1437, 1449 (2017).

142 Bilski v. Kappos, 561 U.S. 593, 651 (2010) (Stevens, J., concurring).

143 *Id.*

Both the legislature and the courts have generally strengthened IPR while providing specific exceptions for certain activities, therefore prioritizing the means of IP over the purpose. The second issue stems from an increasingly digital society that is ambivalent to IPR for digital information, which often infringes copyright on a regular basis, whether intentionally or not. Lastly, the international market poses an immense challenge to policing IPR because national laws have territorial limits to their jurisdiction, while the nearly intangible information can be spread across the globe with ease.

1. The Old Guard and Judicial Adjustment

Rightsholders have historically exercised their rights to counter emerging industries as they encroach on the established market and have even been effective in lobbying governments to influence existing law and policy to strengthen existing IPR.[144] While their attempts to use copyright in this manner have generally been unsuccessful,[145] the broad scope of patent protection may be exercised in this manner to make licensing either prohibitive for smaller firms or to use injunctions as leverage in disputes.[146] While IPR's proponents argue that these strong rights are needed to incentivize the production of new works and inventions, critics note the societal harms resulting from such restrictions.[147] Many commentators emphasize this purpose of IPR in encouraging innovation[148] but neglect the equally important purpose of propagating knowledge. Moreover, the discussion frequently presumes that IPR's incentivizing effect provides enough societal benefits to outweigh the impediment that IPR place on the growth of human knowledge in the digital age.

Litigation by rightsholders has saddled courts—instead of legislatures—with making the decisions that guide future policy (e.g., resolving the

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144 HARGREAVES, *supra* note 62, at 6, 46.

145 *See, e.g.*, Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 456 (1984).

146 HARGREAVES, *supra* note 62, at 59–60.

147 *See id.* at 41, 55.

148 *See* Brian Golger, Co*pyright in the Artificially Intelligent Author: A Constitutional Approach Using Philip Bobbitt's Modalities of Interpretation*, 22 U. PA. J. CONST. L. 867, 881 (2020); *see also* Bilski v. Kappos, 561 U.S. 593, 650 (2010) (Stevens, J., concurring) ("Although there is certainly disagreement about the need for patents, scholars generally agree that when innovation is expensive, risky, and easily copied, inventors are less likely to undertake the guaranteed costs of innovation in order to obtain the mere possibility of an invention that others can copy.").

"incentive-access paradox"[149] of these dueling interests and the potential gains and losses associated with either option), despite courts' aversion to this balancing act.[150] Since the origin of U.S. IP law in 1790, the courts have been left to define the boundaries of IPR and articulate many of the subject matter restrictions codified today.[151] An example of the clash between IPR and digital technology was the development of peer-to-peer sites that enabled decentralized content distribution around the turn of the century.[152] Copyright owners filed suit to enforce their exclusionary rights, prompting the Court to expand copyright liability to incorporate patent's methods of secondary liability in order to hold the defendants liable for networks of millions of infringing users.[153]

The Court subsequently balanced that expanded liability through expanding the court-developed doctrine of fair use to shelter otherwise infringing uses from incurring liability.[154] The courts have freedom in its application because it originated with the courts, with the statutory language merely serving as guidelines for the court's judicial balancing.[155]

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[149] Ku, *supra* note 38, at 286.

[150] *See* Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd., 545 U.S. 913, 960 (2005) (Breyer, J., concurring) ("[T]he law disfavors equating the two different kinds of gain and loss; rather, it leans in favor of protecting technology.").

[151] *See* Mayo Collab. Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 70 (2012) (citing cases from 1841 to the present holding that laws of nature are not patentable); *see also* Campbell v. Acuff-Rose Music, Inc., 510 U.S. 569, 576 (1994) ("[F]air use remained exclusively judge-made doctrine until the passage of the 1976 Copyright Act . . . .").

[152] *See, e.g.*, A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1011–13 (9th Cir. 2001) (describing the peer-to-peer filesharing site Napster).

[153] *See id.* at 1021–22 (applying contributory and vicarious infringement in copyright); *see also* Grokster, Ltd., 545 U.S. at 929–30, 936–37 (applying inducement liability in copyright).

[154] Google, LLC v. Oracle Am., Inc., 141 S. Ct. 1183, 1196 (2021) ("We have described the 'fair use' doctrine, originating in the courts, as an 'equitable rule of reason' that 'permits courts to avoid rigid application of the copyright statute when, on occasion, it would stifle the very creativity which that law is designed to foster.'" (quoting Stewart v. Abend, 495 U.S. 207, 236 (1990)).

[155] *Id.* at 1196–97 (2021) ("The statutory provision that embodies the doctrine indicates, rather than dictates, how courts should apply it. . . . [The courts] have understood [17 U.S.C. § 107] to set forth general principles, the application of which requires judicial balancing, depending upon relevant circumstances, including 'significant changes in technology.'" (quoting Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 430 (1984)).

This expansion has been particularly useful for economic titans such as Google®, whose expansive technological endeavors would otherwise have been declared infringements on a massive scale.[156] However, the applicability of fair use to new technology is often uncertain, regardless of the economic significance or public benefit, because the Supreme Court has rejected the proposition that fair use be imposed "whenever the social value of dissemination outweighs any detriment to the artist."[157] Still, the Court has reserved the ability to consider the public benefit resulting from a particular use.[158]

2. A New Public Mindset and Global Marketplace

One of the most significant effects of the Digital Revolution is the change in the mental attitudes of the public regarding the "ownership" of IP.[159] Any individual acts of IP infringement are magnified by the frequency with which the average citizen traverses the realm of copyright and licensing without knowing the legal dimensions of their actions.[160] Furthermore, most people's reasonable expectations and behaviors are increasingly incompatible with what is allowed under copyright.[161] Such incompatibility

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[156] *See* Perfect 10 v. Amazon.com, Inc., 508 F.3d 1146, 1168 (9th Cir. 2007) (holding that Google's image search program was fair use due to its transformative nature as an electronic reference tool); *see also* Authors Guild, Inc. v. Google Inc., 954 F. Supp. 2d 282, 293–94 (S.D.N.Y. 2013) (holding that Google's book digitization program was fair use that enhanced the value of copyright holders' works and contributed societal benefits); *Oracle Am., Inc.*, 141 S. Ct. at 1208–1209 (holding that Google's copying of declaring code was fair use and observing the Court's judicial authority to equitably balance the statutory guidelines for new technology and the significance of public benefit in the market impact analysis).

[157] Harper & Row, Publ'rs, Inc. v. Nation Enters., 471 U.S. 539, 559 (1985) ("[To] propose that fair use be imposed whenever the 'social value [of dissemination] . . . outweighs any detriment to the artist,' would be to propose depriving copyright owners of their right in the property precisely when they encounter those users who could afford to pay for it." (quoting Wendy J. Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and its Predecessors*, 82 COLUM. L. REV. 1600, 1615 (1982)).

[158] Sega Enters., Ltd., v. Accolade, Inc., 977 F.2d 1510, 1523 (1992) ("[W]e are free to consider the public benefit resulting from a particular use notwithstanding the fact that the alleged infringer may gain commercially. Public benefit need not be direct or tangible, but may arise because the challenged use serves a public interest.").

[159] HARGREAVES, *supra* note 62, at 68.

[160] *Id.* at 42.

[161] *Id.* at 43.

shapes the public attitude towards piracy, with American studies finding that consumers are ambivalent to piracy, that moral considerations are outweighed by pragmatic issues, and that consumers are aware that they are obtaining unauthorized products.[162]

Because consumers are aware of the low reproduction costs of digital content, their ethical concerns about software piracy erode when they are charged prices based on outdated technology (e.g., the compact disk).[163] More recently, the adoption of marketing models based on "freemium" content, where many users may enjoy content for free, has further muddied the public conception of the value of digital content.[164] Interestingly, one successful means of curbing digital piracy has simply been to make a legal alternative available at the right price, with 29% of former users of peer-to-peer software reporting that they had stopped due to a better paid service being available,[165] thereby suggesting that current IPR are misaligned with the market demand rather than fully opposed by the public.

Public attitudes are also influenced by the inversion of the traditional IP market exchange. Ordinary end users now "create troves of text, images, video, and other data that they license to large companies in exchange" for free services.[166] Therefore, the historical IP roles of providers and users have been swapped such that end users are now rightsholders and technology companies are licensees of their clients' copyrighted material.[167] Because these rightsholders perceive minimal value in their own IPR, they can rationalize that any infringing activity they engage in is *de minimis* or the expansive license granted to technology companies relinquished their IP to the public domain.

Naturally, larger rightsholders have responded to public acceptance of piracy by calling for greater breadth and intensity of enforcement measures.[168] However, stronger enforcement through large-scale legal campaigns and site closures has not significantly reduced piracy.[169] Even

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162 *Id.* at 79.

163 *Id.* at 68.

164 *Id.*

165 HARGREAVES, *supra* note 62, at 79–80.

166 Sobel, *supra* note 77, at 85.

167 *Id.*

168 HARGREAVES, *supra* note 62, at 20; *see* ISED CANADA, *supra* note 100, at 9.

169 HARGREAVES, *supra* note 62, at 77.

efforts to educate consumers about the legal ramifications of piracy made no discernable difference in their behavior.[170] The inability to curb digital piracy has led some to forgo formal IPR use in favor of protecting their interests through (1) being first to market, (2) protecting eligible information as trade secrets, (3) using confidentiality agreements and other contractual provisions,[171] and (4) inserting technological protection measures (TPM) into software.[172] Unfortunately, most of these options restrict the flow of information and lead to the secrecy that IP is designed to disincentivize. The use of TPM in particular has been criticized as too restrictive and prohibitive of legitimate non-infringing uses.[173] Despite such criticism, these measures have been bolstered by statutory penalties under the anti-circumvention provision of copyright law.[174]

Another enforcement issue is that digital technology has enabled access to a worldwide market where different national IP regimes and legal traditions introduce costs and complexities that act as barriers to the propagation of IP.[175] Even if national efforts were to change piracy behavior, the results would be confined to the national level and likely not enacted elsewhere.[176] This is magnified by the introduction of decentralized technologies which permit networks to operate across various countries while remaining physically located in a foreign jurisdiction, outside the reach of an individual legal system, thereby making it difficult to determine what law should govern the activity.[177]

III. INDUSTRY 4.0

As new technologies have continued to be developed and improved, the world is once again on the cusp of the explosive growth of the next industrial revolution, deemed "Industry 4.0."[178] The technologies that drive

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170 *Id.* at 79.

171 *Id.* at 16–17.

172 ISED CANADA, *supra* note 100, at 14, 19.

173 *Id.* at 14.

174 17 U.S.C. § 1201(a).

175 HARGREAVES, *supra* note 62, at 21.

176 *Id.* at 80.

177 Spencer & Belcher, *supra* note 123.

178 Jayanta Ghosh, *Power Play of Artificial Intelligence upon Intellectual Property Rights*, 11 INDIAN J.L. & JUST. 100, 107–08 (2020).

Industry 4.0 monitor and convert the physical world into machine-readable data that is processed by cognitive computing systems, particularly machine learning (ML) and AI. These technologies are certain to compound existing conflicts between modern technology and IP law, thus requiring the redefinition of existing systems, models, and services.[179]

A. Growth of Technology

Human knowledge is *exponentially* increasing—doubling from the 1750s to the twentieth century, then every five years since 1965, and every seventy-three days in 2020.[180] Technological capabilities have followed suit,[181] predicted by concepts such as Moore's Law[182] and its modern derivative, the Law of Accelerating Returns.[183] The pace of recent growth can be partly attributed to the over 12 billion sensor-equipped devices connected to the "Internet of Things" and an increasingly digitized economy, both generating an overwhelming amount of machine-readable data.[184] The abundance of data and sufficient computing power enabled AI development to reach a "tipping point" in 2016.[185] Since then, AI technology has experienced significant growth across many different fields.[186] This growth has resulted in 25% of all unique inventor-patentees in 2018 using AI technologies, with AI applications expected to develop across most industries throughout the foreseeable future.[187] This growth is merely part of the same exponential pattern of human knowledge, with a clearly

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[179] *Id.* at 106.

[180] Paulius Čerka et al., *Liability for damages caused by artificial intelligence*, 31 COMPUT. L. & SEC. REV. 376, 381 (2015).

[181] *See, e.g.*, Matt Ferrell, *Quantum Computers Are Coming . . . But Why Should You Care?*, UNDECIDED (May 24, 2022), https://www.undecidedmf.com/episodes/quantum-computers-are-coming-but-why-should-you-care (discussing recent developments for quantum computers and their capabilities).

[182] Čerka, *supra* note 180, at 381 (capacity of computer processors doubles every eighteen months).

[183] *Id.* at 382 (self-replicating and self-organizing chips will accelerate the growth of computer processors).

[184] ISED CANADA, *supra* note 100, at 2, 13.

[185] Lim, *supra* note 78, at 827–30; *see also* ISED CANADA, *supra* note 100, at 4.

[186] OFFICE OF THE CHIEF ECONOMIST, INVENTING AI: TRACING THE DIFFUSION OF ARTIFICIAL INTELLIGENCE WITH U.S. PATENTS, USPTO, 6–7 (2020) [hereinafter AI TRACING].

[187] *Id.* at 7–9.

foreseeable course—a recursive loop for AI technology. AI capabilities will exponentially increase as more knowledge enables more training data for AI and greater technological capability enables greater processing ability.[188] Therefore, any policy recommendations made regarding AI technology must consider the prospective capabilities of the technology because the technological landscape will likely change faster than government is able to react to emerging issues.

B. Technological Overview

Before discussing the effect of AI, a foundation should be laid by answering some background questions such as: What exactly is considered "AI"? How does a machine "learn," and is a person always needed to act as a teacher? Can a machine truly be "creative" like a person? None of these questions have a settled answer due to the evolving nature of the technology, differing ideas of what it means to be intelligent, the continuous development of new models and more efficient methods of AI training, and the philosophically entwined debate over what human creativity truly entails. Nevertheless, generalized answers can be provided for the first two questions, and recent AI may shift the debate regarding the final question.

1. Broad Applications and Diverse Definitions

The definition of "AI" has evolved alongside the increased capabilities of technology, far beyond "the science and engineering of making intelligent machines"—the original definition of the term when coined by John McCarthy in 1955.[189] Currently, "AI" is used broadly to refer to multiple technologies which encompass both various models and structures of software, as well as specialized hardware catering to the needs of said software.[190] For example, the Fundamentally Understanding the Usability and Realistic Evolution of Artificial Intelligence Act of 2017 (FUTURE of AI Act) uses five definitions to define the broad scope of AI.[191] However,

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[188] Čerka, *supra* note 180, at 381–82; *see also* Alon Halevy et al., *The Unreasonable Effectiveness of Data*, IEEE INTELLIGENT SYSTEMS, March–April 2009, at 8.

[189] Christopher Manning, *Artificial Intelligence Definitions*, HUM.-CENTERED A.I. (Sept. 2020), https://hai.stanford.edu/sites/default/files/2020-09/AI-Definitions-HAI.pdf.

[190] Josef Drexl et al., *Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective*, MAX PLANCK INST. FOR INNOVATION & COMPETITION 3 (Oct. 2019); *see also* ISED CANADA, *supra* note 100, at 6.

[191] H.R. 4625, 115th Cong. §§ 1, 3 (2017).

most of the definitions used currently can be consolidated to define AI in relation to its processing (i.e., thinking like *X*) and its output (i.e., acting like *X*), with variations using either humanity or rationality as the standard for evaluation.[192] More specific distinctions used by the USPTO in tracking patent applications growth further classify AI depending on its application to one or more component technologies.[193]

AI technology today is constrained to "narrow" AI, which is defined by the Future of AI Act as AI that "addresses specific application areas," as opposed to "general" AI, which is defined as "a notional future [AI] that exhibits apparently intelligent behavior at least as advanced as a person."[194] Even confined to narrow AI, the variety of definitions demonstrates the broad scope of AI's application and future relevance. The revolutionary impact that Industry 4.0 will bring about must be considered when adapting current policy to address this technology.

2. Machine "Learning"

The broad, catch-all term "AI" is often used to refer to the more specific field of ML—a method of optimizing computer decision-making that "relies on the analysis of data by different algorithms."[195] The AI relies on an architecture composed of layers of mathematical functions known as "neurons" that transform numeric inputs into outputs.[196] The inputs and outputs are known as "weights," which are separated into trainable parameters (i.e., variables) and hyperparameters (i.e., static/control values).[197] The "learning" occurs during the training process, where training data is fed into the model, the magnitude of error is evaluated using a loss function, and the training algorithm attempts to minimize the loss function by adjusting the trainable parameters.[198]

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192 Čerka, *supra* note 180, at 376, 378–79.

193 AI TRACING, *supra* note 186, at 3–4 (categorizing AI technology in patent applications into: knowledge processing, speech, AI hardware, evolutionary computation, natural language processing, machine learning, vision, and planning and control).

194 H.R. 4625, 115th Cong. § 3 (2017).

195 Drexl, *supra* note 190, at 3–4.

196 *Id.* at 5.

197 *Id.* at 5–6.

198 *Id.* at 7.

In general, the quantity, quality, and variety of training data—not the underlying architecture—has the most significant impact on the machine learning process.[199] However, quantity is greater than quality in this regard.[200] More advanced models incorporate additional techniques into their training processes, such as "deep learning," "evolutionary algorithms," and "generative adversarial networks." Each distinctive type and learning process would have to be considered separately for policy decisions.[201]

3. Human Engagement

Current AI are subject to varying levels of human engagement, supervision, and direction in their development and application.[202] Comments submitted to the USPTO suggest that "natural persons, for the foreseeable future, will be heavily involved in the use of AI," including engagement in "designing models and algorithms, identifying useful training data and standards, determining how technology will be used, guiding or overriding choices made by algorithms, and selecting which outputs are useful or desirable in some way."[203] However, the foundations for removing the human element from AI can be observed through comparing a "supervised" and "unsupervised" training model. To illustrate, consider a predictive modeling ML: the model is trained by showing various inputs that are already labelled with the desired output, having it predict outputs, and correcting the model to train it to successfully differentiate between the labels. The correction of the model is the "supervised" part of the learning.[204] Supervised learning has obvious utility in applications such as "discriminative" modeling, which discriminates among the input variables by deciding which class a given variable belongs to (i.e., sorting).[205]

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[199] *Id.* at 8.

[200] Kevin Pasquinelli, *Adapt Your IP Strategy for Artificial Intelligence*, 2 J. ROBOTICS, AI & L. 389, 390–91 (2019).

[201] *See* ISED CANADA, *supra* note 100, at 6.

[202] Drexl, *supra* note 190, at 7–8.

[203] USPTO, PUBLIC VIEWS ON ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY POLICY 22 (2020), https://www.uspto.gov/sites/default/files/documents/USPTO_AI-Report_2020-10-07.pdf [hereinafter PUBLIC VIEWS].

[204] Jason Brownlee, *A Gentle Introduction to Generative Adversarial Networks (GANs)*, MACH. LEARNING MASTERY (June 17, 2019), https://machinelearningmastery.com/what-are-generative-adversarial-networks-gans/ (supervised vs. unsupervised learning).

[205] *Id.* (discriminative vs. generative modeling).

Conversely, when the model is only given unlabeled input variables and tasked with constructing a model by finding structure within the input data, such as through clustering and other patterns, the learning is "unsupervised," as there is no correction to align the outputs with any initial categorizations.[206] The unsupervised model creates a distribution of the input variables that may be "used to generate new" examples that "plausibly fit into the distribution of the input variable," called "generative" modeling.[207] The human engagement is therefore limited to the basic architecture that the AI begins with and the design of the loss function, but even that limited engagement can be excised through new AI models.

4. Creative Machines

In 1950, Alan Turing sought to answer the question, "Can machines think?" Through his proposed "imitation game," a machine could be proven to exhibit intelligent behavior indistinguishable from a human.[208] Naturally, as computers' language processing and response capabilities have improved, the focus has shifted to other criteria resembling Professor G. Jefferson's argument in 1949 that: "Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain."[209] However, modern AI systems have demonstrated that they can compose original music, design new works of art, and write stories and poetry.[210] Recently, programs such as DALL-E 2,[211] Stable Diffusion,[212] and many

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206 *Id.* (supervised vs. unsupervised learning); Lim, *supra* note 78, at 822.

207 Brownlee, *supra* note 204 (discriminative vs. generative modeling).

208 The imitation game consisted of a human judge asking questions and evaluating responses from both a human and a machine. To eliminate extra variables, the conversation would be communicated exclusively through text. If the judge was unable to reliably identify the machine-generated response, then the machine passed the test. Alan M. Turing, *Computing Machinery and Intelligence*, 59 MIND 433, 433–35 (Oct. 1950).

209 *Id.* at 445.

210 *See* Zack Naqvi, *Artificial Intelligence, Copyright, and Copyright Infringement*, 24 MARQ. INTELL. PROP. L. REV. 15, 16–17, n.3–7 (2020) (listing examples of AI in news media); *see also* Victor M. Palace, Note, *What If Artificial Intelligence Wrote This: Artificial Intelligence and Copyright Law*, 71 FLA. L. REV. 217, 222–25 (2019) (listing examples of AI in music, pictures, and writing).

211 *DALLE·2*, https://openai.com/dall-e-2/ (last visited Jan. 20, 2023).

other AI-generated art programs have demonstrated the potential for the accessibility and marketability of artistic AI systems. However, smaller projects such as The Next Rembrandt[213] demonstrate the potential for such programs to become *truly* creative. A category of systems that have demonstrated notable success in these creative fields are modeled as adversarial networks, using two sub-models to produce works indistinguishable from humans in fields beyond the computer contestant in Turing's test. In this rapidly advancing field, it is likely that more effective systems will be produced in the near future, but adversarial models nonetheless demonstrate the progress of unsupervised training and the generation of unique works.

a. Generative Adversarial Networks

Generative Adversarial Networks (GANs) are unsupervised learning algorithms whose architecture involves two sub-models: a generator model for generating new examples and a discriminator model for classifying whether generated examples are from the training data or generated by the generator model.[214] The discriminator model is a normal classification model that takes an example from the domain (the desired class) and "predicts a binary class label of real or fake."[215] A "real" example comes from a training dataset, while a "fake" example is generated by the generator model.[216] The generator model takes a random vector of a fixed-length as input, "drawn randomly from a Gaussian distribution" (i.e., a bell curve), which "is used to seed the generative process."[217] The generative process consists of converting a string of binary code (e.g., the random vector would

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212 *Stable Diffusion Public Release*, STABILITY.AI (Jan. 20, 2023), https://stability.ai/blog/stable-diffusion-public-release.

213 *The Next Rembrandt*, https://www.nextrembrandt.com/ (last visited Feb. 21, 2023). The Next Rembrandt is an AI program designed to produce original paintings mimicking the artistic style of the painter Rembrandt using a custom 3D printer to produce physical paintings with realistic brushstrokes and layering. The finished pieces were displayed alongside actual Rembrandt paintings and proved to be undiscernible to professional art critics and curators.

214 Brownlee, *supra* note 204 (what are generative adversarial networks).

215 *Id.* (the discriminator model).

216 *Id.*

217 *Id.* (the generator model).

be visually portrayed as pure "noise" or static) into a discernable picture.[218] After training, the remaining vectors in this space will reflect points in the domain at issue (i.e., the distributions will overlap).[219] "This vector space is referred to as a latent space, or a vector space comprised of latent variables."[220] "Latent variables" are "hidden" variables that are important for a domain but not consciously recognized by humans (i.e., the structure uncovered by the unsupervised training).[221] To illustrate, if a Convolutional Neural Network[222] is used to process image data,[223] then the latent space provides a compressed representation of the entire set of images used to train the model (i.e., the *overlapping* characteristics that the computer interprets as a single concept, such as a "dog," rather than a literal mashup of the entire data set).[224] However, this does *not* mean that the AI is merely producing a mosaic from the data set—the diffusion process does not "use" existing works to *create* the output, only to *understand* what the desired prompt actually looks like (i.e., the computer needs the picture to understand what a "dog" looks like because pictures are the only form of visual data it can interpret).

GANs are based on a game theoretic scenario in which the sub-models are adversaries competing against each other in a zero-sum game.[225] When the discriminator successfully identifies whether a sample is real or fake, it is "rewarded" (i.e., no change is needed to the model parameters), "whereas the generator is penalized" (i.e., its model parameters are updated).[226] With each cycle of the training loop, the discriminator is updated to get better at discriminating between real and fake samples, and the "generator is updated based on how well . . . the generated samples fooled the

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[218] ALEC RADFORD ET AL., UNSUPERVISED REPRESENTATION LEARNING WITH DEEP CONVOLUTIONAL GENERATIVE ADVERSARIAL NETWORKS 4 (2015).

[219] Brownlee, *supra* note 204 (the generator model).

[220] *Id.*

[221] *Id.*

[222] IBM Cloud Education, *Convolutional Neural Networks*, (Oct. 20, 2020), https://www.ibm.com/cloud/learn/convolutional-neural-networks.

[223] Brownlee, *supra* note 204 (GANs and convolutional neural networks).

[224] *Id.* (the generator model).

[225] *Id.* (GANs as a two-player game).

[226] *Id.*

discriminator."[227] Eventually, the two models will reach a limit where the generator generates perfect replicas indistinguishable "from the input domain every time, and the discriminator cannot tell the difference[,]" resulting in a 50–50 probability between real and fake classifications.[228] At this point, the discriminator is no longer necessary. An additional advantage of GANs is that successful generative modeling enlarges the available training data with latent data, thereby producing more training data for other, complex domains or domains with a limited amount of data.[229]

In sum, the ML model uncovers the latent space of the input variables, from which an input from the general distribution is selected to generate new and different output examples. However, due to the closed loop system, the generator will "eventually end up replicating the training set," thus lacking any additional driving force which allows it to create something original.[230]

b. Creative Adversarial Networks

GANs' inability to create something "original" is addressed by the creative adversarial network (CAN). A CAN is trained as a conditional GAN, where the training data is conditioned on an additional variable, such as a class label.[231] To illustrate, a GAN generating artwork would use a large set of art associated with style labels, such that the discriminator learns (1) to discriminate "real" art from "fake" art and (2) to identify various art styles.[232] Unlike a GAN, a CAN generator receives a signal from the discriminator on both tested criteria for any work it generates: The first signal relates to the baseline criteria (e.g., whether the generated work is "art" or not), which "enables the generator to change its weights to generate images that more frequently will deceive the discriminator as to whether it

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227 *Id.*

228 *Id.*

229 Brownlee, *supra* note 204 (why generative adversarial networks).

230 Vicenc Feliu, *Our Brains Beguil'd: Copyright Protection for AI Created Works*, 25 INTELL. PROP. & TECH. L.J. 105, 108 (2021).

231 Brownlee, *supra* note 204 (conditional GANs).

232 Ahmed Elgammal et al., *CAN: Creative Adversarial Networks Generating "Art" by Learning About Styles and Deviating from Style Norms*, RUTGERS UNIV., June 23, 2017, at 6, 9.

is coming from" the training data, just like a traditional GAN.[233] The second signal relates to the additional classification (e.g., what style of art the work fits into).[234]

The creative generator will try to generate works that meet the first criteria (e.g., whether it is "art"), but confuses the discriminator about the secondary criteria (e.g., what style the art belongs to).[235] These two signals act as contradictory forces to drive the generator to produce novel works that meet the baseline criteria but are difficult to classify into an existing category.[236] While the generator is driven to generate works that meet the baseline criteria, it is still "penalized" if the discriminator is able to classify the work into an existing category.[237] Thus, the two signals together push the generator to maximize the first objective (e.g., produce works indistinguishable from human art) while also maximizing the ambiguity of the generated work with respect to how it fits in the realms of standard categories (e.g., artistic styles).[238]

C. Impact on IP Policy

Around the world (except for Saudi Arabia),[239] there is a hesitancy to equate AI with an organic human being. For IP, this implicates questions of whether a computer can truly "create" or "invent" something new. Moreover, without the same thoughts and impulses as a natural person, AI poses a difficult challenge for the current IP system which is tailored to people's natural self-interest by providing significant legal rights to incentivize the disclosure and dissemination of knowledge for the public benefit. Without the need to incentivize a human, the utilitarian value of IP is significantly reduced. Nevertheless, AI will have an impact on the IP system, but it is *human* innovators who are likely to be excluded under the current system.

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233 *Id.* at 6.

234 *Id.*

235 *Id.*

236 *Id.* at 6–7.

237 *Id.*

238 Elgammal, *supra* note 232, at 7.

239 Chris Weller, *A Robot That Once Said It Would 'Destroy Humans' Just Became the First Robot Citizen*, BUSINESS INSIDER (Oct. 26, 2017), https://www.businessinsider.com/sophia-robot-citizenship-in-saudi-arabia-the-first-of-its-kind-2017-10?op=1.

1. Incentivization and Humanity

Despite AI allegedly having already generated inventions that have been granted patent protection and works that are indistinguishable from human creation, most jurisdictions consider *human* intellectual authorship as a prerequisite for IP protection.[240] The U.S. Copyright Office currently requires that "a work must be created by a human being. . . . [T]he Office will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author."[241] The same limitation applies to patent eligibility.[242] However, it is questionable whether this is a rational restriction to maintain for the future.

To meet the standards for copyright or patent protection, a computer-generated work or invention must possess the requisite "creativity" or "novelty."[243] While some may attempt to distinguish such concepts as uniquely human, AI satisfies the current legal and technical definitions for both.[244] The standard for creativity set in *Feist* is actually much lower than other definitions of creativity specified and used by AI researchers.[245] Two such levels of creativity have been distinguished as "psychological" creativity—producing ideas that are novel for the individual mind that produced them—and "historical" creativity—producing "ideas that are novel for the whole of human history."[246] Psychological creativity "aligns with the originality standard in copyright law" and its requirement of independent creation, while "[historical] creativity aligns with the standard of novelty in patent law."[247]

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[240] INT'L ASS'N FOR THE PROT. OF INTELL. PROP., SUMMARY REPORT: COPYRIGHT IN ARTIFICIALLY GENERATED WORKS 1 (July 1, 2019) [hereinafter AIPPI COPYRIGHT].

[241] U.S. COPYRIGHT OFF., COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES, (3d ed. 2021) § 313.2.

[242] PUBLIC VIEWS, *supra* note 203, at 4 (citing language in 35 U.S.C. §§ 101, 102, 115, 185, and 256).

[243] Annemarie Bridy, *The Evolution of Authorship: Work Made by Code*, 39 COLUM. J.L. & ARTS 395, 398–99 (2016) [hereinafter Bridy, *The Evolution of Authorship*].

[244] *See* discussion *supra* Section III.B.4.b.

[245] Bridy, *The Evolution of Authorship*, *supra* note 243, at 399.

[246] Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV. 5, 13 (2012) [hereinafter Bridy, *Coding Creativity*].

[247] *Id.* at 13.

The objection that computers are unable to "originate anything . . . [only doing] whatever we know how to order it to perform," has persisted since 1842 when it was published by the Countess of Lovelace regarding Charles Babbage's Analytical Engine, a mechanical computer.[248] Although many will insist that true "creativity" requires a human mind and "computational creativity" is nothing more than an oxymoron, it should be noted that all creativity can be expressed as inherently algorithmic.[249] It is impossible to produce "work that is completely original, that breaks completely with existing codes and canons; . . . all cultural production is inherently derivative and algorithmic."[250] Such algorithmic alteration has been commonplace in industries such as music and writing throughout history.[251] This is because purely random "creativity" is often worthless (e.g., the pattern produced by throwing your dinner against the wall would be "original nonsense"[252]) and only creative works that are sufficiently similar to existing norms to be perceived as having artistic value—yet sufficiently dissimilar to not be *predictable*—are hailed as pinnacles of "creativity." If one were to take *unpredictability* as a synonym for this form of creativity, which entails deviating slightly from existing canons to explore the fringes of current knowledge, then we can make machines creative.[253] Indeed, computers are just as capable, or incapable, of originating such things as people are.[254]

The distinction between "creativity" in *products* (product creativity) and "creativity" in *processes* (process creativity) is important to this discussion. Product creativity looks at the *extrinsic* creative value (e.g., aesthetics) of the object itself, detached from its means of creation (e.g., the artist throwing buckets of paint against a blank canvas may produce a painting that has creative value, but the artist did not have a preexisting idea that was brought

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248 Turing, *supra* note 208, at 450.

249 Bridy, *Coding Creativity*, *supra* note 246, at 2; *see* Daniel Wilkerson, *Harmony Explained: Progress Towards A Scientific Theory of Music* § 1.6 (Working Paper), https://arxiv.org/html/1202.4212v2 (applying computational thought to music).

250 Bridy, *Coding Creativity*, *supra* note 246, at 12.

251 *Id.* at 11 (discussing Oulipian writing and algorithmic musical composition).

252 IMMANUEL KANT, CRITIQUE OF THE POWER OF JUDGMENT 186–87 (Paul Guyer ed., Paul Guyer & Eric Matthews trans., 2000).

253 Bridy, *Coding Creativity*, *supra* note 246, at 10.

254 *Id.* at 12.

to life through random splattering of paint droplets).[255] Conversely, process creativity is linked to the psychological and philosophical aspects typically associated with creativity, looking at the *intrinsic* value of the imaginative expression.[256] Different cultures have distinguished between emphasizing the mental process or the valuable product in their cultural conception of creativity.[257] Whether AI may demonstrate process creativity is increasingly debatable as the technology becomes more complex, but whether AI may demonstrate product creativity has already been clearly established.[258]

If there still exists some inherent distinction between the creations of man and machine, is it significant enough to influence our policy? If the above observations are incomplete, then policymakers must abductively infer the most probable conclusion to the information available. While not conclusive, the assertion that "creativity" operates along the same principles whether expressed by a human or computer is the best possible answer based on the current information. It is ill-advised to postpone making impactful policy changes to address emerging technology based on the possibility that an unknown factor is unaccounted for; the consequences of being unprepared for a changing technological paradigm outweigh any foreseeable advantages of distinguishing between different philosophical concepts of creativity, particularly considering practical effects that are likely to result regardless of such a distinction.[259] Therefore, for future policy: if it looks like a duck, walks like a duck, sounds like a duck, acts like a duck, and thinks like a duck, does it really matter if it isn't technically a duck?

2. Propagation

In the context of AI, IPR are likely to fail to facilitate the disclosure and dissemination of knowledge. They are simultaneously unnecessary and insufficient incentives. On one hand, AI only needs instruction—not motivation—to disclose information; on the other hand, the companies currently poised to dominate the AI market have less need for patent

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[255] *See* Julia Langkau, *The Value of Creativity*, THE JUNKYARD (March 23, 2022), https://junkyardofthemind.com/blog/2022/3/20/the-value-of-creativity.

[256] *See id.*

[257] *See id.* (compiling sources).

[258] *See supra* notes 210–13.

[259] *See infra* Sections III.C.3, V(B).

protection because they control both the training data and the AI technology itself. This control gives them a competitive advantage that attracts more customers who, in turn, provide more training data to improve the AI further. Thus, by hoarding consumer data they can ensure market control without using IPR. However, there are concerns about whether AI disclosures would even be useful because AI decision-making processes can be nearly impossible to understand. If the disclosed information cannot be understood, then the benefit to the public by its disclosure is greatly diminished.

a. The practicality of disclosure

If instructed, AI would disclose all information without the need to provide the incentive of IP protection; unlike people who may seek to protect a competitive advantage through trade secrecy, AI are not "miserable little pile[s] of secrets"[260] that must be enticed into revealing useful information. However, a more concrete issue is that current AI demonstrate a "black box problem." The "black box problem"—the inability to fully understand an AI's decision-making process and predict its decisions or outputs—is particularly troublesome for claims of copyright infringement because it may be difficult to establish that a substantial part of a work was reproduced during the process of generating or contributing to the infringing work.[261]

b. The likelihood of dissemination

Other concerns arise because new information economies thrive on networking effects, leading to more monopolies.[262] Among the U.S. companies who hold AI patents, the top thirty held 29% of all AI patents granted from 1976–2018.[263] As few as seven for-profit institutions hold AI capabilities that vastly outstrip all other institutions, while a handful of large

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[260] ANDRÉ MALRAUX, ANTI-MEMOIRS 5 (Kilmartin et al. trans., 1968).

[261] ISED CANADA, *supra* note 100, at 18.

[262] Ghosh, *supra* note 178, at 108 (2020); THE PUBLIC DOMAIN, *supra* note 51, at 68–69; *see also* Bilski v. Kappos, 561 U.S. 593, 651 (2010) (Stevens, J., concurring) (discussing the benefits of innovation and network effects).

[263] AI TRACING, *supra* note 186, at 10.

entities possess significantly more data than anyone else.[264] Due to the significant impact of network effects in the technology market, large companies enter into a positive feedback loop by which they can improve data driven services with data from their users, which in turn attracts more users and provides more data.[265] Providing further benefit to companies by the allocation of IPR to users, programmers, or companies would over-reward them and lead to unequal access to AI as both IPR and market forces operate to cement their monopoly.[266]

3. Creation

There are two aspects of AI's potential impact on innovation: the impact of current IP on AI innovation itself and the subsequent impact on human-created IP. Due to AI's reliance on potentially copyrighted data, AI could be mired in licensing and litigation, stalling any benefit that AI could give to human innovation. However, AI could also prove to be "too much of a good thing" by generating IP at such a rate that it inhibits human-created IP from qualifying for protection.

a. Infringement and Fair Use for data intensive technology

Text and Data Mining (TDM)—"various techniques of informational analysis" applied to "large amounts of machine-readable information to identify trends, patterns, and relationships"—is an essential component of machine learning that is at odds with the copyright system.[267] Because quantity of data is the most significant factor in ML, TDM is essential because it enables the collection of large amounts of training data already available on the Internet, and it is becoming routine in systems across the economy.[268] However, the large quantity of works processed by TDM makes obtaining any necessary authorization a significant burden, if not outright impracticable.[269]

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[264] Iyengar, *supra* note 136; Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C.D. L. REV. 399, 406, 424 (2017).

[265] Sobel, *supra* note 77, at 88.

[266] Palace, *supra* note 210, at 238.

[267] ISED CANADA, *supra* note 100, at 7.

[268] HARGREAVES, *supra* note 62, at 43.

[269] ISED CANADA, *supra* note 100, at 8.

Even if one were to obtain a license for accessing data, publishers are increasingly including provisions in their licensing contracts to require additional licensing fees for TDM use, further hindering developers' ability to train AI.[270] Thus, merely obtaining a general use license may be insufficient to avoid infringement while utilizing TDM, with litigation already being pursued by copyright holders who believe their market is threatened by ML.[271] Should a developer be accused of infringement, the AI could be presumed to have access to everything on the Internet, therefore allowing a plaintiff in an infringement suit to easily demonstrate access to the protected work and thereby hold the developer liable for any similarity.[272] To complicate matters further, there is already a thriving market for providing data used to train ML, so TDM threatens both the rightsholders to the works it digests as well as the market interest of existing data brokers.[273]

Alternatives to TDM are undesirable because proper risk management for data consumption would necessitate both extensive licensing and restricting ML systems to operate only within particular boundaries (e.g., within the public domain), thus mitigating risk but crippling the quality of ML.[274] Inventors that train programs using only data existing in the public domain are left with a lower quality program that may exhibit biases based on its limited data pool.[275] Rightsholders are concerned that new technologies and growing exceptions to IP enforcement could deprive them of revenues or harm their ability to enforce their exclusive rights.[276] Reducing the ambiguity of IPR regarding new technologies is necessary to

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[270] PUBLIC VIEWS, *supra* note 203, at 23.

[271] *See, e.g.*, Thomson Reuters Enter. Ctr. GmbH v. ROSS Intell. Inc., 529 F. Supp. 3d 303 (D. Del. 2021) (denying motion to dismiss claim of copyright infringement).

[272] Mike Jennings et al., *The Challenges of Artificial Intelligence in the Field of IP*, AA THORNTON (March 2020), https://www.aathornton.com/the-challenges-of-artificial-intelligence-in-ip/.

[273] Sobel, *supra* note 77, at 76–77, 82–83.

[274] Pasquinelli, *supra* note 200, at 407.

[275] PUBLIC VIEWS, *supra* note 203, at 30.

[276] ISED CANADA, *supra* note 100, at 9.

improve the marketplace, facilitate efficient enforcement of copyright, and further innovation in emerging fields.[277]

Rightsholders continue to face uncertainty due to the expansion of fair use under the Google cases.[278] The Court's reasoning, in combination with greater freedoms to technological uses and an increase in reliance on data-driven technologies, could effectively transform fair use from an affirmative defense to a presumption. If the exception becomes a default outcome, then the remnants of the rule are warped into a privilege for a select few—reverting to the system predating copyright that vested power in the corporate elite instead of the individual author.[279] Moreover, reliance on the courts to craft new fair use exceptions for emerging technology necessitates prolonged litigation, which leads to greater losses overall as the technology either builds an established market during the litigation[280] or innovation is inhibited by an injunction. Further, any harm resulting from the legal uncertainty will disproportionally affect smaller businesses who lack the resources to carry litigation to the Supreme Court and will either face greater pressure to acquiesce to the legal demands of rightsholders or are prevented from entering the market at all.[281] Smaller rightsholders already allege abuses of monopoly power by larger rightsholders and collecting societies, inadequacy of regulation over copyright contracts and licensing, and ineffective government agencies.[282]

b. Flood of IP and effects on originality and novelty

ML evaluates many potential solutions to a problem, each of which is further explored or abandoned as it is evaluated using the desired parameters.[283] A helpful analogy would be to visualize how a plant explores its surroundings for nutrients through the offshoots of its roots.[284] Because all these possible solutions are temporarily stored as data within the ML

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277 *See, e.g.*, *id.* (explaining rightsholder concerns about protecting IPR from new technologies); HARGREAVES, *supra* note 62, at 20.

278 *See supra* notes 154–56 and accompanying text.

279 *See* Licensing of the Press Act 1662, 14 Car. II. c. 33 (Eng.).

280 *See, e.g.*, Google, LLC v. Oracle Am., Inc., 141 S. Ct. 1183, 1194 (2021).

281 *See* HARGREAVES, *supra* note 62, at 30.

282 *Id.* at 92.

283 Čerka, *supra* note 180, at 379.

284 *Id.* at 379–80.

program, each unique output could qualify for copyright protection if the programmer instructed the AI program to store this data.[285] Therefore, the scale of works being produced by AI is significantly larger than just the final output, and these works would rapidly crowd out human expression as the AI attempts to evaluate every possible solution along its desired path.

Even if protection was not granted to AI-generated works, remaining human works would likely fail to meet the originality or novelty requirements for their respective IP protection. Copyright protection would be denied due to likely access to a substantially similar work, particularly due to the low threshold created by subconscious copying.[286] Similarly, patent protection would be denied due to the invention existing in the prior art created by AI data.[287] Even further, if human works were granted exemptions or could show independent creation to avoid copyright infringement liability, the effective value of the copyright would be negligible because the work would be legally available from another source.

IV. GLOBAL RESPONSE

The most common government response to issues posed by AI development has been to seek public input. In 2019, the USPTO issued several requests for comments which posed questions about the current state of AI and the capacity of current laws to accommodate foreseeable AI application to IP.[288] Comments received from a wide range of stakeholders (e.g., rightsholders and IP attorneys) were compiled and released in a report which included the USPTO's summary and response to the views expressed (U.S. Views). Other developed countries issued similar requests for comments and compiled reports with their own summaries and recommendations.[289]

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[285] MAI Sys. Corp. v. Peak Comput., Inc., 991 F.2d 511, 519 (9th Cir. 1993) (concluding that even the temporary storage of data in a computer's RAM is sufficient for infringement).

[286] ABKCO Music, Inc. v. Harrisongs Music, Ltd, 722 F.2d 988, 997 (2d Cir. 1983) (affirming that copying may be done subconsciously).

[287] The field of prior art is very comprehensive and includes matters "described in a printed publication anywhere in the world." Borden, Inc. v. Occidental Petro. Corp, 381 F. Supp. 1178, 1203–04 (S.D. Tex. 1974). Information published online would meet this threshold.

[288] PUBLIC VIEWS, *supra* note 203, at i–ii.

[289] *See, e.g.*, *Government Response to Call for Views on Artificial Intelligence and Intellectual Property*, INTELL. PROP. OFF. (Mar. 23, 2021), https://www.gov.uk/government/co

In addition to national efforts, non-governmental organizations have conducted surveys internationally. One such organization, the Association Internationale pour la Protection de la Propriété Intellectuelle (AIPPI), an international nonprofit based in Switzerland with members representing 131 countries, issued questions from 2019–2021 asking about members' national IP systems and their perceived ability to address AI issues.[290] The published reports (Int'l Views) contain responses from most developed nations and provide the perspective of IP professionals around the globe.[291] The international perspective is particularly relevant for AI technology due to the Internet's global reach and the need for global IP protection to prevent international exploitation. Further, there is significant interest in harmonizing IP laws among the Int'l Views for AI-generated works (83%),[292] especially regarding whether to recognize AI as inventors (86%),[293] and whether AI-generated inventions qualify for patent protection (91%).[294] However, it would be difficult to harmonize utilitarian IP regimes (e.g., the United States) with IP regimes based on a "moral" right inherent to human creators (e.g., most European nations).[295]

Among both national and international responses, there were three general themes: (1) that current IP laws are adequate to address AI developments; (2) that human efforts needed to be prioritized over AI efforts regarding IP; and (3) that distinguishing between human-created IP

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nsultations/artificial-intelligence-and-intellectual-property-call-for-views/government-response-to-call-for-views-on-artificial-intelligence-and-intellectual-property [hereinafter UK VIEWS].

290 INT'L ASS'N FOR THE PROT. OF INTELL. PROP., https://aippi.org/about-aippi/ (last visited Jan. 18, 2023).

291 The statistics used in this Comment have been modified to correct discrepancies between the number of countries holding certain views and the reported percentage in the source material.

292 AIPPI COPYRIGHT, *supra* note 240, at 6.

293 INT'L ASS'N FOR THE PROT. OF INTELL. PROP., SUMMARY REPORT: INVENTORSHIP OF INVENTIONS MADE USING ARTIFICIAL INTELLIGENCE 6, 15 (July 17, 2020) [hereinafter AIPPI INVENTORSHIP].

294 INT'L ASS'N FOR THE PROT. OF INTELL. PROP., SUMMARY REPORT: INVENTIVENESS AND SUFFICIENCY OF DISCLOSURE IN AI INVENTIONS 10 (July 20, 2021) [hereinafter AIPPI DISCLOSURE].

295 AIPPI COPYRIGHT, *supra* note 240, at 1.

and AI-generated IP would have negative effects. These themes are difficult to reconcile and actively conflict with each other.

A. The Sufficiency of the Status Quo

The U.S. Views generally express a belief that current IP laws are highly flexible and capable of accommodating AI development across all IP areas.[296] Even where conflict was foreseeable, the U.S. Views argued that fair use, supplemented by commercial law principles and well-drafted contracts, could address the conflicts.[297] This sentiment was shared by stakeholders across the globe, with UK's Intellectual Property Office publishing views (UK Views) that trade secrecy would provide important protection if patents were disfavored—despite this being antithetical to patent law's purpose.[298] The majority of the Int'l Views, including the U.S. Views, supported maintaining their nations' current stance that IPR would be restricted to natural persons, thus circumventing issues of AI authors and inventors entirely.[299]

Current criteria for IPR were also vastly supported, with Int'l Views in favor of retaining current definitions for originality (87%)[300] and ordinary skill in the art (90%).[301] Ninety-four percent of the Int'l Views believed that assessment of ordinary skill should be applied equally to human and AI-generated inventions,[302] although a slightly lower amount (70%) believed that the assessment would not be impacted depending on the capabilities of the AI involved.[303] Similarly, a majority made no distinction between AI-assisted and AI-generated invention for purposes of Europe's "inventive step" requirement.[304] The U.S. Views touted the flexibility of the present

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296 PUBLIC VIEWS, *supra* note 203, at iii.

297 *Id.* at iii–iv.

298 UK VIEWS, *supra* note 289 (under trade secrets).

299 AIPPI COPYRIGHT, *supra* note 240, at 4; PUBLIC VIEWS, *supra* note 203, at 7.

300 AIPPI COPYRIGHT, *supra* note 240, at 9.

301 AIPPI DISCLOSURE, *supra* note 294, at 12–14.

302 *Id.* at 15–16.

303 *Id.* at 14–15.

304 *Id.* at 11–12. The inventive step is the European equivalent of the 35 U.S.C. § 103 non-obvious requirement. *Convention on the Grant of European Patents*, EUROPEAN PATENT OFF. (Jan. 21, 2022), https://www.epo.org/law-practice/legal-texts/html/epc/2020/e/ar56.html.

legal framework by including comments citing the natural growth of ordinary skill as new technologies are adopted.[305]

The Int'l Views also supported current disclosure requirements (80%),[306] although only 62% believed their current disclosure laws were adequate to address AI.[307] The U.S. Views were similar, believing there were no unique considerations for disclosure regarding AI inventions.[308] Some UK Views agreed, despite acknowledging that any disclosure would merely provide a "snapshot" of the system at the time of patent application while "it is the nature of AI 'to adapt, change, and evolve.'"[309]

Finally, both domestically and abroad, there were views that any concern or action regarding AI's effect on IP was premature.[310] Some UK Views even dismissed concerns from the perspective of AI owners, believing that current IP protections and licensing requirements would not interfere with the creation, growth, or application of AI technology.[311]

B. Prioritize Man over Machine

The current statutes governing IP in the U.S. have been interpreted by the USPTO to limit recognition as "inventor" to natural persons.[312] Copyright statutes are similarly restrictive, with an almost universal consensus that humanity is a prerequisite to being an "author" for copyright protection.[313] Most support for this limitation appears to stem from the belief that, across every nation, the purpose of copyright is to incentivize *human* creative endeavors.[314] Therefore, human—not machine—creativity must be prioritized to prevent negative impact to human creative endeavors

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305 PUBLIC VIEWS, *supra* note 203, at 12.

306 AIPPI DISCLOSURE, *supra* note 294, at 25–26.

307 *Id.* at 6.

308 PUBLIC VIEWS, *supra* note 203, at 9.

309 UK VIEWS, *supra* note 289 (under disclosure of the invention).

310 AIPPI DISCLOSURE, *supra* note 294, at 5; UK VIEWS, *supra* note 289 (under patent exclusions).

311 UK VIEWS, *supra* note 289 (under copyright protection for AI software).

312 PUBLIC VIEWS, *supra* note 203, at 4 (citing language in 35 U.S.C. §§ 101, 102, 115, 185, and 256).

313 AIPPI COPYRIGHT, *supra* note 240, at 1.

314 PUBLIC VIEWS, *supra* note 203, at 21.

by having them compete with AI-generated content, especially since IPR provide no incentive to machines themselves.[315]

This viewpoint is clear regarding patents as well—the Int'l Views thought that recognizing AI "inventors" would conflict with a policy of fostering innovation (61%).[316] That amount increases to 74% who believed it would conflict with their own nation's public policy behind IP, although the conflicts are attributed to widely diverse reasons.[317] Seventy-two percent were opposed to even naming an AI on a patent application, largely due to European views that it would tarnish the fundamental moral rights of authors by granting the same recognition to an AI.[318] The vast majority (82%) opposed generally recognizing AI as either inventor or co-inventor of a patent, although most cited their current IP system requiring legal capacity for recognition and expressed concern about downstream effects of attributing legal rights to AI (e.g., the legal status of AI as an entity).[319]

Despite the staunch opposition to autonomous AI creation of IP, there was equally strong support for granting IP protection to works or inventions which could be attributed to a human.[320] However, for both patent and copyright, the requisite level of human involvement appears to be minuscule, and the Int'l Views failed to show consensus regarding at what stage in the AI's development the human involvement should occur.[321] However, they almost unanimously (97%) opposed placing any clear cap on the level of AI contribution which would prevent an invention from being patented.[322] The U.S. Views favored granting patent protection as long as a natural person "partially contributed" to the conception[323] of the

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315 UK VIEWS, *supra* note 289 (under protecting works generated by AI); AIPPI INVENTORSHIP, *supra* note 293, at 3–4.

316 AIPPI INVENTORSHIP, *supra* note 293, at 3–4.

317 *Id.* at 5–6.

318 *Id.* at 8–9.

319 *Id.* at 7–8, 15.

320 AIPPI COPYRIGHT, *supra* note 240, at 7.

321 *Id.* at 8–9, 18; AIPPI INVENTORSHIP, *supra* note 293, at 13.

322 AIPPI INVENTORSHIP, *supra* note 293, at 13.

323 As a practical matter, conception is the requirement that an invention be realized, clearly defined, or reduced to practice without the need to conduct additional extensive research or experimentation. PUBLIC VIEWS, *supra* note 203, at 2–3. It is generally satisfied by the other statutory patent requirements, particularly disclosure.

invention.[324] However, AI could theoretically facilitate the entire process of transforming a "general goal for success" into a "clearly defined" solution,[325] so any human involvement is most likely at either the beginning, (e.g., by identifying a problem to solve), or at the end (e.g., by approving the AI-generated solution). Some U.S. professionals even suggested that merely selecting the final solution from several AI-generated outputs would suffice.[326] Therefore, the practical distinction regarding human engagement between the widely opposed AI-generated IP and widely supported AI-assisted IP appears negligible.

Interestingly, despite the strong support for AI-assisted invention, few believed that this would cause an increase in the rate of innovation or subsequent patent applications.[327] Despite foreseeable increases in backlogs and pressure on patent office resources, 69% of Int'l Views oppose allowing their patent offices to benefit from using AI to assess applications.[328]

C. Avoiding Second-Class Creators

Despite the opposition to granting protection to AI-generated IP, the majority of the Int'l Views desired current IPR to apply to both AI-assisted and AI-generated IP, both in duration (57%) and in scope (70%).[329] There were concerns that either granting or denying patents to AI-generated IP would have a disincentivizing effect on innovation or drive AI owners to rely on trade secrecy instead, which is already commonplace for computer-implemented inventions in the UK.[330] Even the groups that expressly stated AI-generated inventions should not be entitled to patent protection were nonetheless concerned about the potential negative impact on "fostering

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[324] PUBLIC VIEWS, *supra* note 203, at 5.

[325] *Id.* at 2–3.

[326] RAYMOND MOSER ET AL., INT'L ASS'N FOR THE PROT. OF INTELL. PROP., GROUP REPORT: INVENTORSHIP OF INVENTIONS MADE USING ARTIFICIAL INTELLIGENCE (June 12, 2020) (responding to question 6(f)).

[327] UK VIEWS, *supra* note 289 (responses to question 8).

[328] AIPPI DISCLOSURE, *supra* note 294, at 21–22.

[329] AIPPI COPYRIGHT, *supra* note 240, at 10, 18. However, only 15% believed the term should be identical, implying that increasing term protection for human-attributed works was a consideration. *Id.* at 6.

[330] *See* AIPPI DISCLOSURE, *supra* note 294, at 3, 5; *see also* UK VIEWS, *supra* note 289 (under patent exclusions).

innovation."[331] Another common concern was that any distinction between AI-assisted and AI-generated IP would incentivize false attribution of works or inventions to humans to benefit from favorable protection granted to human-created IP, particularly due to the extreme difficulty in detecting whether IP is naturally or artificially created.[332]

D. Irreconcilable Conflict

In addition to the inherent conflict in favoring one group over another while simultaneously wanting to treat both groups equally and effectively erasing any meaningful distinction between the two, there are further issues in the majority viewpoint. The most fundamental issue is that most of the Int'l Views acknowledged that AI-generated IP would create complications, despite believing that current laws were adequate.[333] While the U.S. Views were highly confident in the current IP system, the Int'l Views were almost evenly split with only 51% believing current laws were adequate.[334] This divide appears to be based on whether the respondents considered the question "inventions made using AI" to be limited to narrow AI, while the opposing group focused on the implications of general AI.[335] The former group stated that current AI could neither invent nor author without human intervention and suggested that AI will continue to be heavily reliant on human creativity throughout its development and application.[336] Such divergent viewpoints on the future of new technologies were also present at the start of every industrial revolution.[337] However, AI

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331 AIPPI INVENTORSHIP, *supra* note 293, at 4.

332 AIPPI COPYRIGHT, *supra* note 240, at 5; *see also* AIPPI DISCLOSURE, *supra* note 294, at 5–6; UK VIEWS, *supra* note 289 (under protecting works generated by AI).

333 AIPPI INVENTORSHIP, *supra* note 293, at 2–3.

334 *Id.*

335 *See id.*

336 PUBLIC VIEWS, *supra* note 203, at ii, 22.

337 *See, e.g.*, *An Unrestrained Demon*, JUDGE, Oct. 26, 1889 (illustration on cover); Alexander Winton, *"Get A Horse"*, SATURDAY EVENING POST, Feb. 8, 1930, at 39, 42, 143; Christopher Klein, *The Original Luddites Raged Against the Machine of the Industrial Revolution*, HISTORY (Jan. 4, 2019), https://www.history.com/news/industrial-revolution-luddites-workers; chw, *Historical Examples of Opposition to Technological Progress*, LESSWRONG (April 5, 2021), https://www.lesswrong.com/posts/6aRANeq89z4n7Kxz4/historical-examples-of-opposition-to-technological-progress.

developments are the continuation and acceleration of those same patterns of transformation, and society must plan accordingly.

In the Int'l Views, the Philippine group was the sole outlier on several questions due to their belief that it is improper to evaluate humans and AI by the same standard.[338] Because human inventors have practical limitations regarding their organic brain's breadth of knowledge and ability to process information, they will inevitably fail to meet the standard of an AI furnished with theoretically unlimited information and incredible processing power. These beliefs evince a reality presumably accepted by the other nations who supported AI-assisted IP—human creators unassisted by AI will be excluded from the realm of IP. However, the digital age again provides a useful comparison, as the rise of the Internet and subsequent change of available information is analogous to this situation. There will certainly be people who are disadvantaged while AI remains outside common use, and the consolidation and protection of AI and data suggests that unassisted humans will remain disadvantaged for the foreseeable future. These issues regarding market competition were expressed by another group, but their concerns focused on market domination and exclusion through the large amount of patents being granted to a single entity for AI-generated inventions, rather than the domination of the AI itself.[339] The U.S. Views expressed related concerns about the effect of "rapidly generate[d] huge volumes of IP" by autonomous AI, as well as the proliferation of prior art affecting patent applications.[340]

In the UK Views, some individuals believed that the current waiting periods to receive a patent and the length of protection were poorly suited to sectors of fast-moving technology.[341] Only one respondent recognized that the iterative nature of AI and AI-generated inventions made them less suitable overall for patent protection.[342] Others who shared these concerns suggested the creation of new sui generis IPR might be better suited to the reduced cost and fast obsolescence of theoretical AI-generated inventions,

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338 AIPPI DISCLOSURE, *supra* note 294, at 12, 15–16.

339 UK VIEWS, *supra* note 289 (responses to question 8).

340 PUBLIC VIEWS, supra note 203, at 42; *see also* PUBLIC VIEWS, *supra* note 203, at iii, 13–14; AIPPI INVENTORSHIP, *supra* note 293, at 4; UK VIEWS, *supra* note 289 (responses to question 8).

341 UK VIEWS, *supra* note 289 (under patent exclusions).

342 *Id.* (under aims of the patent system).

while simultaneously circumventing the issues associated with integrating AI-generated inventions into the current patent system.[343]

Regarding infringement, the U.S. Views discussed the issue of bias in AI trained exclusively using data available in the public domain, which is often done as a precautionary measure against uncertain infringement liability.[344] The UK Views were clearly divided depending on which interest the particular commenter represented; AI owners expressed similar concerns about curatorial bias from limiting training data to licensed data and potentially prohibitive costs for smaller businesses, while IP owners believed licensing for TDM was the best means of protecting their legitimate interests.[345] The UK Views were further concerned with satisfying the burden of proof in patent infringement cases as demonstrated by frequent citations to the "black box" issue of AI.[346] Additionally, they noted the difficulty associated with proving in which jurisdiction the infringement occurred, particularly for AI hosted on different servers across the globe.[347]

E. Proposed Solutions

Despite the large amount of comments and stakeholder interests represented in the U.S. Views, there was no clear proposal for the future of IP, instead calling on the USPTO to continue to consult with the public on the issue.[348] Only two respondents suggested that the impact of AI on the IP system could pose greater economic and scientific risks by creating monopolies over foundational technology or requiring changes to basic legal frameworks to adjust to general AI.[349] The UK Views included clearer responses that a "fresh look at the entire patent system" was needed to address AI-generated IP, although they disagreed on whether it is a present or future concern.[350]

In addition to the general efforts of patent offices around the globe, there are more focused government efforts to address AI development. In 2019,

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343 *Id.* (under patent exclusions).

344 PUBLIC VIEWS, *supra* note 203, at 30.

345 UK VIEWS, *supra* note 289 (under use of copyright material for training AI).

346 *Id.* (responses to question 16).

347 *Id.*

348 PUBLIC VIEWS, *supra* note 203, at 16.

349 *Id.* at 17.

350 UK VIEWS, *supra* note 289 (responses to question 8).

Executive Order 13,859 launched the American AI Initiative to promote national AI technology and innovation leadership.[351] In 2021, it was reestablished into the National AI Initiative.[352] As part of the Initiative, the White House issued a request for comments on a draft of AI regulatory principles that recognize the unique characteristics of AI,[353] including "the anticipated pace with which AI will evolve," and "current technical challenges in creating interpretable AI."[354] The drafted regulatory principles encourage non-regulatory approaches, including waivers and exemptions from existing regulations, and allow agencies to "address inconsistent, burdensome, and duplicative State laws that prevent the emergence of a national market."[355] These principles also direct agencies to consider applications of AI that favor incumbents over other parties and they call on agencies to make government data and models available to the public where appropriate.[356]

V. PROPOSALS AND GUIDELINES FOR FUTURE POLICY

AI is certain to have a significant impact on nearly every sector of modern civilized life.[357] While the U.S. patent and copyright systems have proven flexible for centuries, they show clear signs of struggle from the Digital Revolution.[358] Attempts to craft new regulations and licensing systems to account for AI will only expound upon existing issues and either stifle AI or be woefully ineffective. Policymakers must disregard those who believe action is premature. They should not be hesitant to consider significant, fundamental changes to our IP system simply because IP is the

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[351] Exec. Order No. 13859, 84 Fed. Reg. 3967 (Feb. 11, 2019).

[352] National Artificial Intelligence Initiative Act of 2020, Pub. L. No. 116-283, § 5001, 134 Stat. 4523 (2021).

[353] Request for Comments 2020-00261, 85 Fed. Reg. 1,825 (Jan. 13, 2020).

[354] Russell T. Vought, Guidance for Regulation of Artificial Intelligence Applications 5, 11 (2019), https://www.whitehouse.gov/wp-content/uploads/2020/01/Draft-OMB-Memo-on-Regulation-of-AI-1-7-19.pdf.

[355] *Id.* at 2, 6–7.

[356] *Id.* at 7, 12.

[357] The multiple sectors of social and economic life expected to be affected include employment, transportation, education, finance, healthcare, personal security, and manufacturing. *Id.* at 3.

[358] *See* discussion *supra* Section III.

first legal system affected by AI developments. The last few centuries have been filled with enormous innovation that repeatedly stunned the world with revolutionary technologies, and it is foolish to insist that our generation is exempt from these forces. Furthermore, AI capabilities are likely to reach a point of explosive and exponential growth, having already demonstrated a "tipping point" in 2016,[359] and U.S. legal systems must be ready to address the foreseeable conflicts.

Our current legal systems have been tailored over millennia to accommodate human nature and social structures, and fully autonomous AI inventors and authors are completely foreign actors to these systems. The incentive of IPR is inapplicable to a non-human creator, as are the European moral rights in creation, and either would overcompensate the rightsholders of AI-generated IP. Simultaneously, a significant incentive for IP infringement exists due to the necessity for large amounts of data and the associated costs of licensing alongside the potential biases associated with limiting training data. Further, AI's generation of large amounts of works and prior art undermines the market for human IP, and not even sui generis rights for AI would avoid the inevitable effect on the rest of the system.[360]

In light of these issues, two things must guide the inevitable changes to the U.S. IP systems in the coming decades: (1) they must remain grounded in the constitutional purpose "to promote the Progress of Science and the Useful Arts,"[361] and (2) they must account for the challenges witnessed during the previous industrial revolution.

A. Policy Considerations

The predominant argument for modern IPR is their role as incentives for the creation of new IP, particularly for patents in industries where the initial costs are high (e.g., pharmaceuticals).[362] However, the introduction of AI into these fields is likely to reduce those initial costs and potentially could disrupt IPR by producing an initial flood of eligible IP that depletes a finite

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359 Lim, *supra* note 78, at 827–30.

360 *See* discussion *supra* Section III.C.3.b.

361 U.S. CONST. art. I, § 8, cl. 8.

362 HARGREAVES, *supra* note 62, at 58.

supply of potential innovations.[363] Even in fields without a finite limit, the sheer volume of prior art theoretically available in the wake of AI-generated IP,[364] combined with the adjusted "person having ordinary skill in the art" to reflect AI capabilities,[365] would make it extremely difficult for unassisted humans to qualify under the current requirements for patent protection. Copyright protection would be similarly difficult to obtain after AI-generated works produce large quantities of variations on current themes and ideas such that any subsequent work would have difficulty avoiding substantial similarity.[366] If IPR are incredibly difficult to obtain, the incentive they provide to create new work is decreased.

At its origin, IPR allowed inventors and authors to dedicate their time to their craft without the need for a wealthy patron.[367] Modern employment at research firms, book deals with publishers, and the creation of "works for hire" have reintroduced patronage as a viable means of paying persons to create. Of course, these quasi-patrons typically receive most of the IPR in the exchange, so the IP systems are still partly responsible for payment of the inventor or author.[368] However, the value of IPR in this regard is the enablement of a dedicated class of professional inventors and authors to produce new IP. Between the potential difficulty of obtaining IPR in the wake of AI-generated IP and the unknown impact of AI on the overall economy and value of human labor, it is unlikely that current IPR will provide similar benefits in the future. If IPR are unable to permit invention or authorship as a profession and will have reduced incentive because of its difficulty to obtain, then it is likely that a greater incentive will result from various market forces rather than the current IPR system.[369] For human works, their commercial value is likely to be minimized after AI-generated works are available, so any attempt to incentivize human creativity should focus on intrinsic, rather than financial, motivations.

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[363] Ryan Abbott, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 B.C. L. REV. 1079, 1118 (2016) (noting that a finite number of combinations exist of amino acids viable to produce antibodies).

[364] *See* discussion *supra* Section III.C.3.b.

[365] *See* discussion *supra* Section IV.A.

[366] *See* discussion *supra* Section III.C.3.b.

[367] Macaulay, *supra* note 47, at 262–64.

[368] *See* discussion *supra* Section II.C.2.

[369] *See supra* text accompanying notes 142–43.

Regarding the other purpose of IPR—the propagation of knowledge—the disclosure aspect of patent law seems likely to have little relevance toward AI-generated IP beyond the underlying architecture of any AI model used to generate IP and the details of the resulting product. With issues such as the "black box" problem minimizing the value of disclosing every aspect of the AI reasoning, it appears that maximizing the access to training data for new AI would provide far more benefits than disclosing the reasoning of existing AI. Therefore, access is greater than disclosure for purposes of AI-generated IP.

For copyright law, the dissemination aspect of IPR lost nearly all relevance with the rise of the Internet. Without the need to provide a means to compensate distributors for the physical publishing and distribution of works, existing copyright protection serves as a hinderance to the dissemination of knowledge.[370] Current public attitudes regarding copyright and the frequency of minor acts of infringement on the Internet demonstrate the current imbalance between copyright protection, the public awareness of this imbalance, and the desire for access to digital works.[371]

For both patent and copyright, IPR were originally designed to minimize the barriers to accessing information to maximize the "Progress of Science and useful Arts." However, modern society has remedied the original barriers, with larger market forces discouraging trade secrecy and modern technology eliminating the economic burden of physical publication and distribution. Now, IPR stand as a barrier, granting a legal monopoly that is no longer offset by its necessity to encourage disclosure and dissemination. While IPR should obviously be rebalanced to properly reflect modern conditions, the rapid development of AI technology suggests that this balance could rapidly shift in the near future and render any current change ineffective yet again. Therefore, the focus must shift towards an alternative system entirely, as the necessity of a quid pro quo becomes negligible.

B. Practical Considerations

The largest concerns associated with IPR today are rights of attribution and rights regarding commercial exploitation. The right of attribution is tied to the European moral right of a creator in their creation and its

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370 *See* discussion *supra* Section II.B.1.

371 *Id.*

relevance is demonstrated by artistic concerns about digital art theft.[372] Additionally, it is already recognized in a limited capacity under U.S. law.[373] Particularly among younger authors, there is less stigma associated with uncontrolled distribution of their works on the Internet if accompanied by clear attribution and there is no profit motive involved.[374] This pattern is also visible for both inventions and works as open-source software and creative commons licensing become increasingly common.[375] As time progresses and older generations are replaced by newer ones, it is foreseeable that this attitude will become predominant. Therefore, future IPR must be fashioned with an emphasis on these two rights to ensure public support and avoid the ambivalence present today.[376]

While ensuring proper attribution to the IP creator appears relatively simple with minimal burden on society, the far more challenging issue is preventing commercial exploitation of IP without compensating the original creator. First, there must be a clear determination of whether AI "use" of images as training data is equivalent to the "use" protected under copyright law. By comparison, it would not be infringement for a human actor to learn to create artwork through *observation* of existing works, which is the closest analogy to the "use" in AI diffusion models. A multi-tiered system of rights based on the natural or artificial status of the actor would be difficult to enforce (e.g., false attribution to human artists to claim greater rights) and would be unable to account for future technological development and integration. If AI use categorically constitutes actionable "use" then there is a question regarding how much use constitutes exploitation (e.g., use in the training of AI to generate commercially sold IP). Presumably, the issue would best be resolved by a flexible standard aligning the IPR to general business practices and ethics in the type of business in which the use occurs, which may be absorbed into existing laws regarding fraud and unfair competition. However, a clearer standard would

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372 *See* Corrinne Ward, *Art Theft on the Internet*, RAMPAGES, https://rampages.us/wardce/art-theft-on-the-internet/ (last visited Feb. 12, 2022).

373 *See* 17 U.S.C. § 106.

374 *See generally id.*

375 *See 2017 State of the Commons*, CREATIVE COMMONS, https://stateof.creativecommons.org/ (last visited Feb. 24, 2023) (showing a tenfold increase in creative commons licensing from 2006 to 2017).

376 *See* discussion *supra* Section IV.D.

reduce litigation by encouraging settlement or summary judgment, which would benefit creators who lack the resources for prolonged litigation.

Another benefit to prioritizing rights of attribution and commercial exploitation would be to reduce the burden of enforcing the broad control currently offered by current IPR. The rise of confidentiality agreements and TPM is evidence of IPR's inability to control the unauthorized distribution of protected IP. Moreover, by eliminating broad rights to control distribution or display, the transaction costs of IP owners would be reduced.[377] Further, discouraging private technological security measures such as TPM helps to stem excessive restrictions on the access and use of information, relating back to IPR's purpose of propagation. This is particularly important with the increasingly international market and the rise of IP infringement in countries beyond the jurisdiction of national IP laws. If law cannot be relied upon to protect IP, then it may be proper to rely on "various first mover advantages, including lock-ins, branding, and networking effects" instead.[378]

The final consideration for future IPR is how to properly offset the usefulness of trade secrecy. This was the original purpose of patents, whose solution was the quid pro quo of IPR in exchange for disclosure. While advanced AI may make it more difficult to maintain trade secrecy before a competitor reverse-engineers or independently invents the invention,[379] there is nonetheless the possibility that such secrecy will rise. The favorability of trade secrecy in the UK and the increased use of confidentiality agreements suggest that secrecy will only increase in popularity as a means of circumventing the uncertainty of IPR as AI-generated inventions become widespread.[380] One effective limitation would be to require limitations on confidentiality agreements, such that secrecy could not be contractually extended to unreasonable lengths. However, this issue is extremely speculative, and it would be best to revisit trade secrecy after AI-generated inventions enter the market.

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377 *See* discussion *supra* Section II.B.1.

378 Bilski v. Kappos, 561 U.S. 593, 651 (2010) (Stevens, J., concurring).

379 18 U.S.C. § 1839(6)(B).

380 UK VIEWS, *supra* note 289 (under trade secrets).

VI. CONCLUSION

While other countries have based their IP systems on the moral right of creators and likely will struggle with philosophical and ethical concerns in response to AI-generated IP, the U.S. has a clear, constitutionally prescribed, utilitarian purpose for its IP system. That purpose—"to promote the Progress of Science and useful Arts"[381]—is independent of the systems that have been enacted to achieve the purpose. The system of IPR in the U.S. can—and should—be modified to better achieve the constitutional purpose in light of the changed circumstances of emerging technology. The twin elements of this purpose—the creation and propagation of knowledge—must not be abandoned in order to maintain the existing system of IPR. The Digital Revolution revealed various issues with the existing system by introducing IP that blurred the distinction between the categories of patent and copyright. It also significantly increased the prevalence of sequential innovation, where patent protection has a much lower incentivizing effect. Finally, it expanded the global market and allowed IP to be accessed and copied around the globe, outside the jurisdiction of national IP protection.

AI is likely to expound upon these existing issues in addition to its own challenges to the IP system. The most significant of these issues is that AI will follow the same pattern of exponential growth that human knowledge and technology has followed for centuries. As AI-generated IP is clearly possible in both technical and creative fields—meeting the technical requirements for both copyright and patent protection—AI promises to further both underlying purposes of IP while simultaneously undermining the current system of IPR. Global comments reveal that most countries and professionals are either unable or unwilling to part with the current IPR system in the face of these overwhelming challenges. In particular, the majority fail to understand that AI-generated IP will inevitably impact human-created IP, regardless of whether different systems or rights are created. Additionally, efforts to attribute AI-generated works to humans would immensely overcompensate the human, regardless of whether the user, owner, or programmer was chosen to receive the IPR.

Instead, a revolutionary change is needed to adjust our current IPR system to AI. It is likely that all areas of law will be required to make such

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[381] U.S. CONST. art. I, § 8, cl. 8.

changes eventually, with the IP system being merely one of the first. Waiting for revolutionary technology to be fully realized (e.g., general AI) before making such change will place the legal system significantly behind a technology which is bound to develop at an exponential rate from that point on. Legal uncertainty harms both AI and IP owners, and injunctions to preserve the status quo will harm all of society. Furthermore, existing dissatisfaction with IP that rose during the digital age will grow, eroding what support for IP among the public remains as they wait for solutions.

Two key concepts to keep in mind while devising new IPR are (1) adherence to the twin purposes of the IP clause and (2) accounting for the practical challenges which arose during the digital age and are foreseeable for the near future. A helpful starting point is the attitudes of inventors and authors familiar with this digitally connected society. They are less concerned with control over the distribution of their IP or any derivation that stems from it. Their primary concerns involve a right to attribution and a right to commercial exploitation of their work. The former is an easy accommodation, and the latter merely reflects proper business ethics. However, a durational limit may be imposed on the right of commercial exploitation like current IPR, potentially adjusted for the rate at which such IP is newly generated by AI. Whatever legal system is adopted in the future, it must be tailored to its utilitarian purpose and accommodate the rapid technological growth and societal change which is certain to result.