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Bowman v. Monsanto Co.: Bellweather for the Emerging Issue of Patentable Self-Replicating Technologies and Inadvertent Infringement.

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Bowman v. Monsanto Co.: A Bellwether for the Emerging Issue of Patentable Self-Replicating Technologies and Inadvertent Infringement

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ABSTRACT

The inherent tendency of patented seeds to self-replicate has led to fears that farmers might face liability for inadvertent patent infringement. To address the perceived problem, some have proposed severely limiting the availability of effective patent protection for self-replicating technologies. Typical examples include denying patent rights to "second generation" self-replicating products, and even broadly declaring such technologies ineligible for patent protection. The fact is, lawsuits against inadvertently infringing farmers remain of largely hypothetical concern. However, changes in the market could soon render such lawsuits a reality. In addressing the resulting policy concerns, Congress and the courts have at their disposal a variety of doctrinal tools that could effectively shield legitimately inadvertent infringers from liability without unduly weakening the ability of patents to incentivize investment in the development of self-replicating technologies. A failure to do so could have dramatic unintended consequences for a host of emerging self-replicating technologies in areas as diverse as synthetic biology, nanotechnology, computer software, and even space exploration. Congress and the courts have already addressed problems of inadvertent copyright infringement that have arisen with respect to software and other digitally encoded content, and some of the same fundamental principles could be recruited to address the emerging issue of inadvertent patent infringement caused by the increasing prevalence of patentable self-replicating technologies. At the same time, innovators in self-replicating technologies might need to seriously consider the implementation of technological restrictions on copying as a practical alternative to patent protection.

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INTRODUCTION

Under the judicially-created doctrine of patent exhaustion, "[T]he initial authorized sale of a patented item terminates all patent rights to *that item*."[1] In 2012, the Supreme Court of the United States granted certiorari in *Bowman v. Monsanto Co.*, a case in which the petitioner sought a dramatic expansion of the patent exhaustion doctrine. In *Bowman*, the petitioner argued that the authorized purchase of a patented product not only exhausts all patent rights with respect to the item that was the subject of the authorized sale, but also confers upon the purchaser the right to make and distribute an unlimited number of perfect copies of the item without the permission of the patent owner, and without an obligation to pay any compensation to the patent owner.[2] On its face, the petition seems almost frivolous, analogous to arguing that the purchaser of a single DVD copy of a copyrighted movie should be permitted to make an unlimited number of unauthorized copies of the movie and distribute or sell the copies without any obligation to compensate the copyright owner.

Of course, copyright law is specifically aimed at preventing the unauthorized copying of protected works, but the same principles have been applied in the context of patents. It is well established, for example, that the purchaser of a patented item is generally not authorized to reconstruct the item if it becomes damaged, let alone make new copies of it.[3] The purchaser of a patented bicycle is certainly permitted to repair the bike, but once the bicycle has worn out beyond repair she is not allowed to rebuild it, and she is certainly not authorized to use the bicycle as a template for manufacturing new copies of the bicycle without the patentee's permission.

What would prompt the Supreme Court to grant certiorari in a case raising such an argument? And why would a large contingent of amici flock to support the petitioner's facially meritless position? The answer is that this was not a case involving bicycles, but instead a product having a very special attribute. The patented product at the center of the litigation was a genetically engineered soybean, and the special attribute that distinguishes soybeans from the vast majority of patented inventions is their propensity to self-replicate.[4] Unlike bicycles, or virtually any other form of technology that has historically been the subject of patent protection, seeds have the inherent ability to serve as the template for the production of a virtually unlimited number of perfect copies of themselves, with relatively minimal, if any, active human

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1. Quanta Computer, Inc. v. LG Elecs., Inc., 553 U.S. 617, 625 (2008) (emphasis added).

2. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1768 (2013) ("Bowman . . . is asking for an unprecedented exception – to what he concedes is the 'well settled' rule that 'the exhaustion doctrine does not extend to the right to "make" a new product.'").

3. Jazz Photo Corp. v. Int'l Trade Comm'n, 264 F.3d 1094, 1102 (Fed. Cir. 2001).

4. *See Bowman*, 133 S. Ct. at 1764–65.

involvement and effort. And as we shall see, in the minds of many, this capability of self-replication can make all the difference in the world.

While *Bowman* did result in a unanimous decision clarifying that, at least as a general matter, patent exhaustion does not extend to second-generation seeds, the case should be viewed as a bellwether for an oncoming wave of controversy around the patenting of self-replicating technologies that will challenge the ability of the patent system to respond effectively. The closest analogy might be the impact that the proliferation of digitally-encoded content – e.g., movies, music, and software – has had on the copyright system. The ease with which these digitally-encoded works can be copied and distributed has enabled massive and widespread copyright infringement, and resulted in the enactment of sweeping legislation intended to bolster the copyright system.[5] Similar stresses on the patent system are on the horizon due to an increasing prevalence of self-replicating technologies. As innovators strive to appropriate the value generated by their investment in innovation, consumers and policy advocates balk at what might appear to be overly aggressive enforcement of intellectual property ("IP"), and Congress and the courts struggle to find a balance between the competing concerns.

Self-replicating technologies tend to be extremely expensive and difficult to initially create, but once developed, they are capable of directing their own replication at a low cost and with little, if any, human intervention.[6] Patents play a crucial role in incentivizing the development of self-replicating technology, but enforcement of these patents creates significant public policy concerns. The current proliferation of infringement litigation involving patented genetically modified ("GM") seeds has already resulted in a great deal of controversy. As of yet, however, the controversy has largely been limited to a single patent owner, Monsanto, and a single first-generation transgenic technology marketed by Monsanto under the trademark, Roundup Ready®.[7] As subsequent generations of patented GM seeds and plants reach the market, along with non-agricultural self-replicating products that are being developed by innovators in synthetic biology and nanotechnology, the controversy will extend well beyond Monsanto and Roundup Ready. When it does, society will be confronted with a host of compelling and potentially irreconcilable policy concerns that are largely without precedent in patent law.

The Supreme Court's decision to grant certiorari in *Bowman* highlights the fact that it is not too early for those concerned with innovation policy to

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5. *See, e.g.*, Digital Millennium Copyright Act, Pub. L. 105–304, 112 Stat. 2860 (1998).

6. *See generally* N.Y. Univ., *Self-Replication Process Holds Promise for Production of New Materials*, SCI. DAILY (Oct. 17, 2011), http://www.sciencedaily.com/releases/2011/10/111012132651.htm.

7. Roundup Ready® is a Monsanto technology based upon the recombinant introduction of a synthetic gene into a crop plant that renders the plant tolerant of the herbicide glyphosate (which is marketed by Monsanto under the trade name Roundup®). *Roundup Ready Crops*, SOURCEWATCH, http://www.sourcewatch.org/index.php/Roundup_Ready_Crops (last visited July 12, 2015).

begin giving serious thought to how the patent system will respond to the challenge of self-replicating technologies in a manner that maintains adequate incentives for innovation while addressing the specific concerns associated with patent enforcement in this area. One of the most pressing issues is the potential for inadvertent infringement inherent in many self-replicating technologies, particularly seeds like the Roundup Ready soybeans that Vernon Bowman planted and which ultimately brought him before the Supreme Court. Although Bowman himself was clearly not an inadvertent infringer, since he knowingly and intentionally took full advantage of the patented Roundup Ready technology present in the soybeans he cultivated, the potential for inadvertent infringement by other farmers appears to have played an important role in the decision to grant certiorari.[8] Significantly, the *Bowman* Court explicitly left the door open to revisiting the issue in a future case and potentially extending the doctrine of patent exhaustion under circumstances where the intent and knowledge of an accused farmer is less clear-cut.[9]

I. THE INCREASING PREVALENCE OF PATENTABLE SELF-REPLICATING TECHNOLOGIES

In *Bowman*, the Supreme Court recognized that "[self-replicating] inventions are becoming ever more prevalent, complex, and diverse."[10] This represents a new trend in patentable innovation. As one commentator recently pointed out, prior to the advent of biotechnology, "No other field (e.g. mechanical engineering, aviation, electronics; maybe with the exception of software and computer viruses) has to deal with self-replicating entities."[11] And while biological innovation has occurred since the dawn of history, as evidenced by poodles and sweet corn – neither of which bears much resemblance to the naturally occurring wolves and wild maize from which they were derived – until relatively recently the products of this innovation have, for the most part, been denied IP protection.[12] Although the situation has not changed much with respect to agricultural animals, sui generis forms of IP for plants in the form of plant patents and plant variety protection certificates became available in the United States in 1930 and 1970, respectively.[13] More recently, the availability of utility patent protection has been extended to innovative plants and seeds, both transgenic and the products of more conven-

8. *See Bowman*, 133 S. Ct. at 1769.

9. *Id.*

10. *Id.*

11. Markus Schmidt, *Do I Understand What I Can Create? Biosafety Issues in Synthetic Biology*, *in* SYNTHETIC BIOLOGY: THE TECHNOSCIENCE AND ITS SOCIETAL CONSEQUENCES 81, 92 (Markus Schmidt et al. eds., 2009).

12. An interesting exception to the general rule is Louis Pasteur's 1873 patent directed to purified yeast "free from organic germs of disease, as an article of manufacture." U.S. Patent No. 141,072 (issued July 22, 1873).

13. *See infra* Part III.

tional breeding.[14] It is this extension of utility patent protection to plants that ultimately led to *Bowman* and the current controversy surrounding the patenting of GM crops and the enforcement of patents against farmers.

The defining characteristic of living organisms that renders them self-replicating, and thus fundamentally distinct from the vast majority of patentable technologies, is genetic material – usually in the form of DNA – that encodes instructions for their own replication. The extension of patent protection to computer programs that took root in the 1980s[15] was significant in this regard, because it created an important new area of patentable technology that can reasonably be characterized as self-replicating. Like living organisms, software contains replicable code that can be used to direct the creation of copies of itself, with the computer program serving as a functional analog of the genome.[16] Although one might argue that software is not truly self-replicating, since its replication only occurs within the confines of a machine, by the same token, replication of plants is not entirely autonomous – requiring the right combination of sun, soil, water, and nutrients. Software replication results in perfect copies that can be easily disseminated, particularly since the development of the Internet, and those perfect copies can themselves serve as templates for further replication. Significantly, the replication requires little, if any, active human involvement and is extremely inexpensive and easy, relative to the cost of initially developing the software.[17] Indeed, a lobbying organization representing software companies recently acknowledged in an amicus brief filed with the Supreme Court that software can plausibly be characterized as self-replicating.[18]

The facile and largely autonomous replication of software has raised significant concerns regarding the ability of IP owners to effectively enforce their rights, but to date, these concerns have largely been restricted to the realm of copyright, not patent law. It bears noting that the policy behind the expansion of copyright protection to software that occurred in the 1970s was largely driven by the ease with which software can be used as the template for the production of perfect copies.[19] But the extension of copyright protection to software is an anomaly. As a general rule, most patentable technologies are not eligible for copyright protection. Although this author and others have written articles in support of extending copyright protection to engi-

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14. *See infra* Part III.

15. *See, e.g.*, Diamond v. Diehr, 450 U.S. 175 (1981).

16. *See* Port of Seattle v. Lexington Ins. Co., 48 P.3d 334, 338 (Wash. Ct. App. 2002).

17. *See infra* Part III.

18. Brief of BSA/The Software Alliance as Amicus Curiae in Support of Respondents, Bowman v. Monsanto Co., 133 S. Ct. 1761 (2013) (No. 11-796), 2013 WL 267020, at *13–14.

19. *See infra* Part III.

neered DNA,[20] the copyright office has taken the position that DNA is not copyrightable,[21] and, at least for the time being, that is the state of affairs. Outside the realm of software, patents will be the primary, if not the only, form of IP protection available for self-replicating technologies, and the proliferation of these technologies will increasingly challenge the existing patent system.

One of the factors driving the surge in self-replicating technologies is the increased application of the advanced tools of biotechnology to the development and commercialization of improved plants. Innovation in agriculturally significant seeds is expected to play a critical role in providing more efficient and environmentally benign processes for the production of important outputs such as food, fuel, structural materials, and high-value chemicals such as pharmaceuticals.[22] For example, agricultural biotechnology has already markedly improved productivity, particularly for some row crops such as corn, cotton, and soybeans; products that have been the primary focus of the initial applications of biotechnology crop genetics.[23] Given that agriculture is inherently destructive of the environment on many levels, any improvement that increases efficiency will ameliorate the destruction by reducing the amount of acreage necessary to yield a given amount of harvest.[24]

Agricultural biotechnology has also helped the environment by allowing farmers to use less toxic alternatives to traditional herbicides and pesticides, and by permitting farmers to use environmentally friendly farming practices such as no-till cultivation.[25] Ongoing efforts aimed at producing agricultural products that thrive on less water, or that have increased nutritional content, will further expand the benefits of agricultural biotechnology, particularly as

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20. *See, e.g.*, Christopher M. Holman, *Copyright for Engineered DNA: An Idea Whose Time Has Come?*, 113 W. VA. L. REV. 699 (2011); Andrew Torrance, *DNA Copyright*, 46 VAL. U. L. REV. 1 (2011).

21. Letter from Robert J. Kasunic, Assoc. Register of Copyrights and Dir. of Copyright Policy and Practices, U.S. Copyright Office, to author (Feb. 11, 2014) (on file with author).

22. *See, e.g.*, Dan Towery & Steve Werblow, *Facilitating Conservation Farming Practices and Enhancing Environmental Sustainability with Agricultural Biotechnology*, CONSERVATION TECH. INFO. CTR. (2010), http://www.ctic.purdue.edu/media/pdf/BioTechFINAL%20COPY%20SEND%20TO%20PRINTER.pdf; COMM. ON THE IMPACT OF BIOTECH. ON FARM-LEVEL ECONS. AND SUSTAINABILITY ET AL., IMPACT OF GENETICALLY ENGINEERED CROPS ON FARM SUSTAINABILITY IN THE UNITED STATES (2010).

23. Michael D. Edgerton, *Increasing Crop Productivity to Meet Global Needs for Feed, Food, and Fuel*, 149 PLANT PHYSIOLOGY 7, 7 (2009), http://www.plantphysiol.org/content/149/1/7.full.pdf+html.

24. For example, agriculture in the U.S. is a leading source of water pollution. *Agriculture: National Water Quality Initiative*, EPA, http://water.epa.gov/polwaste/nps/agriculture.cfm (last visited July 3, 2015).

25. Rolf Derpsch et al., *Current Status of Adoption of No-till Farming in the World and Some of Its Main Benefits*, 3 INT'L J. AGRIC. & BIOLOGICAL ENG'G 1, 1 (2010).

the population increases and the availability of arable land diminishes due to salinization and other related phenomena.[26]

The use of biotechnology to create new self-replicating technologies is by no means limited to agriculture. Other examples include live vaccines, recombinant DNA products, engineered viruses, and other engineered micro-organisms that have practical applications in a wide variety of contexts.[27] The relatively new field of synthetic biology, which many believe represents the next generation of innovation in biotechnology, will thrust the issue of self-replicating technologies front and center.[28] A significant event in this regard occurred in 2010, when Craig Venter and his team announced that they had successfully "booted up" the first entirely synthetic living organism.[29] Dr. Venter aptly characterized this tour de force of synthetic biology as "the first self-replicating cell we've had on the planet whose parent is a computer."[30]

Nanotechnology represents another important new area of technology that is predicted to result in the development of useful self-replicating products.[31] Research into macro-machines with the capability of self-replication, including self-replicating spacecraft, is also ongoing.[32] Self-replication provides many advantages, but it will also give rise to novel and largely unprecedented questions of policy, particularly with respect to IP and innovation policy.

II. INNOVATION IN SELF-REPLICATING TECHNOLOGIES REQUIRES EFFECTIVE INTELLECTUAL PROPERTY

Intellectual property spurs innovation by enabling innovators to appropriate the value created by their investment in conceiving, developing, and commercializing new technologies. Self-replicating technologies are particularly vulnerable to free-riding by copyists, rendering effective IP protection, or a functional analog such as technological restrictions on copying, critically

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26. *See generally* FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS: STATISTICS DIVISION, http://faostat.fao.org/ (last visited July 3, 2015) (for numerous links to statistical data domains).

27. *See What is Biotechnology?*, BIO, http://www.bio.org/node/517 (last visited July 3, 2015).

28. Christopher M. Holman, *Developments in Synthetic Biology Are Altering the IP Imperatives of Biotechnology*, 17 VAND. J. ENT. & TECH. L. 385, 387 (2014).

29. Logan Ward, *Craig Venter Boots up First Synthetic Cell*, POPULAR MECHANICS (May 20, 2010, 11:57 AM), http://www.popularmechanics.com/science/health/breakthroughs/synthetic-cell-breakthrough.

30. *Id.*

31. Joyce Trait, *Governing Synthetic Biology: Process and* Outcome, *in* SYNTHETIC BIOLOGY, *supra* note 11, at 141, 149 ("[D]evelopments involving active nano-systems [i.e., nanotechnology] may ultimately be self-replicating.").

32. Ralph C. Merkle, *NASA and Self-Replicating Systems: Implications for Nanotechnology*, FORESIGHT UPDATE 9, at 2 (June 30, 1990).

important for the sustenance of an optimal level of innovation. The self-replicating nature of software, for example, and the uncertainty with respect to the availability of patent protection for computer programs,[33] was a driving force in the extension of copyright protection to encompass computer programs.[34] In considering the role of IP in the development of self-replicating technologies, it is worth briefly reviewing some of the historical context surrounding this dramatic – and at the time, controversial – expansion of the scope of copyrightable subject matter.[35]

In the 1970s, Congress established a commission of experts to study and make recommendations regarding how copyright law should respond to various technological developments occurring at the time, most notably the increasing commercial significance of computer software.[36] In particular, the National Commission on New Technological Uses of Copyrighted Works ("CONTU") was asked to consider and make recommendations with respect to the question of whether computer programs could be protected under current copyright law, and, if not, whether copyright law should be amended to accommodate computer programs.[37] CONTU issued its highly influential report in 1978, which concluded not only that copyright protection for computer programs was justified both in terms of legal doctrine and innovation policy, but that computer programs were already implicitly copyrightable under both the 1976 and 1909 Copyright Acts. [38]

The ease with which software replicates was an important factor in CONTU's determination that, as a matter of policy, copyright should be extended to software. In its report, the Commission found the underlying principle of copyright to be that "if the cost of duplicating information is small, and it is simple for a less than scrupulous person to duplicate it[,] legal as well as physical protection for the information is a necessary incentive if such information is to be created and disseminated."[39] To illustrate this point, CONTU pointed out that, in the nineteenth century, when music was recorded on a brass wheel to be played on a music box, "[T]he cost of making the

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33. *See* Gottschalk v. Benson, 409 U.S. 63 (1972); Parker v. Flook, 437 U.S. 584 (1978); *see also* Diamond v. Diehr, 450 U.S. 175, 195 (Stevens, J., dissenting) (noting U.S. Patent Office policy in the early 1980s of generally rejecting patents directed towards computer programs).

34. Holman, *supra* note 20.

35. *See* Pamela Samuelson, *CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form*, 1984 DUKE L. J. 663 (1984); *see also* NATIONAL COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT 27 (1979) [hereinafter CONTU Report] (Professor Melville Nimmer arguing that copyright protection should generally not be extended to computer programs).

36. Samuelson, *supra* note 35, at 694–95.

37. CONTU Report, *supra* note 35, at 1.

38. *Id.* at 16.

39. *Id.* at 10.

wheel was inseparable from the cost of producing the final product."[40] However, with the development of easily copied magnetic tapes, legal protection for recorded music became essential, and Congress responded to this need by passing the Sound Recording Act of 1971.[41]

By the same token, CONTU found that while there was little reason to protect the wired circuit or plug boards used to communicate instructions in early computers, the ease with which modern software can be copied weighed heavily in favor of providing effective IP protection for computer programs in the form of copyright.[42] In 1980, Congress adopted the Commission's recommendation and amended the Copyright Act to include a definition of "computer programs,"[43] and courts have interpreted the amendment as signaling congressional approval for copyright protection of software.[44]

Prior to 1980, it was also unclear whether utility patent protection was available for plants and seeds. Congress addressed the free-rider problem associated with the ease with which plants can be copied by enacting sui generis protection in the form of the Plant Patent Act (1930)[45] and Plant Variety Protection Act (1970).[46] The Supreme Court later clarified that the more potent protection provided by utility patents is also available for living organisms, and plants in particular, in *Diamond v. Chakrabarty*[47] and *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.*,[48] respectively. Today's innovation in plants and seeds has become highly capital-intensive, particularly when accomplished by means of the cutting-edge tools of biotechnology,[49] and the availability of IP protection has no doubt played an important role in incentivizing the necessary investment.

Amicus briefs filed in *Bowman* by a diverse collection of stakeholders illustrate the importance of effective IP protection not only for seeds, but for self-replicating technologies in general. Indeed, amici on both sides agreed that the case had important implications for a variety of self-replicating technologies. For example, Knowledge Ecology International filed a brief in support of petitioner Bowman, warning that the Court's decision might "have unknown consequences for other forms of self-replicating technologies . . .

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40. *Id.*

41. Sound Recording Act of 1971, Pub. L. No. 92-140, 85 Stat. 391 (1971).

42. CONTU Report, *supra* note 35, at 10.

43. *See* 17 U.S.C. § 101 (2012).

44. Melville B. Nimmer & David Nimmer, 1 NIMMER ON COPYRIGHT § 2.04 (C)(1)–(2) (2015).

45. 35 U.S.C. §§ 161–164 (2012).

46. 7 U.S.C. §§ 2321–2583 (2012).

47. 447 U.S. 303 (1980).

48. 534 U.S. 124 (2001).

49. On average, a new GE trait requires an investment of $136 million and requires more than thirteen years to develop and commercialize. *Fact Sheet: Getting a Biotech Crop to Market*, CROPLIFE INT'L, https://croplife.org/wp-content/uploads/2014/04/Fact-Sheet-Getting-a-Biotech-Crop-to-Market.pdf (last visited July 3, 2015).

including on organisms, viruses, DNA, or other nanotechnologies."[50] CropLife International, filing in support of Monsanto, argued that the Court's decision would "either advance or retard the development of, and the public's access to, extraordinary new [self-replicating] inventions of tremendous social, economic, and environmental value," such as live vaccines, recombinantly engineered cells, and transgenic animals.[51]

The Software Alliance also filed a brief in support of Monsanto, pointing out that the "use of computer software typically results in creation of a temporary additional copy (or copies) of some or all of the software program in the computer's short-term memory, [which] could in some very general sense be labeled 'self-replication.'"[52] The Software Alliance argued that "application of petitioner's theory for seeds in the context of software [i.e., patent exhaustion for self-replicating technologies] would open the door to massive software piracy."[53] A diverse group of companies engaged in biomedical research, diagnostic testing, and industrial scale manufacturing filed their own joint amici brief stating that these companies had a vital interest in the outcome of the case, because a decision in favor of Bowman "would undermine innumerable existing contracts for the commercialization of patented innovations and cause significant disruption to amici's business."[54]

III. THE HISTORIC ROLE OF INTELLECTUAL PROPERTY IN AGRICULTURAL INNOVATION

Thomas Jefferson reportedly opined that "the greatest service which can be rendered to any country is to add a useful plant to its culture."[55] Unfortunately, however, throughout much of this country's history there was little incentive for private investment in the development of improved plants genetics. In the absence of IP protection for sexually reproduced plants, which was the de facto state of affairs prior to the passage of the Plant Variety Protection Act in 1970,[56] it was extremely difficult for a private seed developer to recoup an adequate return on investment in innovation. Farmers could save and replant harvested grain, and even sell progeny seeds to other farmers, severe-

50. Brief of Amicus Curiae Knowledge Ecology Int'l in Support of Petitioner, Bowman v. Monsanto Co., 133 S. Ct. 1761 (2013) (No. 11-796), 2012 WL 6203695, at *4.

51. Brief for Amicus Curiae CropLife Int'l Supporting Respondents, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 3114457, at *21.

52. Brief of BSA/The Software Alliance as Amicus Curiae in Support of Respondents, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 267020, at *13–14.

53. *Id.* at *15.

54. Brief for Agilent Technologies, Inc. et al. as Amici Curiae in Support of Respondents, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 315225, at *1.

55. Brief for American Soybean Ass'n et al. as Amici Curiae in Support of Respondents, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 315223, at *4.

56. *See* 7 U.S.C. § 2402 (2012).

ly undercutting the ability of a seed developer to charge a premium for an improved seed after an initial growing season.[57]

The first real opportunity for significant private investment in seed development occurred with the introduction of hybrid corn in the 1930s.[58] Hybrid corn varieties are the product of crossbreeding two inbred parent lines, resulting in a hybrid progeny with significantly improved genetic attributes relative to either of the inbred parents.[59] Significantly, the improved characteristics of the hybrid are generally not carried over into the next generation, i.e., hybrid crops do not reproduce "true-to-type."[60] By maintaining physical control of the inbred parent lines – supplemented by trade secret protection, which courts have found to be available for inbred seeds – a developer of an improved hybrid corn can effectively compel farmers to purchase new hybrid seed for each planting season rather than replanting saved seed.[61]

With an incentive for private investment in place, seed developers like Pioneer Hi-Bred began to invest in research and development programs that led to real and substantial improvement in the seed characteristics of hybrid corn.[62] The results speak for themselves. Between 1866 and 1930, the average national yield for corn actually decreased from 24.3 to 20.5 bushels per acre.[63] With the introduction of hybrid corn, yields in the United States increased from 26 bushels per acre in 1926 to 38 bushels per acre in 1950, and eventually to 147 bushels per acre in 2011.[64]

Unfortunately, most other important agricultural crops, such as soybean, barley, cotton and wheat, tend to self-pollinate, which results in progeny that are nearly identical to the parent plant in terms of genetics, and as such are not amenable to the value capture mechanism available to developers of hybrid corn.[65] In the absence of any effective mechanism for preventing farmers from replanting seeds gleaned from the harvest of these crops, there re-

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57. Debra L. Blair, *Intellectual Property Protection and Its Impact on the U.S. Seed Industry*, 4 DRAKE J. AGRIC. L. 297, 304 (1999).

58. *Id.* at 304–05.

59. *Id.* at 305.

60. *See* MAARTEN J. CHRISPEELS & DAVID E. SADAVA, PLANTS, GENES, AND CROP BIOTECH. 364–65 (2d ed. 2003); *see also* Jorge Fernandez-Cornejo, *The Seed Industry in U.S. Agriculture: An Exploration of Data and Information on Crop Seed Markets, Regulation, Industry Structure, and Research and Development*, USDA AGRIC. INFO. BULLETIN NO. 786, 20 (2004), http://www.ers.usda.gov/media/260729/aib786_1_.pdf ("[S]eed saved and planted from the harvest of a hybrid crop tends to diminish in yield and vigor in subsequent harvests, thus ensuring breeders a continuous market for their seed so long as other higher performing hybrid seeds do not enter the market.").

61. Blair, *supra* note 57, at 308–10; Fernandez-Cornejo, *supra* note 60, at 20.

62. Brief for CropLife Int'l, *supra* note 51, at *12.

63. Brief for American Soybean Ass'n et al., *supra* note 55, at 11 (citing USDA NASS QUICK STATS, www.quickstats.nass.usda.gov (last visited Sept. 23, 2015)).

64. *Id.* at 12–13.

65. *Id.* at 13 (citing to CHRISPEELS & SADAVA, *supra* note 60, at 368-69).

mained little incentive for investment in the improvement of crops other than hybrid corn.[66]

In 1970, Congress enacted the Plant Variety Protection Act, which for the first time provided IP protection for sexually reproduced plants, and thus at least some marginal incentive for investment in innovation of these other important crops.[67] However, significant limitations on the rights conferred by plant variety protection certificates, most notably the saved seed exemption which allows farmers to save seeds to replant during a subsequent growing season, tended to attenuate the value of plant variety protection as compared to utility patents, which at the time were generally considered unavailable for plants.[68] Although plant variety protection certificates have clearly played a role in allowing seed developers to recoup some return on investment, they have been found to provide relatively low incentives for investment due to the limitations on the scope of protection.[69]

A major breakthrough in seed innovation occurred in 1980 when, in *Diamond v. Chakrabarty*, the Supreme Court explicitly acknowledged the availability of utility patent protection for genetically engineered living organisms, and, by implication, innovative seeds and plants.[70] Private seed developers responded by substantially increasing their investment in research and development, which, between 1979 and 1982, more than doubled from $146 million to $305 million in inflation-adjusted terms.[71] By the mid-1980s, companies like Monsanto had begun investing heavily in the use of biotechnology to improve seeds, counting on the availability of utility patent protection to allow a return on investment.[72] In 1994, annual private expenditures on seed development in the United States rose to nearly $634 million, and the amount had more than tripled by 2010, reaching nearly $2 billion annually.[73]

This surge of patent-fueled investment appears to have paid off. Farmers around the world have enthusiastically adopted Monsanto's patented technology, and today the vast majority of important agricultural crops such as soybean, cotton, corn, and canola produced in the United States incorpo-

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66. Blair, *supra* note 57, at 304; Brief for CropLife Int'l, *supra* note 51, at 15–16; Jay P. Kesan & Andres A. Gallo, *Property Rights and Incentives to Invest in Seed Varieties: Governmental Regulations in Argentina*, AGBIOFORUM, http://www.agbioforum.org/v8n23/v8n23a08-kesan.htm (last visited July 12, 2015).

67. *See generally* Jay P. Kesan & Mark D. Janis, *U.S. Plant Variety Protection: Sound and Fury...?* 39 HOUS. L. REV. 727, 729-30, 742 (2002).

68. *Id.* at 774–78.

69. *Id.* at 775.

70. *See supra* Part III.

71. Kevin E. Noonan, *It Ain't Necessarily So Down on the Farm: Not All Farmers Agree with Farmer Bowman in* Bowman v. Monsanto, PATENTDOCS (Jan. 31, 2013), http://www.patentdocs.org/2013/02/it-aint-necessarily-so-down-on-the-farm-not-all-farmers-agree-with-farmer-bowman-in-bowman-v-monsant.html.

72. *See* DANIEL CHARLES, LORDS OF THE HARVEST: BIOTECH, BIG MONEY, AND THE FUTURE OF FOOD 5–6 (2001).

73. Noonan, *supra* note 71 (inflation-adjusted to constant 2006 U.S. dollars).

rate improved traits developed using biotechnology, many of which are patented by Monsanto.[74] These improvements have led to dramatic increases in productivity. Total U.S. soybean production, for example, has increased 96% since 1980, while yields per acre have increased 55%.[75] Not only have farmers and consumers benefited, but so has the environment. On a per-bushel basis, the land needed to produce a bushel of soybeans declined by 35%, soil erosion decreased 66%, irrigation water applied per unit of production decreased by 42%, fuel consumption decreased 42%, and greenhouse gas emissions declined by 41%.[76] Maintaining effective mechanisms for appropriating the value of innovation in seeds and other self-replicating technologies is imperative if such improvements are to be sustained.

IV. SELF-REPLICATING TECHNOLOGIES AND INADVERTENT INFRINGEMENT

While the availability of patent protection clearly plays a critical role in incentivizing innovation in self-replicating technologies, it has also spawned public policy concerns, including a heightened potential for inadvertent infringement. As a patented product becomes more autonomous in its own propagation and dissemination, it is more likely that a purported maker or user of the product will unintentionally engage in what might be characterized as an infringing use or manufacture of the product. Particularly problematic is the fact that with respect to many self-replicating technologies, particularly biological products such as plants and seeds, "use" of the product can be inextricably bound up with "making" of the product. As a general matter, purchasers of a product are authorized to use the product, but not to make copies of the product, [77] and when using and making become one in the same the potential for inadvertent infringement can come to the forefront. [78]

Software is an example of a non-biological self-replicating technology where making and using can be one in the same, thereby creating a potential for inadvertent infringement. The use of computer software often involves copying the program from a computer's permanent memory into temporary

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74. *Report Shows Biotech Crop Varieties Continue to be Preferred by U.S. Farmers*, BIOTECH. INDUSTRY ORGANIZATION (July 17, 2014), http://www.bio.org/media/press-release/report-shows-biotech-crop-varieties-continue-be-preferred-us-farmers; *see also* Fernandez-Cornejo, *supra* note 60, at 21, 34; Janet Carpenter & Leonard Ganassi, *Herbicide Tolerant Soybeans: Why Growers Are Adopting Roundup Ready Varieties*, 2 J. AGROBIOTECH. MGMT. & ECON. 65 (1999).

75. Keystone Alliance for Sustainable Agric., *Environmental and Socioeconomic Indicators for Measuring Outcomes of On-Farm Agricultural Production in the United States*, FIELD TO MARKET 8 (December 2012), http://www.fieldtomarket.org/report/national-2/PNT_SummaryReport_A11.pdf.

76. *Id.*

77. Jazz Photo Corp. v. Int'l Trade Comm'n, 264 F.3d 1094, 1102 (Fed. Cir. 2001).

78. *E.g.*, Religious Tech. Ctr. v. Netcom, 907 F. Supp. 1361 (N.D. Cal. 1995).

memory, which technically constitutes copyright infringement.[79] In other words, the simple act of using a lawfully purchased computer program could, in principle, subject the user to copyright infringement liability for the copying that inadvertently occurs. This has never become an issue for a variety of reasons, not the least of which is it would make little sense for software companies to sue their customers for a technical act of infringement that necessarily occurs whenever the product is used.[80] But in order to avoid any ambiguity, Congress enacted 17 U.S.C. § 117, which explicitly provides a statutory exemption from infringement liability for acts of copying that occurred in the natural course of using computer software by an authorized user.[81]

Congress has yet to legislate any statutory exception analogous to 17 U.S.C. § 117 to deal with the potential concerns associated with the inadvertent infringement of biological inventions, although, as discussed below, it is an option that might be worth considering.[82] However, it is precisely this linkage between using and making patented seeds, and thus the potential for inadvertent infringement by farmers and other users of seeds, that Bowman and his supporting amici relied on in arguing for an extension of the scope of patent exhaustion to cover the progeny seed produced in the course of using lawfully purchased authorized seed.[83] The issue has also been the subject of substantial judicial attention and academic commentary.[84]

One of the most oft-cited avenues for potential inadvertent infringement involves contamination by "genetic drift," a scenario in which patented genetically modified genetic material drifts onto an unwitting farmer's property, either in the form of pollen or seed, thereby contaminating the farmer's crop.[85] But contamination by genetic drift is not the only potential source of inadvertent infringement; there are a variety of other means by which unau-

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79. ROBERT BRAUNEIS & ROGER SCHECHTER, COPYRIGHT: A CONTEMPORARY APPROACH 46, 811 (2012); *Religious Tech. Ctr.*, 907 F. Supp. at 1368 (citing MAI Systems Corp. v. Peak Computer, Inc., 991 F.2d 511, 518 (9th Cir. 1993)).

80. Brief of Amicus Curiae Law Professor Christopher M. Holman in Support of Respondents, Bowman v. Monsanto Co., 133 S. Ct. 1761 (2013) (No. 11-796), 2013 WL 314459, at *3.

81. *Id.*

82. *See infra* Part X.

83. *See Bowman*, 133 S. Ct. at 1768.

84. *E.g.*, Organic Seed Growers & Trade Ass'n v. Monsanto Co., 851 F. Supp. 2d 544, 548 (S.D.N.Y. 2012); Monsanto Co. v. Bowman, 657 F.3d 1341, 1345–46 (Fed. Cir. 2011); Brief for Ctr. for Food Safety & Save our Seeds as Amici Curiae Supporting Petitioner, *Bowman*, 657 F.3d 1341 (No. 11-796), 2012 WL 6591149, at *38–40; Michelle Ma, Comment, *Anticipating and Reducing the Unfairness of Monsanto's Inadvertent Infringement Lawsuits: A Proposal to Import Copyright Law's Notice-and-Takedown Regime into the Seed Patent Context*, 100 CALIF. L. REV. 691, 703 (2012); Hilary Preston, Note, *Drift of Patented Genetically Engineered Crops: Rethinking Liability Theories*, 81 Tex. L. Rev. 1153 (2003); Jill Sudduth, *Where the Wild Wind Blows: Genetically Altered Seed and Neighboring Farmers*, 2001 DUKE L. & TECH. REV. 15 (2001).

85. *See generally*, Preston, *supra* note 84.

thorized patented plants might end up growing in a farmer's field and which might plausibly be characterized as inadvertent. For example, a farmer might plant seed derived from a secondary marketing channel, such as commodity grain purchased from a local grain elevator – i.e., grain that is intended to be sold as food or fodder, not as seed to be replanted – or saved seed purchased from another farmer, without knowing that the seed is covered by a patent. While the planting of the seed was intentional, a farmer could argue that his intent was merely to access an inexpensive source of seed, and that the presence of the patented trait was inadvertent.

Even if the farmer knows – or at least strongly suspects – that the seeds contain the patented trait, in a sense, any infringement that results from planting and cultivating the seeds might be characterized as inadvertent since he is arguably doing nothing more than engaging in a traditional farming practice – i.e., the planting of saved seed or commodity seed – but that due to the widespread use of patented seed in his locale, he has been effectively forced to plant seed bearing the patented trait.[86] Another scenario might be where second-generation seed from a previous planting remains in the field after harvest and germinates in a subsequent season, resulting in the unauthorized presence of a patented plant in the farmer's field, or where inadvertent contamination by patented seeds arises out of seed "commingling via tainted equipment during harvest or post-harvest activities, processing, transportation, and storage."[87]

It is generally assumed that direct patent infringement is a matter of strict liability, with no element of intent.[88] But while strict liability might be acceptable for most technologies, the ease with which seeds can spread and reproduce relatively autonomously raises serious public policy concerns if it results in farmers being exposed to liability for the mere presence of patented plants on the farmer's property, without the farmer purposefully intending that the patented material be in his fields. In some cases, the presence of patented plants will not necessarily benefit the farmer, which would compound the inequity of holding the farmer liable. In fact, far from being a benefit, a farmer who does not wish to grow genetically modified crops in his field could characterize the "infringement" as a harmful contamination.[89]

Another objection to holding farmers liable for inadvertent infringement is that it could interfere with the ability of farmers to engage in what many would characterize as traditional farming practices.[90] For example, plant variety certification under the Plant Variety Protection Act explicitly allows farmers to save and replant progeny seeds, but the practice could subject the

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86. This was essentially Bowman's argument. Monsanto Co. v. Bowman, 686 F. Supp. 2d 834, 835–36 (S.D. Ind. 2009).

87. Organic Seed Growers & Trade Ass'n v. Monsanto Co., 718 F.3d 1350, 1357 (Fed. Cir. 2013).

88. *See infra* note 206 and accompanying text.

89. *Organic Seed Growers*, 718 F.3d at 1360.

90. *Id.*

farmer to liability for patent infringement.[91] Liability for inadvertent infringement also impedes the ability of farmers to plant commodity grain obtained from a grain elevator, or to plant brownbag seed harvested and resold by other farmers, again, arguably traditional farming practices.[92]

V. THE MYTH THAT MONSANTO IS SUING FARMERS FOR INADVERTENT INFRINGEMENT

While the self-replicability of seeds undoubtedly creates the potential for lawsuits against inadvertently infringing farmers, the problem seems to remain a largely hypothetical one. In spite of a widespread perception that Monsanto is in the habit of suing farmers for inadvertent infringement, fueled largely by inaccurate reports in print and on the Internet, after diligent inquiry this author has been unable to find a single clear and documented example of such an occurrence. Given the large number of lawsuits Monsanto has filed against farmers, it would be exceedingly difficult to absolutely rule out the possibility of inadvertent infringement in each of these cases.[93] However, this author has attempted by various means to identify examples of such an occurrence and has concluded that the evidence supporting the proposition that Monsanto has sued farmers for inadvertent infringement of seed patents is, at best, weak.

One of the most oft-cited "examples" of Monsanto allegedly suing a farmer for inadvertent infringement is the case of *Monsanto Canada Inc. v. Schmeiser*, which involved a Canadian farmer sued for infringing use of Roundup Ready canola.[94] Although the myth that Schmeiser was the victim of inadvertent infringement caused by seeds "drifting" onto his property has taken strong root in popular culture,[95] anyone who actually reads the decisions issued by the Canadian courts will find that the Canadian judges were

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91. *See* Kesan & Janis, *supra* note 67, at 751.

92. *See infra* Part VII.D.

93. According to a study conducted by the Center for Food Safety, a non-profit public interest group highly critical of Monsanto and agricultural biotechnology, as of November 28, 2012, Monsanto had filed 142 patent infringement lawsuits involving 410 farmers and 56 small farm businesses in 27 states. *Monsanto v. US Farmers: 2012 Update*, CTR. FOR FOOD SAFETY (2012), http://www.centerforfoodsafety.org/files/monsanto-v-us-farmer-2012-update-final_98931.pdf.

94. Monsanto Can. Inc. v. Schmeiser, [2004] 1 S.C.R. 902 (Can.).

95. *See, e.g.*, *Myth: Monsanto Sues Farmers When GMOs or GM Seed is Accidentally in Their Fields*, MONSANTO, http://www.monsanto.com/newsviews/Pages/gm-seed-accidentally-in-farmers-fields.aspx (last visited July 3, 2015); JANISSE RAY, THE SEED UNDERGROUND: A GROWING REVOLUTION TO SAVE FOOD 116–17 (2012) ("The Schmeisers had been afflicted with something known as 'genetic drift,' the billowing of seedmatter by wind from neighboring farms onto their own."); Erica (last name unknown), *Plant Sex: Open Pollinated, Hybrid and GMO Seeds*, NORTHWEST EDIBLE LIFE (Jan. 17, 2013), http://www.nwedible.com/2013/01/plant-sex-open-pollinated-hybrid-and-gmo-seeds.html.

unambiguously convinced by the evidence that Percy Schmeiser was not the victim of drift and inadvertent contamination, but rather a disingenuous and willful patent infringer who had taken affirmative steps to intentionally infringe Monsanto's patents.[96]

Although it is difficult to entirely rule out the possibility of inadvertent infringement in any of the lawsuits filed by Monsanto, it does seem clear that no case brought by Monsanto against farmers that has been decided at the appellate level in the United States has involved a farmer who could plausibly claim to be the victim of inadvertent infringement. To the contrary, in each case it was clear that the farmer knew he was planting patented technology without Monsanto's authorization and intended to benefit from the use of the technology without paying for it. For example, the Federal Circuit explicitly pointed out that Bowman had signed a Pioneer Hi-Bred technology agreement, with language and restrictions identical to the Monsanto technology agreement, and then proceeded to plant second-generation seed he obtained from a local grain elevator from 1999 through 2007.[97] Bowman also benefited from the technology by applying glyphosate to his crops. In fact, he was quite open about his purposeful use of the patented technology, candidly reporting it to Monsanto.[98]

Prior to *Bowman*, the Federal Circuit decided four other cases involving infringement of Monsanto's seed patents by farmers, none of which would support a plausible argument of inadvertent infringement. The first of these, *Monsanto Co. v. Ralph*, involved a farmer who purchased Roundup Ready soybean seeds and cotton seeds, signed a Technology Agreement stipulating that he would not replant progeny seeds, and then proceeded to do just that during multiple growing seasons.[99] Not only was Ralph's infringement intentional and calculated to take full benefit of the patented technology without paying for it, the farmer demonstrated dishonesty throughout the proceedings, a recurring theme in a number of the litigations this author reviewed.[100] For

96. *See Schmeiser*, [2004] 1 S.C.R. 902, at para. 6, 87; Organic Seed Growers & Trade Ass'n v. Monsanto Co., 851 F. Supp. 2d 544, 553 (S.D.N.Y. 2012); Dan Charles, *Top-Five Myths of Genetically Modified Seeds, Busted*, NPR (Oct. 18, 2012), http://www.npr.org/blogs/thesalt/2012/10/18/163034053/top-five-myths-of-genetically-modified-seeds-busted (Canadian judges were convinced that "Schmeiser intentionally planted Roundup Ready canola."); Alan McHughen & Robert Wager, *Popular Misconceptions: Agricultural Biotechnology*, 27 NEW BIOTECH. 724, 726 (2010).

97. Monsanto Co. v. Bowman, 657 F.3d 1341, 1345–46 (Fed. Cir. 2011).

98. *Id.*

99. Monsanto Co. v. Ralph, 382 F.3d 1374, 1377–78 (Fed. Cir. 2004).

100. *See, e.g.*, Monsanto Co. v. Hargrove, No. 4:09-CV-1628 (CEJ), 2011 WL 5330674, at *4 (E.D. Mo. Nov. 7, 2011) ("Defendants' behavior during this litigation (which resulted in their answer being stricken and their default for failing to comply with the court orders) prevented plaintiffs from conducting discovery as to defendants' size and financial condition, the duration of defendants' misconduct, defendants' motivation for harm, and whether defendants attempted to conceal their misconduct."); Monsanto Co. v. Roman, No. Civ.A. 103CV068-C, 2004 WL 1107671, at *8

example, Ralph made numerous misrepresentations to the court, including representing under oath that he did not save any seed, a lie that he only recanted after the district court judge confronted him with evidence to the contrary.[101] He also violated court orders, destroyed evidence, and engaged in intentional obstructions of the discovery process, which the court found had forced Monsanto to take depositions that would not have been necessary if Ralph had cooperated.[102]

The next case decided by the Federal Circuit, *Monsanto Co. v. Scruggs*, involved another farmer who purchased Roundup Ready soybean seeds and cotton seeds, and then proceeded to harvest and replant progeny second-generation seeds without Monsanto's permission, a violation of the terms Monsanto requires of all farmers using its technology.[103] Scruggs did not sign the technology agreement, but he clearly understood he was violating Monsanto's patents, and his only defense was based on arguments that Monsanto's patents did not cover progeny seed, arguments that have been rejected by the Federal Circuit.[104]

The next case, *Monsanto Co. v. McFarling*, involved another farmer that had purchased patented seed, signed the Technology Agreement agreeing not to replant progeny seed, and then proceeded to do so in subsequent growing seasons without paying the license fee.[105] Finally, *Monsanto Co. v. David* involved a farmer who had not purchased a sufficient amount of Roundup Ready soybeans to completely plant his soybean fields, and who then proceeded to apply a large amount of glyphosate-based herbicide to his fields "that would destroy any plants that did not contain the Roundup Ready gene, and would therefore have destroyed any conventional soybean seed David planted."[106]

In an attempt to identify a case involving an inadvertently infringing farmer that perhaps never made it to the appellate level, I searched the Westlaw database for any reported decision arising out of a lawsuit filed by Monsanto against a farmer for infringement of a seed patent, but after reviewing each of those decisions – and the complaints when available on Westlaw – I could not find a single example in which a farmer credibly argued inadvertent infringement.[107] To the contrary, it appeared to be the case that in the vast majority, if not all, of the cases, the farmer is at least aware of the fact that he is infringing. In most cases there is evidence that the farmer was tak-

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n.15 (N.D. Tex. May 17, 2004) ("Roman does claim in his Response to have signed a license agreement in 1996, although there is evidence from his own deposition testimony that he never signed any such agreement.").

101. *Ralph*, 382 F.3d at 1378.

102. *Id.* at 1378–79.

103. Monsanto Co. v. Scruggs, 459 F.3d 1328, 1333 (Fed. Cir. 2006).

104. *See id.* at 1334–35.

105. Monsanto Co. v. McFarling, 488 F.3d 973, 976 (Fed. Cir. 2007).

106. Monsanto Co. v. David, 516 F.3d 1009, 1012 (Fed. Cir. 2008).

107. I performed and analyzed Westlaw federal courts database searches in July 2014 for reported decisions and complaints filed by Monsanto.

ing advantage of the patented technology, e.g., spraying his fields with herbicide that would kill his crops in the absence of the patented technology.

Furthermore, it seems clear that I am not the only legal researcher who has been unable to find such a case. The fact that so many opponents of Monsanto continue to incorrectly point to Percy Schmeiser as the leading example of a farmer sued by Monsanto for inadvertent infringement implies that those making the allegation are not aware of any actual example of a lawsuit filed by Monsanto based on inadvertent infringement. There are numerous public interest organizations vehemently opposed to Monsanto who have had a strong interest in finding such a case, but they have apparently been unable to do so.

The Public Patent Foundation ("PubPat") is a good example of an apparently sophisticated and competent legal organization highly motivated to identify a case of a farmer being sued for inadvertent infringement.[108] In *Organic Seed Growers*, PubPat brought a lawsuit on behalf of a number of organizations representing organic farmers and others seeking to invalidate a large number of Monsanto patents relating to biotechnology and agriculture, including a number of patents on seeds.[109] In an attempt to establish standing, PubPat claimed that the plaintiff farmers faced the threat of being sued for inadvertent infringement.[110] But in denying standing, the district court found that although the "plaintiffs allege without specification that [Monsanto has] accused certain non-intentional users of Monsanto's seed of patent infringement and threatened them with [litigation, no] plaintiffs claim to have been so threatened."[111] Although the complaint purported to identify specific lawsuits that had been filed against farmers who had not intentionally planted patented Monsanto seeds, none of whom were plaintiffs in the case, the district court found this assertion to be "belied by the decisions in the suits against the referenced individuals."[112] In fact, the cases cited in the complaint as supposed examples of Monsanto suing inadvertently infringing farmers invariably involved a defendant charged with intentionally saving and replanting second-generation patented seeds or inducing others to infringe Monsanto's patents.[113]

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108. PubPat lawyers had the wherewithal to successfully challenge the patent eligibility of so-called gene patents in the Supreme Court in *Association for Molecular Pathology v. Myriad Genetics*, 132 S. Ct. 1794 (2012). Association For Molecular Pathology v. Myriad Genetics, ACLU (June 13, 2013), https://www.aclu.org/cases/association-molecular-pathology-v-myriad-genetics.

109. Organic Seed Growers & Trade Ass'n v. Monsanto Co., 718 F.3d 1350, 1352 (Fed. Cir. 2013).

110. *Id.* at 1354.

111. Organic Seed Growers & Trade Ass'n v. Monsanto Co., 851 F. Supp. 2d 544, 553 (S.D.N.Y. 2012).

112. *Id.* at 552.

113. *Id.* Examples of cases found to be mischaracterized by plaintiffs included *Monsanto Co. v. Parr*, 545 F. Supp. 2d 836, 842–44 (N.D. Ind. 2008) ("[D]efendant intentionally induced others to infringe Monsanto's patents"); *Monsanto Co. v. Nel-*

Another public interest organization highly motivated to identify specific instances of lawsuits based on inadvertent infringement is the Center for Food Safety ("CFS"), which filed an amicus brief with the Supreme Court in support of Bowman.[114] The brief alleges that Monsanto has "sued farmers . . . in cases where their fields were potentially contaminated by pollen or seed from someone else's transgenic crop; [and] when transgenic seed from a previous year's crop sprouted, or 'volunteered,' in fields planted with conventional varieties the following year."[115] No specific examples are provided in the brief, which instead cites to a 2005 report prepared by CFS entitled *Monsanto vs. U.S. Farmers*.[116] A close inspection of the specific examples cited in the 2005 report reveals that they provide, at best, weak support for the idea that Monsanto has sued inadvertent infringers.[117]

Monsanto vs. U.S. Farmers provides only one example of a farmer supposedly sued for infringement based on genetic drift – which the report refers to as "biological contamination" – and that farmer was Percy Schmeiser.[118] The Canadian courts found Schmeiser to be anything but an inadvertent infringer.[119] The report goes on to characterize a lawsuit filed by Monsanto against a farmer named Hendrik Hartkamp as "[o]ne of the more drastic examples of a riches to rags story as the result of prosecution by Monsanto."[120] Although the report characterized Hartkamp's unauthorized use of Monsanto's patented technology without a license as "entirely unwitting," the judge who decided the case issued an order which found as a matter of undisputed fact that "after the 1999 soybean crop emerged, [Hartkamp] sprayed the crop with Roundup Ultra herbicide," and that he "did not obtain either a license or other authorization from Monsanto to plant Roundup Ready soybean seed in either 1998 or 1999."[121]

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son, No. 4:00-CV-1636, 2001 U.S. Dist. LEXIS 25132, at *2 (E.D. Mo. Sept. 10, 2001) (Monsanto alleged that defendants violated their licensing agreement by intentionally saving and replanting second generation seed with patented traits); and *Monsanto Can. Inc. v. Schmeiser*, [2001] F.C.T. 256, para. 120 (Can.) (the trial court found that the defendant had saved and planted seed "he knew or ought to have known was Roundup tolerant").

114. Brief for Food Safety and Save our Seeds as Amici Curiae Supporting Petitioner, Bowman v. Monsanto Co., 133 S. Ct. 1761 (2013) (No. 11-796), 2012 WL 6591149.

115. *Id.* at *15–16.

116. *Id.* at *1–2; *see Monsanto vs. U.S. Farmers*, CTR. FOR FOOD SAFETY (2005), http://www.centerforfoodsafety.org/files/cfsmonsantovsfarmerreport11305.pdf.

117. Brief for Food Safety and Save our Seeds, *supra* note 114.

118. *Monsanto vs. U.S. Farmers, supra* note 116, at 38.

119. *Id.*

120. *Id.* at 42.

121. Monsanto Co. v. Hartkamp, No. 00-164-P, 2001 WL 34079482, at *1 (E.D. Okla. Apr. 19, 2001).

The case cited in *Monsanto vs. U.S. Farmers* wherein it is hardest to absolutely rule out inadvertent infringement is *Monsanto Co. v. Eaton*.[122] The report suggests that the widespread presence of unauthorized Roundup Ready soybeans in Eaton's field was likely caused by "crop volunteers," i.e., plants in a field resulting from "seed that has not been deliberately sown; typically seeds that failed to germinate in the previous season or that fall from a plant prior to harvest."[123] It is true that the district court, on a motion for summary judgment filed by Monsanto, could not rule out the possibility that a jury might find that the high level of patented plants found in Eaton's fields were "crop volunteers."[124] But the judge also pointed out that some of the assertions made by the defendant were "not quite accurate," or "not completely accurate."[125] Although the judge found it possible that a jury might not necessarily conclude that the infringement was caused by Eaton intentionally planting patented seeds, the court explicitly acknowledged that "this is an extremely close call." [126] For example, the court noted that the defendant's own expert witness had testified that in his opinion, "[T]o a reasonable degree of scientific certainty, the appearance of 'volunteers' in defendant's field was 'extremely unlikely to account' for the extensive presence of Roundup Ready soybeans in the farmer's fields."[127] And while Eaton alleged that he had sprayed his fields with non-glyphosate herbicide, Monsanto made specific allegations that Eaton had purchased Roundup that year, implying that he in fact did use glyphosate.[128] On motion for summary judgment, the judge did not have to decide this factual dispute, and ultimately the case settled before trial.[129]

It seems reasonable to assume that CFS is unaware of any more recent cases involving a plausible claim of inadvertent infringement, since the only examples it could provide in its 2013 amicus brief were those referenced in the 2005 *Monsanto vs. U.S. Farmers* report. Furthermore, there would seem to be a number of excellent lawyers eager to challenge Monsanto's assertion of patents against farmers, including both Professor Mark Lemley of Stanford, who argued before the Federal Circuit on behalf of the accused farmer in *Monsanto Co. v. McFarling*,[130] or the attorneys at PubPat. If a case clearly presenting a plausible argument of inadvertent infringement was to present itself, would not one of these attorneys jump at the opportunity to pursue the case to the appellate level?

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122. Monsanto Co. v. Eaton, No. 4:00-CV-00435 (E.D. Mo. July 6, 2001).
123. *Monsanto vs. U.S. Farmers, supra* note 116, at 4.
124. *Eaton*, No. 4:00-CV-00435, slip op. at 19–20.
125. *Id.*, slip op. at 15.
126. *Id.*, slip op. at 19 n.13.
127. *Id.*
128. *Id.*, slip op. at 9–10.
129. *Monsanto vs. U.S. Farmers, supra* note 116, at 42.
130. Monsanto Co. v. McFarling, 488 F.3d 973 (Fed. Cir. 2007).

VI. AN INCREASING LIKELIHOOD OF ACTUAL LAWSUITS INVOLVING INADVERTENT INFRINGEMENT

The dearth of lawsuits against inadvertently infringing farmers might be attributable, at least in part, to discretion and forbearance on the part of Monsanto. For its part, Monsanto has publicly committed "to [never] exercise its patent rights where trace amounts of [its] patented seeds or traits are present in a farmer's field as a result of inadvertent means."[131] This commitment played a pivotal role in the Federal Circuit's decision to dismiss *Organic Seed Growers* due to the plaintiff's lack of standing, with the court finding that Monsanto is bound by the commitment as a matter of judicial estoppel.[132] Still, Monsanto's stated commitment only extends to "trace" levels of contamination, and at this point it is unclear what level of contamination would be deemed by Monsanto to exceed trace levels, and how Monsanto might respond to inadvertent infringement that it believes exceeds that threshold. In *Organic Seed Growers*, the Federal Circuit pointedly noted that during oral argument, "Monsanto's counsel was quite careful never to represent that Monsanto would forgo suit against a grower who harvested and replanted windblown seeds—even if that grower gained no advantage by doing so" – for example, by a farmer that does not spray herbicide on a patented, herbicide resistant crop inadvertently growing on the farmer's field.[133]

The nature of the patented trait that has been the subject of all of Monsanto's enforcement actions to date has likely played a role in this regard. After reviewing the numerous lawsuits filed by Monsanto against farmers that have resulted in a decision reported on Westlaw,[134] I have been unable to identify a single one that did not involve an allegation that a farmer had illicitly planted seeds containing the Roundup Ready trait. The reason this is significant is that the value of Roundup Ready only manifests itself when the farmer performs the overt act of spraying his fields with glyphosate – i.e., Roundup – which, in the absence of the Roundup Ready trait, would kill his crops.[135] It would be irrational for a farmer to spray glyphosate on his field of soybeans unless he knows that at least a substantial percentage of those soybeans bear the Roundup Ready trait. Moreover, if it can be shown that a farmer has sprayed his crops with glyphosate, it becomes difficult for him to persuasively argue that he was not aware he was infringing, and indeed, that infringement was not his desired objective.

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131. *Monsanto's Commitment: Farmers and Patents*, MONSANTO, http://www.monsanto.com/newsviews/Pages/commitment-farmers-patents.aspx (last visited July 12, 2015).

132. Organic Seed Growers & Trade Ass'n v. Monsanto Co., 718 F.3d 1350, 1358 (Fed. Cir. 2013).

133. *Id.* at 1359 n.6.

134. *See supra* note 100 and accompanying text.

135. *See supra* note 7 (Glyphosate is a broad spectrum herbicide and is as toxic to non-Roundup Ready soybeans as it is to weeds).

The situation, however, might become more complicated in the not too distant future as advances in technology and developments in the market render it increasingly likely that infringement lawsuits will be filed in cases where it is more difficult to prove that a farmer has taken overt action unambiguously establishing the intentional use of patented technology, or even knowledge that a patented plant is growing in the farmer's field. Various factors that increase the likelihood of a lawsuit under circumstances of inadvertent infringement, or at least in which it seems plausible that the infringement was inadvertent, are discussed in this Part.

A. "Generic" Roundup Ready

One factor that could lead to lawsuits against arguably inadvertently infringing farmers is the imminent expiration of the patents on the Roundup Ready trait in soybeans and the anticipated commercialization of "generic" Roundup Ready seeds. Monsanto's patents covering the original Roundup Ready trait – now referred to as "first-generation Roundup Ready," or "Roundup Ready 1" – will expire by 2015, ending Monsanto's legal right to exclusivity.[136] The company has already developed and released a next-generation glyphosate tolerance trait, which it markets as Roundup Ready 2.[137] However, Monsanto is also cooperating with non-Monsanto seed developers in order to make it possible for them to incorporate the first-generation Roundup Ready trait into their seeds, which will not be covered by any active Monsanto patent.[138] In effect, for the first time, generic versions of a genetically modified crop could become available to farmers.

If generic Roundup Ready seeds do enter the market, they will coexist with Monsanto's Roundup Ready 2, which is covered by its own patents.[139] Under this scenario glyphosate-tolerance will no longer equate with patented technology, and a farmer found to have cultivated seeds containing patented Roundup Ready 2 seeds, perhaps obtained as commodity seed from a local grain elevator, might plausibly argue that he only sought to take advantage of generic Roundup Ready and did not intend to benefit from any inadvertent, and arguably unavoidable, presence of Roundup Ready 2-containing seeds in his field.

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136. *Roundup Ready Soybean Patent Expiration*, MONSANTO, http://www.monsanto.com/newsviews/pages/roundup-ready-patent-expiration.aspx (last visited July 12, 2015).

137. *Genuity Roundup Ready 2 Yield Soybeans: More Beans Per Pod, More Bushels Per Acre*, MONSANTO, http://www.monsanto.com/products/pages/genuity-roundup-ready-2-yield-soybeans.aspx (last visited July 12, 2015).

138. American Seed Trade Ass'n and Biotech. Indus. Org., *The Accord: Generic Event Marketability and Access Agreement is Open for Signature* (Oct. 31, 2012), http://www.agaccord.org/include/facts.pdf.

139. *Roundup Ready Soybean Patent Expiration: Commitments*, MONSANTO, http://www.soybeans.com/commitments.aspx (last visited July 12, 2015).

B. Passively Beneficial Traits

A second factor that could lead to inadvertent infringement lawsuits will be the increasing commercialization of patented transgenic traits that do not require a farmer to take any overt action to experience the benefit of the technology, such as insect resistance and drought tolerance. This will render it more difficult to prove that a farmer has intentionally used and benefited from the patented technology.[140] Although insect resistant soybeans are currently not commercially available in the United States, Dow AgroSciences recently reported U.S. approval of an insect resistant trait comprising two genes providing insect resistance,[141] and Monsanto is currently exploring "how [insect resistant] soybeans could fit into the U.S. agricultural landscape."[142] A farmer found to be infringing a patent on such a trait by using commodity grain as seed, for example, might argue that he was simply trying to save money by obtaining a cheap source of seed and had no intention of using the patented technology built into the seed. In fact, the farmer could argue that the patentee's own actions had rendered infringement unavoidable by encouraging neighboring farmers to adopt the patented technology, effectively pushing the technology into the local grain elevators.

C. Trait Stacking

The first genetically modified crops contained a single trait, e.g., glyphosate tolerance or insect resistance.[143] But as the market matured, seed companies began to develop more and more seeds containing stacked traits, i.e., multiple patented genetic modifications incorporated into the same seed.[144] One vision for the future of the seed industry is that seed developers will license in a variety of traits, perhaps patented and licensed by different firms, and farmers will be able to choose seeds incorporating the combination of traits that best suits their needs.[145] Some of the traits might be off-patent like Roundup Ready 1.

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140. *Plant Biotechnology Pipeline*, CROPLIFE INT'L (June 2014), http://croplife.org/wp-content/uploads/2014/06/Plant-Biotech-Pipeline-2014.pdf.

141. Rich Keller, *Dow Two-Bt Soybean Insect-Resistant Trait Approved*, AG PROFESSIONAL (May 1, 2014), http://www.agprofessional.com/news/Dow-two-Bt-soybean-insect-resistant-trait-approved-257548091.html.

142. Emily Unglesbee, *Soybeans: Monsanto Assessing Fit of Bt Varieties in U.S. — DTN*, AGFAX (Sept. 6, 2014), http://agfax.com/2014/03/05/soybeans-monsanto-assessing-fit-bt-varieties-u-s-dtn/#sthash.JqgD3OUE.dpuf.

143. Natasha Gilbert, *Case Studies: A Hard Look at GM Crops*, NATURE (May 1, 2013), http://www.nature.com/news/case-studies-a-hard-look-at-gm-crops-1.12907.

144. *Sorting Out the Facts Behind Stacks*, MONSANTO, http://www.monsanto.com/newsviews/Pages/gene-stacks-facts.aspx#q9 (last visited July 12, 2015).

145. *Id.* Also my personal communications with management of agricultural biotechnology companies.

The result could be an increasingly heterogeneous seed population, with some farmers growing non-GMO crops, others using seeds containing only off-patent traits, and the rest using seeds incorporating one or more patented traits, possibly in combination with non-patented generic traits. Unless grain elevator operators start sequestering the seeds based on the presence of traits, which will become increasingly infeasible as the heterogeneity increases, commodity seeds will represent a collection of patented and non-patented traits. It will become impossible for a farmer to purchase commodity seeds without inadvertently having some percentage comprising a variety of patented traits, perhaps with the patents owned by different patent owners.

D. Planting of Commodity Grain

Another factor that might contribute to an increased likelihood of a lawsuit based on possibly inadvertent infringement would be if farmers begin to make greater use of commodity grain as a source of seed. This is what Bowman did that resulted in his infringement of Monsanto's patents, illustrating that such a practice is at least feasible for farmers.[146] Bowman clearly knew and benefited from the presence of the patented Roundup Ready trait in the commodity soybeans he planted, but one can imagine scenarios in which a farmer using commodity grain as an inexpensive source of seed might not realize that the seed contains patented traits, and have no intent to benefit from the presence of the patented traits. This becomes more likely as more traits are stacked into plants, particularly traits that are not patented or that do not require any overt action, such as the application of herbicide to benefit from the trait.[147]

Some would argue that a farmer who plants commodity grain is simply engaging in a practice that has long been in the public domain. But if the use of patented GM technology becomes very prevalent, as a practical matter it could become very difficult, if not impossible, to purchase commodity or saved seed that does not contain the patented technology. As a consequence, a farmer might know that patented technology is in the seeds, but, with no desire or intention to use the technology, plausibly argue that any infringement that occurs is inadvertent and unavoidable. This might particularly be the case if the patented trait is one which does not require an overt act by the farmer evidencing the fact that the farmer is aware of, and actively seeks to benefit from, the technology.

The extent to which inadvertent infringement based on the planting of commodity grain will become a problem depends upon the extent to which farmers actually engage in the practice. Amicus briefs filed with the Supreme Court in *Bowman* reveal a division of opinion on this point. For his part, Bowman argued that the use of commodity grain constituted an important

146. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1763 (2013).

147. *See supra* Part VII.B–C.

traditional farming practice that "growers have done for generations."[148] But according to a number of amici who filed briefs with the Supreme Court in support of Monsanto, including organizations representing grain elevator operators, mainstream farmers, and seed companies, the planting of commodity seeds is in fact not a practice engaged in by the vast majority of farmers.[149]

CHS Inc., for example, a farmer-owned cooperative whose operations comprise an integrated network of elevators, marketing offices, and export terminals, argued in its amicus brief that the use of commodity grain as seed is neither a traditional nor a common practice among farmers, largely because commodity grain is inferior to the seed farmers normally purchase from commercial vendors.[150] An amicus brief filed on behalf of growers of soybeans, corn, wheat, and sugar beets echoed the point that the planting of commodity grain is an unorthodox practice fraught with risk due to the lack of verification or certification with respect to germination rate or seed maturity, along with the potential for contamination by crop residue, foreign matter, and weed seeds – "the soybean's natural enemy."[151] Another amicus, seed developer Pioneer Hi-Bred, argued that Bowman's planting of commodity seed violated a variety of state and federal laws, including the Plant Variety Protection Act.[152] Bowman himself acknowledged that "the use of commodity grain as seed is occasional," admitting that commodity seeds will generally result in a significantly smaller yield, due to factors such as lack of uniformity in maturity, decreased disease resistance, and the absence of other beneficial traits typically provided in commercially supplied seeds.[153]

Still, Monsanto apparently deemed Bowman's unauthorized planting of commodity seed of sufficient commercial significance to warrant the filing of a lawsuit, which suggests that the potential for inadvertent infringement based on the planting of commodity grain is not an issue so insubstantial that it can be dismissed out of hand. Indeed, in its brief, CHS Inc. argued that if the Supreme Court had ruled in favor of Bowman, it could encourage other farmers to adopt the practice on a larger scale, which would in turn "disincentive innovators from investing in the development of new genetically enhanced seed."[154]

Furthermore, even if the planting of commodity grain is not a common practice today, the widespread adoption of GM technology could be increasing the incentives in favor of commodity seed planting. For example, genetic

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148. Brief of Defendant-Appellant Vernon Hugh Bowman, *Bowman*, 133 S. Ct. 1761 (No. 11–796), 2011 WL 882003, at *6.

149. *See, e.g.*, Brief for American Soybean Ass'n et al., *supra* note 55, at *31.

150. Brief for Amicus Curiae CHS Inc. in Support of Respondents, *Bowman*, 133 S. Ct. 1761 (No. 11–796), 2013 WL 315222, *2.

151. *See* Brief for American Soybean Ass'n et al., *supra* note 55.

152. Brief for Pioneer Hi-Bred Int'l, Inc. as Amicus Curiae Supporting Respondents, *Bowman*, 133 S. Ct. 1761 (No. 11–796), 2013 WL 315224.

153. Brief of Defendant-Appellant Vernon Hugh Bowman, *supra* note 148 at *6.

154. *See* Brief for Amicus Curiae CHS Inc., *supra* note 150, at *3.

modification has dramatically increased the value of soybeans for use as seed relative to their value for use as food or fodder. Seed companies are able to charge a great deal more for the seed than they could in the past, but farmers are not able to charge more for the resulting commodity grain sold for use as food. As a result, the disparity in price between soybeans sold as seed versus soybeans sold as food continues to increase. The greater this price differential, the more incentive a farmer will have to buy commodity grain priced for sale as food, and then take advantage of its high value for use as seed by planting it.

Another scenario that could incentivize commodity seed planting would be if we arrive at a point where farmers do not perceive a great differential in value between the latest patented trait and earlier versions of the trait that have gone off-patent. For example, farmers could decide that there is insufficient additional value present in the next-generation Roundup Ready 2 product to warrant the price differential and choose to use generic Roundup Ready 1 products instead. If a substantial number of neighboring farmers are using generic Roundup Ready 1, a farmer might plausibly argue that he is planting commodity seed in the expectation that it will contain the generic Roundup Ready trait rather than patented Roundup Ready 2.

VII. PROPOSED SOLUTIONS TO THE PROBLEM OF INADVERTENT INFRINGEMENT WOULD DENY SELF-REPLICATING TECHNOLOGIES EFFECTIVE PATENT PROTECTION

The belief that patents on self-replicating technologies will lead to inadvertent infringement has generated a number of proposals that would address the perceived problem in a manner that threatens to dramatically undercut the ability of the patent system to incentivize innovation in fields that generate self-replicating products, such as biotechnology, nanotechnology, and perhaps even software. Some of these proposals are described in this Part.

A. Patent Exhaustion

In *Bowman v. Monsanto Co.*, the infringing farmer and a number of supporting amici urged the Court to extend the judge-made doctrine of patent exhaustion to cover second-generation progeny of patented seeds, arguing that such an extension is necessary in order to shield farmers from liability for inadvertent infringement.[155] By implication, this extension of the exhaustion doctrine might well be applied to other self-replicating technologies outside the realm of plants and living organisms.[156] The Supreme Court declined this invitation to extend the doctrine, based on the facts of the case which included unquestioned intentional and knowing infringement on the part of Bowman, but the Court emphasized that it was not addressing every situation "in-

155. *Bowman*, 133 S. Ct. at 1768.

156. *Supra* Part III.

volving a self-replicating product," and noted that "[i]n another case, the article's self-replication might occur outside the purchaser's control [or] might be a necessary but incidental step in using the item for another purpose."[157] Were the courts to extend patent exhaustion to encompass progeny of self-replicating products like seeds, perhaps in a case featuring a more sympathetic accused infringer, it could have severe negative implications for a variety of self-replicating technologies.

B. Patent Ineligibility

Several years ago, the Federal Circuit's Judge Gajarsa wrote a concurring opinion in *SmithKline Beecham v. Apotex* opining that "products capable of being 'reproduced by nature unaided by man,' are not [patent eligible]," based upon his concerns about the potential for inadvertent infringement.[158] The specific example he gave was a hypothetical genetically modified "blue corn."[159] He predicted that patents on technologies having the potential to replicate without active human involvement could lead to "a widespread in terrorem effect crippling entire industries whose artisans learn that even their best efforts to respect patent rights may not save them from liability as inadvertent, inevitable infringers."[160] While Judge Gajarsa's position with respect to the patent eligibility of seeds seems inconsistent with Supreme Court precedent, such as *Chakrabarty*[161] and *J.E.M. Ag*,[162] it does illustrate the susceptibility of even a Federal Circuit judge to reach for dramatic restrictions on the availability of patent protection based on perceived potential policy concerns associated with inadvertent infringement. Such an approach, which would effectively exclude even the most inventive and useful self-replicating products from patent protection, could have profoundly negative implications for innovation.

C. Lack of Moral Utility

In *Organic Seed Growers,* organizations representing organic farmers asked the courts to declare a number of Monsanto's patents relating to genetically modified crop plants invalid under the doctrine of moral utility, alleging that the problems caused by inadvertent infringement rendered the claimed subject matter "injurious to the well-being, good policy, or sound

157. *Bowman*, 133 S. Ct. at 1769.

158. SmithKline Beecham v. Apotex, 365 F.3d 1306, 1330–32 (Fed. Cir. 2004), *opinion vacated on reh'g en banc*, 403 F.3d 1328 (Fed. Cir. 2005), *superseded*, 403 F.3d 1331 (Fed. Cir. 2005), *aff'd on other grounds*, 403 F.3d 1331 (Fed. Cir. 2005).

159. *Id.*

160. *Id.* at 1333.

161. Diamond v. Chakrabarty, 447 U.S. 303 (1980).

162. J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124 (2001).

morals of society."[163] Monsanto prevailed based on the plaintiff's inability to establish standing, but the court implied that plaintiffs might have standing to proceed with their case if they could establish a reasonable likelihood that a farmer might "accumulate greater than trace amounts of modified seed by using or selling contaminated seed from his fields."[164]

The doctrine of moral utility, which was at one time a viable theory for invalidating certain patents associated with activities deemed immoral or illegal, is generally believed to be of little relevance under recent Federal Circuit decisions that appear to have rejected the idea that the patent system plays a role in policing morality.[165] However, the doctrine is based on language from Supreme Court decisions, and it is not inconceivable that, if presented with the right set of facts, the Supreme Court might revive the doctrine. We have seen this phenomenon repeatedly in recent years, most notably with respect to the patent eligibility doctrine, which the Federal Circuit attempted to cabin but which was revived by the modern Supreme Court.[166]

D. Duty on Patent Owner to Prevent Inadvertent Infringement

Bowman and some of his supporting amici suggested that the law should impose a duty on patent owners, like Monsanto, to take affirmative steps to prevent the occurrence of inadvertent infringement, arguing, for example, that Monsanto should have been required to impose contractual restraints on authorized users of the technology which required the labeling and sequestration of patented second-generation progeny seeds.[167] Bowman also argued that Monsanto should have required licensed users of the company's technology "to sell their patented grain to preapproved grain dealers who would keep Monsanto's patented traits separate and agree not to sell to farmers who refused to sign a No Plant Agreement."[168] He argued that these measures were necessary in order to allow farmers to continue using commodity grain as an alternative source of seed, and that if Monsanto chose to enforce its patents in a manner that effectively precludes the planting of

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163. Organic Seed Growers & Trade Ass'n v. Monsanto Co., 718 F.3d 1350, 1354 (Fed. Cir. 2013); *see* Complaint, Organic Seed Growers & Trade Ass'n v. Monsanto Co., 851 F. Supp. 2d 544, (S.D.N.Y. March 29, 2011) (No. 11CV02163), 2011 WL 1126563.

164. *Organic Seed Growers*, 718 F.3d at 1359.

165. *See, e.g.*, Juicy Whip, Inc. v. Orange Bang, Inc., 292 F.3d 728 (Fed. Cir. 2002).

166. *See, e.g.*, Bilski v. Kappos, 561 U.S. 593 (2010); Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289 (2012); Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 133 S. Ct. 2107 (2013).

167. Monsanto Co. v. Bowman, 657 F.3d 1341, 1348–49 (Fed. Cir. 2011); Monsanto Co. v. Bowman 686 F. Supp. 2d 834, 836–37 (S.D. Ind. 2009); *see* also Brief for Knowledge Ecology Int'l, *supra* note 50, at *13 n.2.

168. Brief of Defendant-Appellant Vernon Hugh Bowman, *supra* note 148, at *34.

commodity grain, then the law should require the company to ensure the maintenance of an accessible source of non-patented commodity grain for farmers.[169]

Under 35 U.S.C. § 287(a), a patent owner may only recover damages for patent infringement if the owner provides constructive notice by marking the patented article, or its package, with applicable patent numbers, or, in the alternative, after providing actual notice to the accused infringer.[170] Pointing to this statutory provision, Bowman argued that it would be easy for Monsanto to require growers to inform their purchasers – i.e., grain elevators – of the presence of patented Monsanto seeds by means of "appropriate labels placed on seed bags," and that in the absence of such explicit labeling, any purchaser of unlabeled patented seed should be immune from the imposition of any damages for infringement.[171]

This marking requirement argument was left unresolved in *Bowman*, as the Federal Circuit held the argument moot, given that Monsanto had provided actual notice to Bowman of his infringement.[172] But if a court were to be presented with a case involving a farmer who planted unlabeled seeds without actual notice, it seems likely that the court would side with the patent owner on the question of damages. When a party other than the patentee is selling or making a patented article, such as a farmer selling commodity grain, courts use a "rule of reason" to determine whether the statutory requirement has been met.[173] In *Bowman*, Monsanto argued that it had substantially complied with the constructive notice provision of Section 287 by marking, and requiring its "seed partners" to mark, all first-generation seeds that contain patented Monsanto technology, and that under the Federal Circuit's rule of reason, it had no obligation under the statute to compel farmers to mark their commodity seeds because there is normally nothing for them to mark.[174] According to Monsanto, growers normally do not place their soybeans in bags or other

169. *Bowman*, 657 F.3d at 1348–49; *Bowman* 686 F. Supp. 2d at 836–37.

170. 35 U.S.C. § 287 (2012).

171. Brief of Defendant-Appellant Vernon Hugh Bowman, *supra* note 148, at *36.

172. *Bowman*, 657 F.3d at 1349.

173. Funai Elec. Co. v. Daewoo Elecs. Corp., 616 F.3d 1357, 1374–75 (Fed. Cir. 2010) (upholding jury finding of constructive notice, under a rule of reason, where patentee properly marked all articles patentee sold under its own brand, even though a third-party failed to mark any patented articles the third-party sold as Original Equipment Manufacturers); Wine Ry. Appliance Co. v. Enter. Ry. Equip. Co., 297 U.S. 387, 398 (1936) (the marking statute "requires nothing unreasonable of patentees"); Sessions v. Romadka, 145 U.S. 29, 50 (1892) ("[S]omething must be left to the judgment of the patentee" when the practicability of marking the article itself is a "doubtful case[.]").

174. Brief for Plaintiffs-Appellees Monsanto Company and Monsanto Technology LLC, Bowman v. Monsanto Co., 133 S. Ct. 1761 (2012) (No. 2010-1068), 2011 WL 1748629, at *45.

containers capable of being marked unless engaged in brownbag sales of illegal seeds.[175]

Bowman and some of his amici also suggested that patent owners should be required to develop and employ technical solutions to address the problem of inadvertent infringement. In particular, Bowman asserted that equities required Monsanto to use the so-called "Terminator gene" to render second-generation seeds infertile, thereby obviating the threat of inadvertent infringement.[176] Similarly, Knowledge Ecology International filed an amicus brief in support of Bowman, arguing that "Monsanto could stack its genetically modified seed with a 'Terminator gene' that renders subsequent generations of seed sterile."[177] These assertions seem disingenuous given the de facto moratorium on the technology,[178] and the district court appropriately dismissed the argument, pointing to the absence of evidence on the record that the Terminator gene was available, and noting that in any event the court is not the appropriate venue for raising such a policy argument.[179]

While self-help measures such as sequestration, labeling, and technological restrictions on copying might in some instances be a prudent approach for companies like Monsanto, they should not be compulsory, and the failure of a patent owner to take such steps should not cause the loss of patent rights. At least as a general matter, requiring patent owners to take positive steps to prevent infringement can be seen as contrary to established principles of law. "As a general rule, the law imposes no duty on one person actively to assist in the preservation of the . . . property of another . . . even though the means by which the harm can be averted are in his possession."[180] And as a matter of policy, there are advantages to the use of patents as the primary means to protect new technologies. Unlike technological restrictions on access, patents eventually expire, and even while they are in force, they do not preclude all third-party use of the covered technology, particularly in the context of basic research.

E. Compulsory Licensing

The policy concerns associated with patented self-replicating products has also led to proposals for federal legislation that would limit the rights of patent owners. For example, Representative Kaptur (D-OH) recently introduced the Seed Availability and Competition Act of 2013, which would in effect create a system of compulsory licensing for the second-generation

175. *Id.* at *45–46.

176. Monsanto Co. v. Bowman, 686 F. Supp. 2d 834, 837 (S.D. Ind. 2009).

177. Brief for Knowledge Ecology Int'l *supra* note 50, at 13 n.2.

178. *See infra* note 300 and accompanying text.

179. *Bowman*, 686 F. Supp. 2d at 837.

180. Sidwell v. McVay, 282 P.2d 756, 759 (Okla. 1955); *see also* Louisville & N.R. Co. v. Scruggs & Echols, 49 So. 399, 400 (Ala. 1909) ("The law imposes no duty on one man to aid another in the preservation of the latter's property.").

progeny of patented seeds.[181] Under the proposed system, any farmer wishing to retain seeds harvested from the planting of patented seeds would pay a fee set by the Secretary of Agriculture, and would then be free of any contractual limitation on retaining the seed previously set by the biotechnology company.[182] The fee would go into a Patented Seed Fund, which would later be distributed by the Secretary of Agriculture to the patent holders.[183]

In a press release, the communication director for the bill's sponsor stated, "Rep. Kaptur has concerns about the ability of corporations to obtain patents on self-replicating articles, such as seeds and human DNA, allowing patent holders to claim property rights in perpetuity."[184] He went on to note, however, that "Rep. Kaptur recognized the importance of protecting intellectual property and wanted to avoid the constitutional issues that would arise from attempting to nullify patent rights."[185] He also explained that the proposed "system places the Department of Agriculture as an intermediary, giving it the discretion to set fees and apportion them to the companies 'fairly,' while leaving companies like Monsanto out of the payment process."[186]

VIII. LEVERAGING EXISTING DOCTRINE TO ADDRESS INADVERTENT INFRINGEMENT WHILE MAINTAINING THE INCENTIVE TO INNOVATE

The proposals outlined in the previous Part could have dramatic negative impact on the incentives for innovation in self-replicating technologies. In fact, drastic approaches of this type are probably unnecessary, since courts already have at their disposal a variety of existing doctrines of patent law that could be implemented in a manner that effectively shields an inadvertent infringer from liability without unduly eviscerating patent protection for developers of self-replicating technologies. Some of these approaches are discussed in this Part.

A. A Restricted Interpretation of What It Means to Make, Use, Or Sell a Self-Replicating Technology

It is often assumed that a standard of strict liability applies to direct patent infringement, and thus, that any farmer found to have patented plants growing in his fields will necessarily be subject to liability for patent infringement. This assumption appears throughout much of the academic commentary on inadvertent infringement, and was at the heart of the *Organic*

181. Seed Availability and Competition Act of 2013, H.R. 193 (introduced Jan. 4, 2013), https://www.govtrack.us/congress/bills/113/hr193/summary.

182. *Id.*

183. *Id.*

184. *Id.*

185. *Id.*

186. *Id.*

Seed Growers lawsuit.[187] In fact, however, it is a mistake to assume that the presence of patented material on a field necessarily constitutes patent infringement. Direct infringement is defined by the statute, which specifies that a patent is infringed by one who makes, uses, sells, offers for sale, or imports patented subject matter.[188] Significantly, it is well established that mere possession of patented technology does not constitute patent infringement.[189]

In the context of patent infringement, "making," "using," and "selling" are terms of art subject to judicial interpretation.[190] The statute itself provides no definition for the terms, and the legislative history is not particularly enlightening.[191] In fact, the case law is relatively sparse with respect to how these terms are to be interpreted, but the courts have noted that the term "use," for example, has never been construed in a manner that reaches the broadest interpretation one might ascribe to it.[192] Although the Supreme Court rejected Bowman's arguments that he had not made or used the patented technology,[193] Bowman was, by his own admission, not an inadvertent infringer, and the door remains open for the court to interpret "making, using, and selling" in a manner that would shield inadvertent infringers from liability.[194]

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187. *See generally* Organic Seed Growers & Trade Ass'n v. Monsanto Co., 718 F.3d 1350 (Fed. Cir. 2013).

188. 35 U.S.C § 271 (2012). With respect to the potentially infringing activities of farmers, the most applicable of the five statutory infringing activities would seem to be "making, using, and selling," so this article will focus on these three and forgo discussion of importation and offering for sale. *See id.*

189. Cal. Table Grape Comm'n v. RB Sandrini, Inc., No. 1:06-CV-00842OWWTAG, 2007 WL 1847631, at *18 (E.D. Cal. June 27, 2007); L.A. Gear Inc. v. E.S. Originals Inc., 859 F. Supp. 1294, 1298 (C.D. Calif. 1994).

190. Roche Products, Inc. v. Bolar Pharm. Co., 733 F.2d 858, 861 (Fed. Cir. 1984).

191. *See* Paper Converting Mach. Co. v. Magna-Graphics Corp., 745 F.2d 11, 16 (Fed. Cir. 1984) ("Congress has never deemed it necessary to define any of this triad of excludable activities, . . . leaving instead the meaning of 'make,' 'use,' and 'sell' for judicial interpretation.").

192. *Roche Products, Inc.*, 733 F.2d at 861 (Fed. Cir. 1984) ("Although few cases discuss the question of whether a particular use constitutes an infringing use of a patented invention, they nevertheless convincingly lead to the conclusion that the word 'use' in section 271(a) has never been taken to its utmost possible scope."); *see also* Quantum Group Inc. v. Am. Sensor Inc., No. 96 C 0761, 1998 WL 766707, at *6 (N.D. Ill. Apr. 10, 1998) ("On its face, § 271(a) prohibits any and all uses of a patented invention. However, the term has never been taken to its utmost possible scope.").

193. Bowman v. Monsanto, 134 S. Ct. 1761, 1763 (2013).

194. *Id.* at 1769.

1. Courts Are Willing and Able to Interpret Statutory Language in a Restricted Manner

A restricted judicial interpretation of "make, use, and sell" that would shield a truly inadvertent infringer from liability is not at all unlikely, particularly if the court believes that doing so would comport with the overall congressional and constitutional purpose and policy underlying the patent statute. There is ample precedent to support this sort of judicial activism. For example, consider how the courts have imposed restricted interpretations on forms of the word "use" as it is construed for the purposes of anticipation under 35 U.S.C. § 102.

Prior to the enactment of the America Invents Act ("AIA") in 2011, 35 U.S.C. § 102(a) specified that a patent shall not be awarded if, prior to the date of invention, the claimed invention was "known or used" by others.[195] As interpreted by the courts, the term "known or used" is limited to publicly available knowledge or use – strictly private knowledge or use is not sufficient to satisfy the statute.[196] There is nothing in the language of the statute to support this crabbed interpretation, but courts have determined that, in order to satisfy public policy concerns and to comport with the overall intention of the statute, this narrower interpretation should be applied to the word "use" as used in this context.[197]

An even more striking example is seen in the manner in which the courts have interpreted the term "public use" as it appears in pre-AIA 35 U.S.C. § 102(b).[198] With no explicit basis in the statute, the courts have interpreted "public use" as excluding even highly public uses of a patented invention if those uses were for the purpose of experimenting on the invention. For example, in the seminal case in this area, *City of Elizabeth v. American Nicholson Pavement Co*., the invention was a type of pavement that was used extensively for years on a public thoroughfare.[199] Nonetheless, because the Supreme Court viewed this use as a form of experimentation, it was held not to constitute "public use" within the meaning of the statute.[200] Conversely, courts have held that the commercial use of a patented invention by the inventor constitutes "public use" under the statute, even if that use is kept entirely secret and there is no way for the public to discern the nature of the invention from the activities.[201]

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195. 35 U.S.C. § 102(a) (2012).

196. *See* Woodland Trust v. Flowertree Nursery, Inc. 148 F.3d 1368, 1370 (Fed. Cir. 1998); *In re* Hilmer, 359 F.2d 859, 878 (C.C.P.A. 1966); *In re* Borst, 345 F.2d 851 (C.C.P.A. 1965).

197. JANICE M. MUELLER, PATENT LAW 194 (Wolters Kluwer 4th ed. 2013).

198. 35 U.S.C. § 102(b).

199. City of Elizabeth v. Am. Nicholson Pavement Co., 97 U.S. 126, 135 (1878).

200. *Id.* at 133–34.

201. Metallizing Eng'g Co. v. Kenyon Bearing & Auto Parts Co., 153 F.2d 516, 519–20 (2d Cir. 1946); *see also* Robert A. Armitage, *Understanding the America Invents Act and Its Implications for Patenting*, 40 AIPLA Q.J. 1, 40–45 (2012).

Outside the context of patent law, the Supreme Court has stressed the importance of interpreting words such as "use" and "utilize" in a way that comports with how people normally use the terms, and in a manner consistent with the intent of Congress and the overall purpose of the statute. For example, in *Watson v. United States*, the Supreme Court held that "[w]ith no statutory definition or definitive clue, the meaning of the verb 'uses' has to turn on the language as we normally speak it," and should strike "the ear as 'both reasonable and normal.'"[202] In *Public Citizen v. Department of Justice*, the question before the Supreme Court was whether the Justice Department's use of an ABA committee to evaluate the qualifications of nominees for federal judgeships constituted "utilization" of the committee.[203] After acknowledging that "read unqualifiedly," the verb "utilize" would accurately describe the Justice Department's use of the committee, the Court proceeded to interpret the term in a manner excluding such use.[204] The Court justified its narrow interpretation of the term by inferring that "Congress did not intend that the term 'utilized' apply to the Justice Department's use of the ABA Committee."[205]

2. Intent and Knowledge

It is generally assumed that "an infringement may be entirely inadvertent and unintentional and without the knowledge of the patent."[206] However, the matter is not nearly so clear-cut and settled as is so often assumed, as illustrated by an interesting "Works in Progress" article by Saurabh Vishnubhakat that "challenges the axiom of U.S. patent law that direct patent infringement is a strict liability tort."[207] The patent statute is silent with respect to the role of intent and knowledge in direct infringement, and in my view, it would be within the power of the courts to introduce some requirement of intent and/or knowledge, at least in the context of certain alleged acts of infringement involving self-replicating technologies. Although this would be a marked departure from mainstream patent jurisprudence, there is ample precedent for this sort of doctrinal evolution to be found in judicial interpretations of indirect patent infringement and copyright infringement.

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202. Watson v. United States, 552 U.S. 74, 79 (2007).

203. Pub. Citizen v. U.S. Dep't of Justice, 491 U.S. 440, 448 (1989).

204. *Id.* at 452.

205. *Id.* at 441.

206. DONALD S. CHISUM, CHISUM ON PATENTS § 16.02[2] at 16-3 1 (2000) ("It is, of course, elementary, that an infringement may be entirely inadvertent and unintentional and without knowledge of the patent."); *see also* Fla. Prepaid Postsecondary Educ. Expense Bd. v. Coll. Savings Bank, 527 U.S. 627, 645, 654 n.5 (1999) ("Actions predicated on direct patent infringement . . . do not require any showing of intent to infringe; instead, knowledge and intent are considered only with respect to damages."); Jurgens v. CBK, 80 F.3d 1566, 1570 n.2 (Fed. Cir. 1996).

207. Saurabh Vishnubhakat, *A Relevant Intent Theory of Patents*, http://www.law.berkeley.edu/files/Vishnubhakat_Saurabh_IPSC_paper_2014.pdf.

For example, although the statutory provision that covers contributory patent infringement recites an element of knowledge, it does not explicitly specify whether knowledge of the infringed patent is required for liability.[208] Nonetheless, as acknowledged by the Federal Circuit in 1990,

> Although not clear on the face of the statute, subsequent case law held that [35 U.S.C.] § 271(c) [the statutory provision relating to contributory infringement] required not only knowledge that the component was especially made or adapted for a particular use but also knowledge of the patent which proscribed that use.[209]

Section 271(b), the statutory basis for induced patented infringement, is silent on the question of knowledge. For years, the courts have struggled to define the level of intent necessary to establish liability for this form of indirect infringement. In 1974, for example, a district court judge stated that he was "inclined toward the view that an inducement under § 271(b), like a direct infringement under § 271(a), does not require a specific intent."[210] In 1990, however, this view was rejected in a Federal Circuit opinion holding that although "[o]n its face, § 271(b) . . . certainly does not speak of any intent requirement to prove active inducement, . . . we are of the opinion that proof of actual intent to cause the acts which constitute the infringement is a necessary prerequisite to finding active inducement."[211] Still, the role of intent in induced patent infringement remained unresolved in 2004, when a Federal Circuit panel acknowledged a "lack of clarity" on the intent requisite for inducement liability.[212] In 2010, the Federal Circuit held that a party can be liable for inducing infringement, despite having no actual knowledge of the infringed patent, so long as the party "deliberately disregard[s] a known risk" that the induced acts are infringing.[213] On appeal, this aspect of the decision was overruled by the Supreme Court, which held in *Global-Tech Appliances, Inc. v. SEB S.A.* that deliberate disregard is insufficient to establish actual knowledge, but that willful blindness can constitute actual knowledge. [214]

Copyright law also provides some relevant precedent with regard to the willingness and ability of courts to incorporate an intent element into the definition of infringement in order to address policy concerns caused by the ad-

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208. 35 U.S.C. § 271(c) (2012).

209. Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469 n.4 (Fed Cir. 1990) (citing Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 488 (1964)).

210. Hauni Werke Koerber & Co. v. Molins, Ltd., No. 73-404-R, 1974 WL 20172, at *5 (E.D. Va. June 11, 1974).

211. *Hewlett-Packard Co*., 909 F.2d at 1469.

212. Insituform Techs., Inc. v. Cat Contracting, Inc., 385 F.3d 1360, 1378 (Fed. Cir. 2004).

213. SEB S.A. v. Montgomery Ward & Co., 594 F.3d 1360, 1377 (2010).

214. Global-Tech Appliances, Inc. v. SEB S.A., 131 S. Ct. 2060, 2070–71 (2011).

vance of technology. Like patent infringement, copyright infringement has historically been treated as a strict liability offense, but with the development of the Internet, it became difficult for Internet Service Providers to avoid becoming unintentional and inadvertent, albeit active, participants in the unauthorized posting of copyrighted subject matter. When presented with this issue, a federal district court judge sitting in Silicon Valley ruled in *Religious Technology Center v. Netcom* that, although copyright infringement is generally treated as a matter of strict liability, it would be poor public policy to hold an Internet Service Provider strictly liable under circumstances such as this. For that reason, the court held that liability for this sort of Internet-based infringement requires a showing of "some element of volition or causation."[215] The principle enunciated in *Religious Technology Center* has generally been received positively and was largely embraced by Congress in the Digital Millennium Copyright Act.[216]

If courts can modify the rule of strict liability in copyright in order to address compelling public policy concerns caused by advances in technology, then why not with respect to patent law? The Supreme Court has noted the "historic kinship between patent and copyright law," and it would not be the first time that legal precedent established with respect to one of these forms of IP has been later expanded to the other.[217] For example, in *Sony Corp. v. Universal City Studios*, the Supreme Court looked to patent law's definition of contributory infringement in crafting the standard for contributory infringement of copyright.[218] And in *eBay v. Mercexchange*, the Supreme Court referred to copyright law's standard for granting an injunction in defining the standard for permanent injunctions under patent law.[219]

In *Schmeiser*, the Canadian Court of Appeals expressed some openness to the infringing farmer's argument for the incorporation of a knowledge element into the definition of infringing "use."[220] The court noted that the principle that intention is not material to a finding of infringement was "developed in the context of patents for conventional inventions," implying that the general rule might not necessarily be applicable to non-conventional, i.e., self-replicating inventions.[221] The court observed that while "[c]learly, in most cases of patent infringement, to allow a defense of ignorance or lack of

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215. Religious Tech. Ctr. v. Netcom, 907 F. Supp. 1361, 1370 (N.D. Cal. 1995).

216. RALPH S. BROWN & ROBERT C. DENICOLA, BROWN AND DENICOLA'S COPYRIGHT: UNFAIR COMPETITION, AND RELATED TOPICS BEARING ON THE PROTECTION OF WORKS OF AUTHORSHIP 477 (Foundation Press, 9th ed. 2005) ("[DMCA] creates a series of safe harbors generally following along the lines of Judge Whyte's analysis in *Netcom*.").

217. *See, e.g.*, Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 439 (1984) (citing "historic kinship between patent law and copyright law").

218. *Id.* at 440–42.

219. eBay v. Mercexchange, 547 U.S. 388, 392–93 (2006).

220. Monsanto Can. Inc. v. Schmeiser (C.A.) [2003] 2 F.C. 165, para. 56 (Fed. Ct.).

221. *Id.*

intention to infringe would destroy the efficacy of the patent, [] the patented Monsanto gene [arguably] falls into a novel category."[222] The Canadian court did not need to resolve the issue, given the ample evidence of Schmeiser's knowledge of infringement.[223] The court did, however, acknowledge that at some point the law with respect to intent in patent infringement might need to be modified with respect to a patented invention found within a living plant that might, without human intervention, produce progeny containing the same invention.[224]

One interesting aspect of *Schmeiser* was the Supreme Court of Canada's discussion of the potentially critical role of knowledge in distinguishing between the mere possession of a patented item – which does not constitute infringement – and infringing use of the item. The court noted that possession of a patented item, at least under commercial circumstances, can lead to a rebuttable presumption of use, but that a lack of knowledge and intent could, under some circumstances, assist in rebutting the presumption of use arising from possession,[225] particularly if the farmer does not avail himself of the benefits of the technology.[226] This suggests that a defendant farmer could potentially rebut any presumption of use by showing that he never intended to cultivate plants containing the patented genes and cells.

The Supreme Court of Canada further suggested that a defendant's conduct on becoming aware of the presence of the patented invention might very well assist in rebutting the presumption of use arising from possession.[227] A farmer might demonstrate that the continued presence of the patented gene on their land was accidental and unwelcome, for example, by showing that he acted quickly to arrange for its removal, and that the level of contamination was consistent with that to be expected from unsolicited "blow-by" seed.[228]

3. Beneficial Use of the Invention

Another manner in which a court might address the problem of inadvertent infringement is by declining to recognize cultivation of a seed as "use" or "making" of a patented invention under circumstances where the farmer did not actively seek to benefit from the patented technology. An extreme example of this would be a farmer whose fields include patented plant material as a consequence of genetic drift, but other scenarios under which a farmer might argue lack of beneficial use might include a farmer using commodity grain that happens to contain patented technology as seed.

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222. *Id.* at para. 56–57.

223. *Id.* at para. 57–58.

224. *Id.* at para. 57.

225. Monsanto Can. Inc. v. Schmeiser, [2004] 1 S.C.R. 902, para. 86 (Can.).

226. *Id.* at para. 158 (citing British United Shoe Machinery Co. v. Simon Collier Ltd. (1910), 27 R.P.C. 567 (H.L.)).

227. *Id.* at para. 86.

228. *Id.*

Such a farmer might argue that he is only using commodity grain as an inexpensive source of seed, without seeking to obtain any benefit from the patented trait, and that any presence of the patented trait in his fields is inadvertent, caused by the prevalence of the patented trait in the local seed population. A farmer might even argue that planting saved Roundup Ready seed does not constitute infringement if he does not spray his fields with glyphosate, since he derives no benefit from the patented technology.

In *Organic Seed Growers*, the Federal Circuit implied that it remains an open question whether an alleged infringer having no intent to benefit from a patented technology will necessarily be found liable for patent infringement.[229] In fact, there have been a number of judicial decisions suggesting that not all technical "uses" of a patented invention constitute infringing use.[230] Courts look to the underlying purpose of the invention, and at times will find that a technical use is not infringing because it does not avail itself of the benefits provided by this purpose.[231] *Chisum on Patents* notes, for example, that "the defendant's use must incorporate in some fashion the principles of the claimed invention."[232]

We see this principle in cases such as *Kaz Manufacturing Co. v. Chesebrough-Ponds, Inc.*, in which the Second Circuit Court of Appeals defined infringing use as "the commercially valuable use of which patentee would or could avail himself."[233] The court pointed out that the construction of a patented wall safe for use as an anchor for a boat, for example, would not be infringement because "such use would not be for the purpose of utilizing the teachings of the patent."[234] In *Kaz*, the Second Circuit ruled that the defendant's use of a literally infringing product for the purpose of advertising defendant's product did not constitute patent infringement, noting that "the purpose to which an unauthorized construction of a patented article is put may determine whether the construction constitutes an infringement of the patentee's rights."[235]

Similarly, in *Quantum Group, Inc. v. American Sensor, Inc*., the district court noted that although "[o]n its face, § 271(a) prohibits any and all uses of a patented invention[,] the term has never been taken to its utmost possible scope, and that in practice only 'those uses that rely on the method or princi-

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229. Organic Seed Growers v. Monsanto, 718 F.3d 1350, 1356 (Fed. Cir. 2013) ("For purposes of this appeal, we will assume (without deciding) that using or selling windblown seeds would infringe any patents covering those seeds, regardless of whether the alleged infringer intended to benefit from the patented technologies.").

230. *See, e.g.*, Kaz Mfg. Co. v. Chesebrough-Ponds, Inc., 211 F. Supp. 815 (S.D.N.Y. 1962), *aff'd*, 317 F.2d 679 (2d Cir. 1963).

231. *See id.* at 817–18.

232. DONALD S. CHISUM, 4 CHISUM ON PATENTS § 16.02[4]; *see also* Roche Products, Inc. v. Bolar Pharms. Co., 572 F. Supp. 255 (E.D.N.Y. 1983) ("To find infringing use there must be a benefit at the expense of the patent.").

233. *Kaz Mfg. Co.*, 211 F. Supp. at 818.

234. *Kaz Mfg. Co.*, 317 F.2d at 680 n.3.

235. *Id.*

ples of a patent constitute infringement.'"[236] The court applied this principle to the facts of the case, finding no infringement had occurred since "[c]ommon sense suggests that none of the activities in question involved any functional use of the infringing products."[237] Other courts have likewise, on occasion, dismissed infringement of a patentee's right to use when the infringing invention was "useless in function" and "such use would not be for the purpose of utilizing the teachings of the patent."[238] The Canadian courts have also noted that under prevailing precedent, infringing "use" of a patented product connotes "utilization with a view toward production or advantage," and in a manner that deprives the inventor "in whole or in part, directly or indirectly, of the full enjoyment of the monopoly conferred by the Patent."[239]

The rationale adopted by the courts in the forgoing cases would seem to apply in the case of a farmer who has not been shown to have utilized the patented technology in a manner that provides any of the benefits associated with the invention. Bowman actually made an argument along these lines, claiming to have planted commodity grain not for the purpose of obtaining the benefit of the patented Monsanto trait, but rather because he wanted an inexpensive source of seed, and that he had only infringed because Monsanto seeds are so prevalent in that area.[240] Unfortunately for Bowman, it was impossible for him to plausibly argue that he was not using the trait, because the evidence showed that he had sprayed his fields with glyphosate.[241] But in a case where the evidence of benefit to the farmer is less clear, one might imagine a different outcome.

The question of whether inadvertent use of a patented technology in a manner that provides no meaningful benefit to the user can constitute patent infringement was addressed by Judge Posner, sitting by designation as the district court judge in *SmithKline Beecham v. Apotex*.[242] This case provides an interesting example of inadvertent infringement involving an essentially autonomously replicating pharmaceutical compound. After acknowledging that as a general matter "inadvertancy is not a defense to infringement," Judge Posner went on to conclude that inadvertent use of a patented product in a manner that does not benefit the technical infringer would not constitute

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236. Quantum Group Inc. v. Am. Sensor Inc., No. 96 C 0761, 1998 WL 766707, at *6 (N.D. Ill. 1998).

237. *Id.*

238. *See* Condenser Corp. v. Micamold Radio Corp., 145 F.2d 878, 880 (2d Cir. 1944); *see also Kaz Mfg. Co.*, 317 F.2d at 680–81.

239. Monsanto Can. Inc. v. Schmeiser, [2004] 1 S.C.R. 902, para. 58, 69 (Can.).

240. Monsanto Co. v. Bowman, 686 F. Supp. 2d 834, 836–37 (S.D. Ind. 2009).

241. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1765 (2013).

242. SmithKline Beecham v. Apotex, 247 F. Supp. 2d 1011, 1028 (N.D. Ill. 2003), *aff'd*, 365 F.3d 1306 (Fed. Cir. 2004), *reh'g granted in part and vacated*, 403 F.3d 1328 (Fed. Cir.) (en banc), *aff'd on other grounds on remand*, 403 F.3d 1331 (Fed. Cir. 2005).

an infringing use "in any intelligible sense of the word."[243] Judge Posner found it significant that, under the facts of that case, the infringer "gain[ed] nothing [from the infringement, and the patent owner was] the sole cause of infringement."[244]

As to the question of whether the inadvertent sale of patented technology necessarily constitutes infringement, Judge Posner posited a case where the inadvertent presence of a patented component in an alleged infringer's product does not increase the value to consumers or reduce the cost of production or sale, and concluded that such activity would not constitute "in a meaningful sense" an infringing sale of patented technology.[245] Extending the logic of Judge Posner to patented seeds and farmers, it would often be the case that the sale of grain containing a patented trait should not be considered an infringing sale because the trait in no way increases the value of the grain as food or fodder.[246] Furthermore, the presence of an herbicide tolerance trait like Roundup Ready would not affect the cost of production if that herbicide was not applied to the field. However, if the trait does reduce the cost of production, for example, by providing drought tolerance or insect resistance, then perhaps this benefit would be sufficient to characterize the sale of the resulting grain as infringing.

In fact, one might argue that in some cases a farmer who has planted his fields with Roundup Ready crops but does not spray the field with glyphosate has nonetheless benefited from the technology under the doctrine of "exigent use." *Moy's Walker on Patents* defines exigent use as the "use of [an invention, the underlying function which is to be on hand and available for deployment should an exigent situation arise,] occurs when the equipment is made ready for deployment, regardless of whether the equipment is later actually deployed."[247] An example would be the benefit derived from having a fire extinguisher hanging on the wall, even if the fire extinguisher is never used to put out a fire, since it provides a means to put out a fire should one erupt.

For example, in *Olsson v. United States*, the Court of Claims held the United States liable under 28 U.S.C. § 1498 for keeping infringing howitzers ready for use in case of war, even though the weapons were never fired.[248] The court explained that the guns were being employed for the purpose of national defense, an exigent use that entitled the plaintiff to recover compen-

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243. *Id.* at 1028, 1031.

244. *Id.* at 1044.

245. *Id.* at 1031.

246. The vast majority of commercialized genetic traits are input traits, which increase the value of grain when used as seed, but not when used for food or feed. *See, e.g.*, Lothar Willmitzer, *Plant Biotechnology: Output Traits – The Second Generation of Plant Biotechnology Products is Gaining Momentum*, 10 CURRENT OPINION IN BIOTECH. 161, 161 (1999), http://www.ufv.br/dbv/pgfvg/BVE684/htms/pdfs_revisao/trangenicos_transformacao/willmitrev.pdf.

247. 4 MOY'S WALKER ON PATENTS § 14:33 (4th ed.).

248. Olsson v. United States, 25 F. Supp. 495, 497–98 (Ct. Cl. 1938).

sation from the United States.[249] Similarly, in *Hughes Aircraft Co. v. United States*, the Court of Claims held that the "use of a system as a backup mode or to provide an extra measure of safety is 'use' within the meaning of 28 U.S.C. § 1498."[250]

In much the same way that a fire extinguisher hanging on the wall clearly has some beneficial value even if it is never used to put out fire, or that an airbag benefits passengers by providing an extra degree of safety even if it is never deployed, under some circumstances the presence of a herbicide resistance trait might be characterized as providing beneficial value to a farmer even if the herbicide is never sprayed on the plants. The same logic could apply to other traits, such as drought resistance or insect resistance, which can provide benefit even if the insect or drought is not a problem that a particular growing season because, like a fire extinguisher, it provides a ready mechanism to deal with a problem such as drought in the event that it does occur.

The Supreme Court of Canada addressed the applicability of the exigent use doctrine in the context of genetic traits in *Schmeiser*. The court opined that even if Schmeiser had not used glyphosate on his fields, the fact that he had cultivated the seeds at all would likely constitute infringement because it allowed him to take advantage of the "stand-by," or "insurance," utility of the invention.[251] That is, he gained benefit from having the Roundup Ready trait in his canola because if he needed to control weeds, he could have sprayed his crops with Roundup and taken advantage of the trait.

But as a general matter, the inadvertent presence of some herbicide tolerant plants in a farmer's field should not necessarily be considered exigent use, particularly if the farmer is not aware of its existence, or does not know what percentage of his crop bears the trait. If he is not aware that he has Roundup Ready seeds growing in his field, for example, he will not be able to take advantage of any insurance utility because he will not realize that he has the option of spraying glyphosate on his fields to control weeds. Furthermore, a farmer will not have the option of spraying with glyphosate unless he knows that the majority of his field includes glyphosate resistant soybean, because the application of glyphosate would not only kill the weeds, but would also kill any crops growing in his fields that do not bear the Roundup Ready trait.

The proper resolution of a question of beneficial use might depend upon how a court defines the "patented invention." That is, should it be defined literally by the language of the claims, or should it be defined in terms of the gist or heart of the invention, i.e., the point of novelty and inventiveness with respect to the prior art? Federal Circuit jurisprudence has stressed the importance of formal interpretation and literal application of claim language, rather than analysis that would seek to discern the heart of a patented inven-

249. *Id.* at 656–57.

250. Hughes Aircraft Co. v. United States, No. 426-73, 1982 WL 36740, at *37 (Ct. Cl. Trial Div. 1982), *aff'd in part, rev'd in part*, 717 F.2d 1351 (Fed. Cir. 1983).

251. Monsanto Can. Inc. v. Schmeiser, [2004] 1 S.C.R. 902, para. 84 (Can.).

tion.[252] But in a recent article, Lemley persuasively argued that in many instances, the courts, at least implicitly, seem to be focusing the analysis on what they view to be the gist of the invention.[253] This "gist of the invention" approach has also featured prominently in recent Supreme Court decisions, including *Quanta*, *Bilski*, and *Mayo*.[254]

The resolution of this issue could in some cases depend upon the specific language of each claim at issue in that particular case. Patents directed towards genetically modified seeds and plants typically include multiple claims defining the invention at different levels of abstraction and specificity.[255] For example, the core claim is typically directed toward the genetic material itself, i.e., the DNA construct that constitutes the trait.[256] A plausible argument could be made that a farmer cultivating a seed harboring a patented DNA construct is not using the DNA construct if he is not making any use of it in the common sense of the word. For instance, if the patent claim recites the DNA construct that confers herbicide resistance, and the farmer never sprays his crop with that herbicide, a good argument might be made that he is not using that DNA construct.

Patents on plant genetic traits typically also contain claims directed towards seeds and plants comprising the DNA construct.[257] But regardless of how the invention is claimed, the gist of the invention remains the DNA construct. One might argue that even though a farmer has cultivated a seed that falls within the literal scope of the patent claim, the actual invention remains the transgenic DNA construct which is not being used.

Introducing elements of benefit and intent to direct infringement could help to shield some farmers from liability who clearly seem to deserve it. Consider, for example, the organic farmer plaintiffs in *Organic Seed Grow-*

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252. CLS Bank Int'l v. Alice Corp. Pty. Ltd., 717 F.3d 1269, 1315 (Fed. Cir. 2013) (Moore, J., dissenting in part) ("Federal Circuit precedent [has] abolished the 'heart of the invention' analysis for patentability."); *see also* Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 345 (1961) ("[T]here is no legally recognizable or protected 'essential' element, 'gist' or 'heart' of the invention.").

253. Mark A. Lemley, *Point of Novelty*, 105 NW. U. L. REV. 1253, 1255 (2011); *see also* Bernard Chao, *Breaking Aro's Commandment: Recognizing That Inventions Have Heart*, 20 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1183 (2010).

254. *See, e.g.*, Quanta Computer v. LG Electronics, 553 U.S. 617, 1238–39 (2010); Bilski v. Kappos, 130 S. Ct. 3218 (2010); Mayo Collaborative Services v. Prometheus Laboratories, 132 S. Ct. 1289 (2012). For discussion of "gist of invention" approach, *see, e.g.*, Allen Eng'g Corp. v. Bartell Indus., Inc., 299 F.3d 1336, 1345 (Fed. Cir. 2002) (citing *Aro Mfg. Co.*, 365 U.S. at 345) ("It is well settled that 'there is no legally recognizable or protected essential element, gist or heart of the invention in a combination patent.'").

255. *See, e.g.*, the patents infringed by Bowman: U.S. Patent No. 5,352,605 (issued Dec. 4, 1994) and U.S. Patent No. RE39,247E (issued Aug. 22, 2006). Bowman v. Monsanto Co., 133 S. Ct. 1761, 1764 (2013).

256. *See, e.g.*, Claim 1 of the '605 Patent and Claim 103 of the '247E Patent.

257. *See, e.g.*, Claim 4 of the '605 Patent and Claims 122 and 129 of the '247E Patent.

ers, who claim that they live in fear of being sued by Monsanto for patent infringement that is inadvertent and unavoidable.[258] With respect to these organic farmers, the presence of transgenic organisms in the farmer's field would not increase the value of his crops nor would it reduce the farmer's cost of production.[259] To the contrary, the presence of transgenic organisms might even prevent the farmer from selling his crop (especially if he is an organic farmer).[260] The farmer derives no benefit from the technology, and in the spirit of Judge Posner's decision in *SmithKline Beecham* should not be found to have made, used, or sold the patented technology in a manner that would constitute infringement.

Consider also the case of a farmer who plants his fields with commodity grain purchased from a grain elevator. In some cases, it will be relatively straightforward to establish that the farmer knowingly benefited from the patented technology, and thus should be held liable for infringement. A farmer like Bowman is a good example. Another might be a farmer who has purchased and replanted commodity seeds from a grain elevator in a case wherein the patented trait confers resistance to a particular type of insect. Depending upon the surrounding circumstances, this farmer could be found to be purposefully using the benefit patented trait to the same extent as Bowman. For example, if the targeted pest is a major problem on this farmer's fields, such that the farmer could not successfully grow the crop without the trait, then this farmer might be reasonably characterized as using the trait to the same extent as Bowman. If he would have absolutely been required to use some chemical pesticide were it not for the recombinant trait, then the failure to use such a chemical could be seen as overt evidence of intentionally taking advantage of the benefit of the patented trait, analogous to Bowman's use of glyphosate. Based on these facts, it should be no problem to find infringement.

But change the facts a bit, and we might end up with a circumstance under which it seems clear that the farmer should not be held liable. What if it turns out that the pest targeted by the trait is not a problem at all for this farmer, perhaps because it is only present during a different time of year, or in a different part of the country? Or what if the farmer can introduce evidence that he applied pesticide sufficient to deal with the pest, such that he obtained no advantage from the genetic trait? In a very pragmatic sense, this farmer has not "used" the trait which is the subject of the patent, and by focusing on

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258. *See* Organic Seed Growers v. Monsanto, 718 F.3d 1350, 1354 (2013).

259. SmithKline Beecham Corp. v. Apotex Corp., 247 F. Supp. 2d 1011, 1031 (2003), *aff'd*, 365 F.3d 1306 (Fed. Cir. 2004), *reh'g granted in part and vacated*, 403 F.3d 1328 (Fed. Cir.) (en banc), *aff'd on other grounds on remand*, 403 F.3d 1331 (Fed. Cir. 2005).

260. Petition Letter from George Kimbrell, Senior Attorney, Ctr. for Food Safety, to Tom Vilsack, Sec'y, USDA (Sept. 26, 2013), http://www.centerforfoodsafety.org/files/cfs_petition_usda_alfalfa-contamination_9_26_2013_final_57348.pdf (organic farmer prohibited from selling his crop when an organic buyer found transgenic alfalfa seeds in the crop being sold).

benefit the court could arrive at the intuitively reasonable outcome that no infringement has occurred.

The truly hard case might lie somewhere between the extreme scenarios set forth above. Imagine a case where the insect targeted by a patented trait in commodity grain represents a slight but non-trivial threat to a farmer's crops? And what if a farmer who decides to use the commodity grain as an inexpensive source of seed can plausibly claim that he was willing to live with a certain level of damage from the insect, and was not willing to pay for the patented trait designed to deal with it? The farmer might argue that he should not be compelled to pay for a technology he does not want or need, regardless of whether he might inadvertently obtain some benefit from it. A patent owner like Monsanto, on the other hand, might argue that the intent of the farmer is irrelevant, and that the farmer has benefited from the technology and should be required to pay for its use.

If such a case were presented to the court, the outcome might depend upon the court's policy leanings. For example, are the overall objectives of the patent system better served by protecting the ability of farmers to use commodity grain as seed without being required to pay for patented technology inadvertently present in the grain, or by ensuring that innovators like Monsanto are compensated by those who benefit from the technology, even if that benefit appears to be inadvertent? Given that the burden of proving infringement always lies with the patentee, an argument might be made that when there is some ambiguity regarding intent and benefit, the default rule should be to decide the case in favor of the alleged infringer.

4. Autonomous and Indirect Infringement

Under the right circumstances, a court might be able to avoid imposing liability on an alleged inadvertent infringer by attributing the making and using of the product to the product itself rather than to any human agent. In fact, Bowman and Schmeiser both argued that, since plants are autonomous beings, their growth and propagation should not be attributed to the farmer, and that the role played by the farmer is not sufficiently active to constitute an infringing making or use of the patented plant material.[261] Arguments of this type no doubt have some intuitive appeal. The common understanding of the terms "make" and "use" clearly contemplate the maker or user taking some positive action of some sort. For instance, Merriam-Webster defines "use" as "to put into action or service: avail oneself of,"[262] and "make" as "to cause to happen to or be experienced by someone; to cause to exist, occur, or

261. Bowman v. Monsanto Co., 133 S. Ct. 1761, 1768–69 (2013); Monsanto Can. Inc. v. Schmeiser, [2004] 1 S.C.R. 902, para. 90 (Can.).

262. *Use*, MERRIAM-WEBSTER, http://www.merriam-webster.com/dictionary/use (last visited July 5, 2015).

appear."[263] To the extent plants truly are responsible for their own replication, should not their making and using of the seeds be attributed to the plant itself, thereby absolving farmers of liability?

On the specific facts of Bowman and Schmeiser, U.S. and Canadian courts have had no trouble rejecting this argument of autonomous replication, based on the evidence in each case establishing the substantial active role both accused farmers had taken in planting and cultivating the seeds. The Supreme Court of Canada pointed out that Schmeiser's suggestion that the infringing crop had merely "'grown itself' . . . denies the realities of modern agriculture [and] ignores the role human beings play in agricultural propagation."[264] The court concluded that a farmer's acts of sowing and cultivating plants "necessarily involves deliberate and careful activity on the part of the farmer," sufficient to qualify as making or using under the patent statute.[265] The Supreme Court of the United States similarly concluded, "[I]t was Bowman, and not the bean, who controlled the reproduction (unto the eighth generation) of Monsanto's patented invention."[266]

But perhaps the argument would find some traction if it were presented by a farmer who could more plausibly argue that the presence of patented plants in his fields was truly inadvertent. There are clearly circumstances under which it makes no sense to attribute the growth and replication of a plant to any human agency, including some cases that might lead to an allegation of inadvertent infringement. The genetic drift scenario is a good example – growth of a plant that spuriously appears in a farmer's field should not be attributed to the farmer, and should not serve as the basis for a finding of patent infringement. Of course, the difficult question that might arise is where to draw the line between the two extremes of a farmer like Bowman, who actively cultivates a patented plant, and the farmer whose fields have been contaminated by a patented plant as a result of a seed being carried there by wind or an animal.

Note that even in a case where a court absolves a farmer from liability for direct infringement by attributing replication of patented plant material to the plant itself, it might still be possible to hold the farmer liable for inducing infringement. Significantly, patent inducement is not a matter of strict liability, and it would be necessary to establish that the farmer had intentionally induced the seed to replicate and grow and knew that this would constitute patent infringement, which would go a long way in shielding inadvertent infringers from liability.[267] This approach might even be generally applicable to self-replicating technologies, providing a mechanism for introducing an

263. *Make*, MERRIAM-WEBSTER, http://www.merriam-webster.com/dictionary/make (last visited July 5, 2015).

264. *Schmeiser*, [2004] 1 S.C.R. 902, at para. 90, 92.

265. *Id.*

266. *Bowman*, 133 S. Ct. at 1769.

267. *Supra* Part VIII.

intent element without altering the definition of infringement for non-self-replicating technologies.

B. Equitable Defenses

Another approach to addressing a plausible case of inadvertent infringement would be for the court to invoke its inherent authority to create a new equitable defense to patent infringement. There are numerous examples of equitable defenses in patent law, including the defenses of inequitable conduct, experimental use, and patent misuse.[268] These defenses have been created by the courts to address situations that arise from time to time, and which are not adequately addressed by the statute, in a manner that furthers public policy and the overall objectives of the patent statute.[269] There is nothing to prevent the courts from invoking their equitable authority in this manner if confronted with a legitimate case of inadvertent infringement.

Such an approach was championed by Judge Posner in *SmithKline Beecham*, in which he was faced with a situation where a finding of infringement threatened to block a generic drug company "from producing a public-domain product[,] however strenuous the efforts they make to avoid committing a purely nominal infringement."[270] After acknowledging that he could not find any statutory language or case law bearing on the question, Judge Posner proposed, "[A]s a matter of fundamental principle it must be a defense to a charge of patent infringement that the patentee caused the infringement."[271] In support of this proposition, he pointed out that it "is a completely orthodox defense to a suit for breach of contract that the plaintiff prevented the defendant from performing his contractual duty," and found the logic behind this fundamental principle of law equally applicable in the case of an inadvertent infringer like the generic drug company in this case.[272]

Judge Posner further proposed that enforcement of a patent against an inadvertent infringer under circumstances where the patent owner's actions made the infringement unavoidable could be considered a form of patent misuse. According to Judge Posner, "[W]hen the advance of science . . . enables a form of patent misuse that is new but is well within the conceptual heartland of the doctrine, the boundaries of the doctrine can expand modestly

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268. *See, e.g.*, Qualcomm Inc. v. Broadcom Corp., 548 F.3d 1004, 1025 (Fed. Cir. 2008); *see also* City of Elizabeth v. Am. Nicholson Pavement Co., 97 U.S. 126, 133 (1877).

269. *See* Glitsch, Inc. v. Koch Eng'g Co., 216 F.3d 1382, 1385–86 (Fed. Cir. 2000) (citing Mercoid Corp. v. Mid-Continent Inv. Co., 320 U.S. 661, 670 (1944)).

270. SmithKline Beecham Corp. v. Apotex Corp., 247 F. Supp. 2d 1011, 1044 (N.D. Ill. 2003), *aff'd*, 365 F.3d 1306 (Fed. Cir. 2004), *reh'g granted in part and vacated*, 403 F.3d 1328 (Fed. Cir.) (en banc), *aff'd on other grounds on remand*, 403 F.3d 1331 (Fed. Cir. 2005).

271. *Id.* at 1043.

272. *Id.*

to encompass it."[273] He cited the Federal Circuit's 1999 decision in *AT&T v. Excel Communications* for the proposition that the "sea-changes in both law and technology stand as a testament to the ability of law to adapt to new and innovative concepts, while remaining true to basic principles."[274]

C. Remedies as a Policy Lever

One should not lose sight of the fact that a finding of infringement, in and of itself, really has no adverse consequences for the infringer in the absence of a substantial award of remedies.[275] This is the logic behind 35 U.S.C. § 287(c), pursuant to which health care providers are exempt from any remedy for infringement of a medical procedure patent. While, as a technical matter, a doctor can still be found to have infringed a patent, she has no reason to fear a lawsuit because she cannot be assessed money damages and cannot be enjoined. As a corollary, patent owners have no reason to file a lawsuit against doctors for infringing patents covered by Section 287(c), although infringement by a healthcare provider could form the basis for an indirect infringement action against a non-healthcare provider who induced or contributed to infringement.

The important role remedies play in ameliorating potential concerns relating to the sorts of technical acts of infringement, that might otherwise trigger significant policy concerns, have been noted by the courts. For example, in *Embrex, Inc. v. Service Engineering Corp.*, Judge Rader opined that *de minimis* and experimental use exceptions are not needed in the United States in part because, as a practical matter, the absence of substantial remedies achieves the same outcome.[276] This can be seen, for example, in *Condenser Corp. of America v. Micamold Radio Corp*., where the Second Circuit refused to enjoin the technically infringing defendant's machine for a detail that the court characterized as useless in function and of too trifling importance to justify the intervention of a court.[277] With respect to damages, the court held that it would be equally unwarranted to give judgment for damages or profits; for it is inconceivable that the infringement, if there is any at all – which is doubtful at best – could add a cent to the defendant's profits, or could interfere in the slightest degree with the plaintiff's sales.[278]

Similarly, in *Schmeiser* the Canadian Federal Court of Appeal suggested that, in a case of inadvertent infringement, the patentee might be denied any remedy, finding it to be an open question whether a seed patent owner like

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273. *Id.* at 1046–47.

274. *Id.* at 1047 (citing AT&T Corp. v. Excel Commc'ns, Inc., 172 F.3d 1352, 1356 (Fed. Cir. 1999)).

275. *See id.* at 1045.

276. Embrex, Inc. v. Serv. Eng'g Corp., 216 F.3d 1343, 1352–53 (Fed. Cir. 2000) (Rader, J., concurring).

277. Condenser Corp. of Am. v. Micamold Radio Corp., 145 F.2d 878, 880 (2d Cir. 1944).

278. *Id.*

Monsanto could under all circumstances obtain a remedy for infringement on the basis that the intention of the alleged infringer is irrelevant.[279] Particular situations identified by the court wherein a remedy might not be warranted in the absence of intent would be when "a plant containing [a patented gene arrives] fortuitously onto the property of a person who has no reason to be aware of the presence of the characteristic created by the patented gene."[280] The court also opined that even a farmer who becomes aware of the presence of the patented plant on his property might tolerate its presence without doing anything to cause or promote the propagation of the plant or its progeny without incurring liability that would result in a remedy.[281] In *SmithKline Beecham v. Apotex*, Judge Posner also suggested a denial of remedies as a potential solution to the problem of inadvertent infringement.[282]

IX. A LEGAL RESPONSE SHOULD BE NARROW AND TAILORED TO SPECIFIC AND SUBSTANTIATED DEFICIENCIES IN THE CURRENT SYSTEM

With the increasing prevalence of self-replicating technologies, the perceived potential of innocent parties being held liable for inadvertent infringement could lead to increasing calls for reform of patent law in order to address the issue. In *Bowman,* the Supreme Court turned aside the attempt for the time being, but left the door open for doing so at a time when it is presented squarely with a case involving a truly inadvertent infringer. If the courts or Congress do decide to take action to address the issue, it is important that they do so in a manner that is conservative and narrowly tailored to address the concern without unduly creating ancillary harm to the patent system.

The preceding Part describes various possibilities for courts to interpret and deploy existing doctrines of patent law in a manner that would shield a legitimate inadvertent infringer from liability. The calls for extreme measures, such as patent exhaustion for all self-replicating technologies, invalidity based on patent ineligibility, or lack of moral utility for self-replicating technologies, do not appear to be necessary and clearly should not be invoked at this early stage when lawsuits against inadvertent infringers remain of largely hypothetical concern.

Likewise, if Congress chooses to address the issue with legislation, it should do so in a manner that is as narrow and targeted as possible. There are

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279. Monsanto Can. Inc. v. Schmeiser (C.A.) [2003] 2 F.C. 165, para. 57 (Fed. Ct.).

280. *Id.*

281. *Id.*

282. SmithKline Beecham Corp. v. Apotex Corp., 247 F. Supp. 2d 1011, 1045–46 (N.D. Ill. 2003), *aff'd*, 365 F.3d 1306 (Fed. Cir. 2004), *reh'g granted in part and vacated*, 403 F.3d 1328 (Fed. Cir.) (en banc), *aff'd on other grounds on remand*, 403 F.3d 1331 (Fed. Cir. 2005).

a number of examples of Congress enacting legislation to address perceived policy concerns in a manner that did not unduly harm the incentives of the IP system. For example, to address concerns associated with the technical act of copyright infringement that occurs whenever use of a computer program results in the production of a new copy, Congress enacted 17 U.S.C. §117, which states in part that:

> Notwithstanding the provisions of section 106 [defining infringement], it is not an infringement for the owner of a copy of a computer program to make or authorize the making of another copy or adaptation of that computer program provided . . . that such a new copy or adaptation is created as an essential step in the utilization of the computer program in conjunction with a machine and that it is used in no other manner . . . .[283]

This statutory fix addresses the potential for inadvertent infringement caused by the self-replicating nature of computer software, without unduly interfering with the rights of copyright owners. Significantly, instead of granting a blanket license to make copies, 17 U.S.C. § 117 limits the scope of the license based on the use that is made of the copy and does not permit the owner of the computer program to use the copy in a manner contrary to the legitimate business interests of the copyright owner, e.g., by distributing copies to other computer users.

Similarly, Congress addressed concerns associated with the potential for doctors to be sued for infringing patents in the course of performing medical procedures by enacting 35 U.S.C. § 287(c), which provides that doctors are not subject to the imposition of any remedy for infringement under such circumstances. The limitation on patent rights is narrow and targeted, leaving intact the patentability of medical procedures and permitting patentees to enforce their patents against competitors who contribute to or induce infringement by doctors.

Although the spirit of Section 287(c) stands as a useful model for any congressional response to the issue of inadvertent patent infringement, the specific approach is probably not directly applicable to patented seeds. Section 287(c) works because patent owners can generally derive benefit from their patents on methods of treatment by enforcing their patents against competing companies that provide the tools used by doctors to perform the treatments, relying on theories of indirect infringement. There is generally no need to file lawsuits directly against doctors and, for the most part, patent owners have no desire to file lawsuits against doctors.[284]

In contrast, farmers will often be the only viable target for an infringement lawsuit by a seed patent owner. Monsanto would no doubt be in a much

283. 17 U.S.C. § 117 (2012).

284. Brief for Eli Lilly and Company as Amicus Curiae Supporting Respondents, Limelight Networks, Inc. v. Akamai Technologies, Inc., 134 S. Ct. 2111 (2014) (No. 12-786), 2014 WL 1319146, at *10.

better position if the company could avoid suing farmers altogether, and indeed its patenting activities would probably be much less controversial if that were the case, but unfortunately there will always be some percentage of farmers who seek to obtain an advantage over other farmers by using a patented trait without paying for it, either by saving and replanting authorized seed, or by purchasing seed that was not intended to be replanted and planting it anyway. If the patent owner is unwilling to enforce its patent against farmers who choose not to pay for the technology, the patent will have little if any value since other farmers will learn that they do not need to respect it, and can themselves avoid paying for the technology while obtaining its benefit. In fact, in an environment where some farmers are infringing with impunity, other farmers are in a sense compelled to infringe also, or else be put at a competitive disadvantage with the infringing farmer. At least in the current environment, seed patent owners must be willing and able to enforce their patents against farmers, otherwise patents will cease to be a viable mechanism for capturing value and will no longer function as an incentive for investment in further innovation.

X. LEARNING FROM COPYRIGHT LAW'S RESPONSE TO THE SELF-REPLICATION OF DIGITAL CONTENT

In considering legal fixes for potential problems relating to inadvertent infringement of self-replicating technologies, it might be useful to learn from and even model legal solutions that have been implemented to address concerns relating to the ease with which copyrighted digital content is replicated and propagated over the Internet. The overall objective is to protect potentially inadvertent infringers while at the same time ensuring, to the extent possible, adequate means for copyright owners to enforce their rights. In practice, this often entails imposing some burden on potential infringers to take affirmative steps to avoid inadvertent infringement, or at least to cooperate with efforts of copyright owners to enforce their rights.

For example, courts have on occasion found Internet Service Providers liable for copyright infringement under circumstances in which the provider failed to take reasonable measures to prevent infringement, irrespective of whether the infringement was inadvertent. In *Perfect 10 v. Amazon.com*, the Ninth Circuit held that Google could be held contributorily liable if it had knowledge that infringing Perfect 10 images were available using its search engine, could take simple measures to impede further infringement of Perfect 10's copyrighted works, and failed to take such steps.[285] In the same vein, the Second Circuit has held that a willfully blind Internet Service Provider could be held liable even in the absence of specific intent or knowledge of infringing activities.[286]

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285. Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146, 1172–73 (9th Cir. 2007). *But see* Perfect 10 v. Visa Int'l Serv. Ass'n, 494 F.3rd 788 (9th Cir. 2007).

286. Tiffany (NJ) Inc. v. eBay, 600 F.3d 93, 109 (2d. Cir. 2010).

Applying these principles to a patented self-replicating technology like Monsanto's seeds, a farmer's liability could depend upon the farmer's ability to control the extent of infringement, and perhaps the degree to which the farmer profits from the infringement. A recent summary judgment decision issued in *Disney Enterprises v. Hotfile* provides some interesting insight in this regard.[287] The district court entered summary judgment finding Hotfile liable for vicarious copyright infringement based on the manner in which the company provides an online storage locker service containing many copyrighted movies and television shows.[288] The copyright owners were able to prevail in this case by establishing that Hotfile has the right and ability to control the infringement, and is directly profiting from the infringement.[289] Significantly, it was not necessary to prove that Hotfile contributed to the infringement, or was even aware of it.[290] A similar rationale might be applied to farmers and grain elevator operators under circumstances in which a court finds that the entity is profiting from the infringement and has the ability to control it.

The doctrine of vicarious infringement exemplified by Hotfile has not, to the best of my knowledge, been extended to patent law. But the courts are quite adept at adapting judicial innovations in copyright to patent law and vice versa. For example, in *Sony*, the Supreme Court incorporated principles from patent laws doctrine of contributory infringement into copyright law.[291] Similarly, in *eBay v. Mercexchange*, the Supreme Court cited the Copyright Act in defining the criteria to be considered by a court when entering an injunction against a patent infringer.[292] Note that these refinements of copyright and patent law are often triggered by advances in technology, and it seems well within the realm of possibility that advances in self-replicating technologies might spur similar judicial activity.

The Digital Millennium Copyright Act ("DMCA"), enacted by Congress in 1988, largely in response to the ease with which copyrighted digital content replicates and propagates over the Internet, addresses the problem of inadvertent infringement by creating safe harbors for parties like Internet Service Providers who might otherwise face liability for inadvertent infringement resulting from their activities.[293] At the same time, the DMCA seeks to maintain effective copyright protection by requiring those seeking to

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287. Disney Enters., Inc. v. Hotfile Corp., No. 11-20427-CIV, 2013 WL 6336286 (S.D. Fla. Sept. 20, 2013).

288. *Id.* at *1; *see generally* Eriq Gardner, *Hollywood Studios Win Massive Hotfile Lawsuit*, THE HOLLYWOOD REPORTER (Aug. 8, 2013, 2:41 PM), http://www.hollywoodreporter.com/thr-esq/hollywood-studios-win-massive-hotfile-616764.

289. *Disney*, 2013 WL 6336286, at *41.

290. *Id.* at *44.

291. Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 439 (1984) (citing "historic kinship between patent law and copyright law").

292. eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 392 (2006).

293. 17 U.S.C. § 512 (2012) (titled "Limitations on liability relating to material online").

avail themselves of the safe harbors to engage in certain activities that assist, or at least do not impede, the ability of the copyright owner to detect and enforce copyright against willful infringers.[294] For example, service providers are required to reasonably accommodate technologies that would allow the copyright owner to detect or prevent infringement.[295]

Congress could consider legislation that would adapt something like the DMCA approach to the policy concerns associated with patented self-replicating technologies and inadvertent infringement. Such a legislative approach could provide some form of safe harbor for farmers, and perhaps other potential inadvertent infringers such as seed cleaners and grain elevator operators. It would likely raise the interesting policy question of how to allocate the burden of responsibility for implementing measures to minimize the incidence of inadvertent infringement, for example, by testing seeds to check for the presence of patented technology, or by taking measures to segregate patented seed from unpatented seed, or to prevent genetic drift. Is it the responsibility of a patent owner like Monsanto to make sure that its patented seeds are not intermingled with generic seeds in grain elevators? Or do grain elevator operators have some duty to make sure that farmers buying commodity grain for use as seed do not buy the patented product, i.e., by monitoring and sequestering the commodity in a way that they have not been before?

To take a specific example, consider a farmer operating in an environment in which both generic Roundup Ready 1 and patented Roundup Ready 2 are widely used. If said farmer chooses to buy commodity grain for use as seed, should the law impose a duty on the farmer to make sure he is not planting patented Roundup Ready 2 seeds, even though he is perfectly within his rights to plant the generic Roundup Ready seeds? To hold the farmer strictly liable if he plants any patented seeds, which could effectively result in a de facto prohibition against planting of commodity seeds, would arguably impinge upon the traditional ability of farmers to use commodity grain as seed. A DMCA-style approach could grant some sort of safe harbor to such a farmer, but should also impose an obligation on the farmer to take reasonable measures to avoid using patented technology. For example, if a patent owner like Monsanto develops methods for testing and distinguishing between patented and non-patented seeds, there should be some obligation on the farmer to cooperate to some extent, or at least not to interfere with the patent owner's efforts to implement such an approach.

XI. GENETIC USE RESTRICTION TECHNOLOGIES

Given the practical difficulties associated with enforcing patents against farmers, developers of self-replicating technologies such as Monsanto would do well to consider alternate approaches to appropriating the value created by their investment in innovative technologies. One approach would be to intro-

294. *Id*.
295. 17 U.S.C. § 512(i).

duce some sort of technical restriction on copying. Little anger is directed toward the developer of an improved hybrid corn simply because farmers have to buy the seed every year if they want to benefit from the improvements in the hybrid seed. But using a patent to require the same thing, i.e., that a farmer pays for improvements to the seed each time he plants the seed, is an entirely different matter. It is not rational, but the reality is that people generally do not have a problem with farmers having to buy seed every year if it is based on a technological restriction, but to achieve the same result by means of patents is viewed by many as somehow improper.

In principle, the technology for restricting access to second-generation copies of patented seeds is available, although it has never been used in a Monsanto product, perhaps in part due to the negative public perception associated with the technology. Opponents of the technology have dubbed it "Terminator," and unfortunately the name has stuck and is even at times used by Monsanto, but a more accurate and neutral terminology is Genetic Use Restriction Technologies ("GURTs").[296] GURTs come in two forms, varietal-GURTs ("V-GURTs") and trait-GURTs ("T-GURTs").[297] A plant incorporating a V-GURT produces sterile seeds, which are perfectly fine for use as feed or fodder, but which cannot be saved and replanted by farmers.[298] The sterility of seeds incorporating V-GURTs led to the Terminator label, and a great deal of opposition from NGOs and others concerned with the implications of the technology, particularly for farmers in developing nations.[299] In 2000, the United Nations Convention on Biological Diversity ("UNCBD") recommended a de facto moratorium on field-testing and commercial sale of terminator seeds; the moratorium was re-affirmed and the language strengthened in March 2006 at the COP8 meeting of the UNCBD.[300] Monsanto has publicly pledged to forgo the use of V-GURTs, and the prospects for utilizing the technology in commercialized transgenic seeds seems highly unlikely in the foreseeable future.[301]

T-GURTs, on the other hand, do not result in sterile seeds. Instead, T-GURTs regulate the expression of a specific transgenic trait (hence the term T-GURT) in a plant while enabling plants to remain fertile and to produce viable seeds.[302] For example, a T-GURT might function by modifying a crop

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296. *Myth: Monsanto Sells Terminator Seeds*, MONSANTO, http://www.monsanto.com/newsviews/pages/terminator-seeds.aspx (last visited May 29, 2015); *see, e.g.*, U.S. Patent No. 5,723,765 (filed June 7, 1995).

297. Mellissa J. Hills et al., *Genetic Use Restriction Technologies (GURTs): Strategies to Impede Transgene Movement*, 12 TRENDS IN PLANT SCI. 127 (2007).

298. *Id.*

299. Haider Rizvi, *Biodiversity: Don't Sell "Suicide Seeds", Activists Warn*, INTER PRESS SERV. (Mar. 21, 2006), http://www.ipsnews.net/2006/03/biodiversity-dont-sell-suicide-seeds-activists-warn/.

300. *Moratorium*, BAN TERMINATOR, http://www.banterminator.org/Glossary/Moratorium (last visited July 5, 2015).

301. *Myth: Monsanto Sells Terminator Seeds, supra* note 296.

302. Hills, *supra* note 297.

in such a way that the genetic trait engineered into the crop does not function until the crop plant is treated with a chemical that is sold by the biotechnology company.[303] A farmer using a seed protected by T-GURT technology could save and replant seeds, but would not obtain the benefit of the enhanced trait in the crop unless they purchase the activator compound.

T-GURTs could be a useful approach that would avoid much of the Terminator controversy surrounding V-GURTs, resulting in a product more analogous to hybrid corn, i.e., capable of replication but with the loss of valuable attributes in second-generation seeds. But in the long run, the world community should reconsider the validity of the opposition to V-GURTs. The use of this technology in genetically engineered crops could be tremendously beneficial in numerous ways, extending beyond their potential to provide an alternative to patents for innovators attempting to secure compensation for use of their technology. For example, it would address concerns about the drift of transgenic DNA or the escape of genetically modified crops into the environment.[304] GURTs could also provide technical benefits for farmers. Use of V-GURTs could reduce the propagation of volunteer plants, which can reduce the efficiency of crop rotation practices.[305] It can also alleviate the problem of sprouting that can occur in non V-GURT grain under warm, wet harvest conditions.[306]

CONCLUSION

The increasing prevalence of self-replicating patentable technologies will, in all likelihood, compel the patent system to address the issue of inadvertent infringement head on, and it is imperative that it do so in a manner that does not unduly impinge upon the ability of innovators to achieve adequate protection for their inventions. Proposals to impose compulsory licensing schemes on self-replicating technologies, or to exhaust patent rights with respect to second-generation self-replicating technologies, or even to deny self-replicating technologies patent protection altogether, based on an alleged lack of patent eligibility or moral utility, would do just that, and do not appear to be warranted by what is currently a largely hypothetical concern over inadvertent infringement. There are established doctrines of patent law that could be adopted to address cases of inadvertent infringement if and when they are actually presented before a court. If the courts or Congress choose to enact novel legal doctrine to address inadvertent infringement, it should be conservative in nature, perhaps learning from the manner in which courts and Congress have addressed the proliferation of easily replicable copyrightable

303. *Genetic Use Restriction Technologies*, INT'L SEED FEDERATION (June 2003), http://www.worldseed.org/cms/medias/file/PositionPapers/OnSustainableAgriculture/Genetic_Use_Restriction_Technologies_20030611_(En).pdf.

304. *Id.*

305. *Id.*

306. *Id.*

subject matter on the Internet. Still, as a matter of prudence, innovators in self-replicating technologies might want to consider an increased emphasis on non-patent mechanisms for restricting unauthorized copying of self-replicating technologies, including the implementation of technological restrictions on copying such as GURTs.