

**DOWNLOADING INFRINGEMENT: PATENT LAW AS A
ROADBLOCK TO THE 3D PRINTING REVOLUTION**

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I. INTRODUCTION

The ability to create and replicate arbitrary three-dimensional objects using a single device is a technology often dreamed of by science fiction authors. Yet the past several decades have seen steady advances in additive manufacturing technology, more colloquially known as 3D printing.¹ While the current machines are a far cry from Star Trek's replicators, the capabilities of the current technology — in

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1. See *infra* Part II.

terms of materials, resolution, and size of the finished product — have transformed 3D printing from an expensive curiosity into a vital tool for both design and manufacturing.

Many commentators have discussed the impact of 3D printing technology on modern industry, noting the technology's potential to disrupt traditional design and manufacturing processes.² Indeed, the ability to create prototypes almost immediately and manufacture custom designs in a cost-effective manner may well revolutionize modern industry. But availability of this technology at the consumer level creates the potential for a different set of disruptive effects. 3D printing has now advanced to the point where consumers have ready access to the technology, either through services that print customer designs or with relatively affordable 3D printers designed for home use.³ This development has been a boon for the do-it-yourself (“DIY”) community — the broad collection of people engaged in the “creation, modification or repair of objects without the aid of paid professionals”⁴ — which quickly adopted 3D printing as part of its toolkit.

Yet this new technology puts the DIY community at risk of running afoul of patent law. Historically, DIYers have never had to worry much about infringing upon patents: even if their projects did happen to infringe, their work was individualized and difficult to replicate, and thus unlikely to draw the attention of any patentees who might try to enforce their rights.⁵ Consumer-level availability of 3D printing potentially changes that calculus. With the new technology, a DIYer can create a design and then make that design available to the whole world in the form of a digital file. It then becomes easy for anyone to replicate the DIYer's work, either by sending the digital file to a third party or by printing the design on personal hardware. 3D printing thus empowers the DIY community to generate public goods in the form of useful designs, freely available to anyone with access to a 3D printer. But if one of these designs happens to infringe on an existing patent, 3D printing also enables widespread patent infringement in the form of digital downloads in much the same manner that the advent of digital music enabled widespread copyright infringement.

This hypothetical conflict between the DIY community and intellectual property holders is not a question that can be relegated to some

2. See, e.g., CHRIS ANDERSON, *MAKERS: THE NEW INDUSTRIAL REVOLUTION* (2012); *Special Report: Manufacturing and Innovation: A Third Industrial Revolution*, ECONOMIST, Apr. 19, 2012, at 3 [hereinafter *Third Industrial Revolution*]; *3D Printing: Second Industrial Revolution is Under Way*, NEW SCIENTIST, <http://www.newscientist.com/special/3D-printing> (last visited Dec. 22, 2012).

3. See *infra* Part II.

4. Stacey Kuznetsov & Eric Paulos, *Rise of the Expert Amateur: DIY Projects, Communities, and Cultures*, 2010 PROC. NORDIC CONF. ON HUM.-COMPUTER INTERACTION 295, 295.

5. See Eric Michael, *Patents 101: Does DIY Infringe?*, GLASSBOX DESIGN (Feb. 27, 2009), <http://glassbox-design.com/2009/patents-101-does-diy-infringe>.

far-flung future. Released in January of 2012,⁶ the MakerBot Replicator consumer-level 3D printer sold 5,500 units by the end of August 2012, out of a total of 13,000 MakerBot printers sold since the company's inception in 2009.⁷ Leading 3D printing service Shapeways reported printing over one million products for a community of over 150,000 users by the end of June 2012.⁸ Thingiverse, the primary website for sharing DIYer designs, has reached an estimated average of 20,000 people per month during the first half of 2012.⁹ In 2010, Michael Weinberg, of the public interest group Public Knowledge, discussed the potential conflicts that home 3D printing would create with intellectual property owners.¹⁰ One of his predictions has already come to pass: copyright owners have taken notice of allegedly infringing print schematics shared on Thingiverse and have acted to have them removed.¹¹ Such activity is bound to draw the attention of patentees who perceive a real competitive threat to their inventions.

This Note discusses the modes of infringement made possible by 3D printing technology, identifies the actors most likely to face a risk of litigation, and proposes modifications to the current patent law regime, with an eye toward both preserving the public goods¹² generated by the DIY community and providing patentees with a method for good faith extrajudicial enforcement of their rights. Part II of this Note briefly summarizes the current state of the technology. Part III discusses how infringement may arise and who may be liable. Part IV proposes patent law modifications analogous to the Digital Millennium Copyright Act's ("DMCA") safe harbor and notice-and-takedown

6. Press Release, MakerBot Industries, Introducing the MakerBot Replicator (Jan. 10, 2012), available at <http://www.makerbot.com/blog/2012/01/09/introducing-the-makerbot-replicator>.

7. Ryan Kim, *MakerBot's Next Goal: Enabling 3-D Printer-based Businesses* (Aug. 27, 2012, 1:29 PM), <http://gigaom.com/2012/08/27/makerbots-next-goal-enabling-3-d-printer-based-businesses>.

8. *Funding the Rise of Creative Commerce*, SHAPEWAYS (June 19, 2012), <http://www.shapeways.com/blog/archives/1442-Funding-the-Rise-of-Creative-Commerce.html>.

9. See *Thingiverse.com*, QUANTCAST, <http://www.quantcast.com/thingiverse.com> (last visited Dec. 22, 2012).

10. See Michael Weinberg, *It Will Be Awesome If They Don't Screw It Up: 3D Printing, Intellectual Property, and the Fight Over the Next Great Disruptive Technology*, PUBLIC KNOWLEDGE (2010), <http://www.publicknowledge.org/files/docs/3DPrintingPaperPublicKnowledge.pdf>.

11. See Bre Pettis, *Copyright Policy*, THINGIVERSE BLOG (Feb. 18, 2011), <http://blog.thingiverse.com/2011/02/18/copyright-and-intellectual-property-policy> (discussing the first takedown notice for a Thingiverse design); Clive Thompson, *Clive Thompson on 3D Printing's Legal Morass*, WIRED: DESIGN (May 30, 2012, 1:43 PM), <http://www.wired.com/design/2012/05/3-d-printing-patent-law> (discussing a takedown notice aimed at a schematic for tabletop game pieces).

12. For the purposes of this Note, the term "public goods" can be understood either in its colloquial sense or in its technical sense as a non-excludable, non-rivalrous resource. See, e.g., Tyler Cowen, *Public Goods*, THE CONCISE ENCYCLOPEDIA OF ECONOMICS, <http://www.econlib.org/library/Enc/PublicGoods.html> (last visited Dec. 22, 2012).

provisions for copyright infringing material. Part V proposes the creation of a public-private partnership to help ensure that DIYers' inventions remain in the public domain, if they so desire. Part VI concludes.

II. THE CAPABILITIES AND ACCESSIBILITY OF 3D PRINTING TECHNOLOGY

The technology to “print” three-dimensional objects from a digital file has been available since the 1980s.¹³ The earliest incarnation of this technology, stereolithography, “sliced” a computer-aided design (“CAD”) file into two-dimensional cross-sections, and used an ultraviolet laser to “print” the cross-sections layer by layer in a photo-sensitive resin.¹⁴ The intervening years have seen the introduction of a bevy of improvements to this technique,¹⁵ and modern machines can print in a startling array of media: plastics,¹⁶ food products,¹⁷ and metals,¹⁸ along with most materials that can be reduced to powder.¹⁹

In the industrial context, the advantages of 3D printing are obvious: rapid prototyping of designs, cost-effective manufacturing of customized “one-off” items, production of designs that would be in-

13. See U.S. Patent No. 4,575,330 (filed Aug. 8, 1984) (claiming invention of the stereolithography process).

14. *Id.*; see also *Stereolithography (SLA) — The Process*, LASER PROTOTYPES EUR. LTD., <http://www.laserproto.com/ServicesProcess.aspx?PageID=5> (last visited Dec. 22, 2012).

15. See generally Sebastian Anthony, *What is 3D Printing?*, EXTREMETECH (Jan. 25, 2012, 2:16 PM), <http://www.extremetech.com/extreme/115503-what-is-3d-printing>; Christopher Barnatt, *3D Printing*, EXPLAININGTHEFUTURE.COM, <http://www.explainingthefuture.com/3dprinting.html> (last visited Dec. 22, 2012).

16. See *FDM (Fused Deposition Modeling)*, RPWORLD.NET, <http://rpworld.net/cms/index.php/additive-manufacturing/rp-rapid-prototyping/fdm-fused-deposition-modeling-.html> (last visited Dec. 22, 2012) (printing with thermoplastics); *WOOF Rocks the Boat*, OPEN3DP (July 14, 2012), <http://open3dp.me.washington.edu/2012/07/woof-rocks-the-boat> (printing with recycled HDPE milk jugs).

17. See Windell H. Oskay, *Solid Freeform Fabrication: DIY, on the Cheap, and Made of Pure Sugar*, EVIL MAD SCIENTIST LABORATORIES (May 9, 2007), <http://www.evilmadscientist.com/2007/solid-freeform-fabrication-diy-on-the-cheap-and-made-of-pure-sugar> (printing with sugar); *Printing Cookie Dough*, OPEN3DP (July 4, 2012), <http://open3dp.me.washington.edu/2012/07/printing-cookie-dough> (printing with cookie dough); Elizabeth Fish, *Chocolate Printer Goes on Sale, Comes Too Late for the Easter Bunny*, PCWORLD: GEEK TECH BLOG (Apr. 9, 2012, 3:10 PM), http://www.pcwORLD.com/article/253438/chocolate_printer_goes_on_sale_comes_too_late_for_the_easter_bunny.html (printing with chocolate).

18. See Joris Peels, *3D Printing in Gold Possible*, IMATERIALISE (Jan. 19, 2011), <http://i.materialise.com/blog/entry/3d-printing-in-gold-possible> (printing with gold); *Transplant Jaw Made by 3D Printer Claimed as First*, BBC NEWS (Feb. 6, 2012, 9:07 AM), <http://www.bbc.com/news/technology-16907104> (printing with titanium).

19. See, e.g., *3D Printing in Wood Flour*, IMATERIALISE (Apr. 6, 2011), <http://i.materialise.com/blog/entry/3d-printing-in-wood-flour> (printing with powdered wood); *Bone Yard — 3DP in Bone*, OPEN3DP (Mar. 10, 2011), <http://open3dp.me.washington.edu/2011/03/bone-yard-3dp-in-bone> (printing with powdered bone); *Ceramics*, SHAPEWAYS, <http://www.shapeways.com/materials/ceramics> (last visited Dec. 22, 2012) (printing with ceramic powder); see generally *3D Powder Printing*, DAAP INFO CENTER, <http://wiki.daap.uc.edu/groups/infocenter/wiki/99d01> (last updated July 13, 2011).

feasible using traditional techniques, and more efficient use of materials.²⁰ Large-scale industrial manufacturers such as GE and EADS have already demonstrated an interest in exploiting this technology,²¹ and recent work by Xerox may bring electronics manufacturers into the 3D printing fold.²² *The Economist* has even gone so far as to suggest that this technology heralds a “third industrial revolution.”²³

Slightly less heralded has been the potential effect of consumer access to 3D printing technology. While most 3D printing equipment is designed and priced for the industrial market,²⁴ several printers that use plastic filament as their printing medium are now available at prices accessible to individual users. RepRap is an ongoing project relying upon open source design to develop a 3D printer that can print nearly all of its own parts;²⁵ thus its cost is largely determined by the prices of the underlying materials. MakerBot Industries followed on the RepRap project and sought to lower the bar to entry by releasing a line of ready-to-use 3D printers; their current model, the Replicator 2, sells for about \$2,200.²⁶ And recently 3D Systems, a company known more for its industrial 3D printing equipment, entered the consumer market with a more user-friendly \$1,299 design called Cube.²⁷ Consumers who do not want the expense and hassle of a home machine, or who desire access to a wider array of printing media, can upload designs to the Shapeways website and have custom-printed objects mailed to them.²⁸

Since most consumers are not DIYers, the utility of 3D printers for most users is dependent upon access to easy-to-use designs. Currently, two major design collections help to fill this gap. In addition to accepting individual uploads, Shapeways makes available a wide as-

20. See *Solid Print*, in *Third Industrial Revolution*, *supra* note 2, at 14 [hereinafter *Solid Print*].

21. *Id.* at 14, 16.

22. See *Print Me a Phone: New Techniques to Embed Electronics into Products*, *ECONOMIST*, July 28, 2012, at 71.

23. *Third Industrial Revolution*, *supra* note 2.

24. Printers for the industrial market can cost anywhere from \$15,000 to over \$1 million. *Solid Print*, *supra* note 20, at 18.

25. See REPRAP, http://reprap.org/wiki/Main_Page (last visited Dec. 22, 2012).

26. *MakerBot Replicator 2: Desktop 3D Printer*, MAKERBOT INDUSTRIES, LLC, <http://store.makerbot.com> (last visited Dec. 22, 2012). MakerBot is probably the most well known manufacturer, following co-founder and CEO Bre Pettis' appearance on the Colbert Report. Pettis and his team laser-scanned Stephen Colbert's head and printed various altered models of it on a version of the MakerBot printer. *Bre Pettis*, *COLBERT NATION* (June 8, 2011), <http://www.colbertnation.com/the-colbert-report-videos/388966/june-08-2011/bre-pettis>.

27. CUBIFY, <http://cubify.com/cube> (last visited Dec. 22, 2012).

28. SHAPEWAYS, <http://www.shapeways.com> (last visited Dec. 22, 2012). As of this writing, Shapeways will print objects in four different plastics, colored sandstone, ceramic, glass, stainless steel (which may be plated with other metals), and sterling silver (though molten silver is actually just poured into a 3D printed mold). *Material Portfolio*, SHAPEWAYS, <http://www.shapeways.com/materials> (last visited Dec. 22, 2012).

sortment of user-designed objects for printing, though consumers do not have the opportunity to purchase the underlying design file.²⁹ MakerBot Industries takes a different approach with its website Thingiverse, where DIYers share their own designs and improve upon others' designs.³⁰ Thingiverse allows users to download standard format CAD files, in contrast to Shapeways's sales-focused model.³¹ Access to the underlying CAD file means that consumers can print objects at home on a personal 3D printer; while a savvy user may want to customize the object before printing, in theory even the most technophobic consumer should be able to simply download the file and print the object. If 3D Systems's user-friendly Cube printer is any indication, this theoretical understanding is on the verge of merging with reality.

III. PRINTING UNCERTAINTY: BRINGING PATENT INFRINGEMENT TO THE MASSES

Thingiverse illustrates the ultimate implication of consumer-level 3D printing: clever DIYers can embody their ideas in a digital format and share them with the world, and consumers halfway around the globe can immediately download, use, and benefit from those ideas. At present, that lofty description seems undermined by the triviality of reality: a substantial number of publicly available designs are decorations,³² games,³³ or pop culture references.³⁴ Intellectual property concerns would thus seem primarily limited to copyright infringement, in both the underlying CAD files and the objects themselves.³⁵ But many such objects are useful,³⁶ and thus potentially patentable or patented.³⁷

29. See *Feed of the Future*, SHAPEWAYS, <http://www.shapeways.com/feed> (last visited Dec. 22, 2012).

30. THINGIVERSE, <http://www.thingiverse.com> (last visited Dec. 22, 2012).

31. *Id.*

32. See, e.g., *Crania Anatomica Filigree (Small)*, SHAPEWAYS, <http://www.shapeways.com/model/294261/crania-anatomica-filigree-small.html> (last visited Dec. 22, 2012).

33. See, e.g., *Steampunk Dice Set*, SHAPEWAYS, <http://www.shapeways.com/model/267913/steampunk-dice-set.html> (last visited Dec. 22, 2012).

34. See, e.g., *Yoda Vase*, THINGIVERSE, <http://www.thingiverse.com/thing:27687> (last visited Dec. 22, 2012).

35. See generally Brian Rideout, *Printing the Impossible Triangle: The Copyright Implications of Three-Dimensional Printing*, 5 J. BUS. ENTREPRENEURSHIP & L. 161 (2011) (discussing the copyright implications of 3D printing).

36. For example, Thingiverse features designs that allow users to print upgrades for their printers. See, e.g., *Parametric Universal Heavy Duty 20ml Syringe Extruder*, THINGIVERSE (July 1, 2012), <http://www.thingiverse.com/thing:26047>. Designs for the printable portions of some RepRap designs are also available. See, e.g., *MendelMax 1.5*, THINGIVERSE (Mar. 30, 2012), <http://www.thingiverse.com/thing:20355>.

37. See 35 U.S.C. § 101 (2006) ("Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.").

As a result, Thingiverse, Shapeways, and their ilk — along with DIYers and downloaders — now have the capability to generate wide-scale patent infringement over the Internet; future advancements in consumer-level 3D printing technology will only expand this capability.

One fundamental difference between patent infringement and copyright infringement is that a showing of independent invention does not eliminate patent liability.³⁸ Indeed, the most likely scenario for 3D printing infringement is one where a DIYer independently creates a design for an infringing item, and then shares that design through Thingiverse or Shapeways with users who print or purchase copies of the item. This scenario presents three possible avenues of patent infringement: (1) liability for one who “makes, uses, offers to sell, or sells any patented invention”;³⁹ (2) liability for one who “actively induces infringement of a patent”⁴⁰ (“induced infringement”); and (3) one who “offers to sell or sells . . . a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention”⁴¹ (“contributory infringement”).

For the purposes of analysis, assume that Alice is a DIYer who unwittingly and independently creates an infringing design. More concretely, suppose that Alice’s design infringes on The Nemours Foundation’s Wilmington Robotic Exoskeleton (“WREX”),⁴² an orthosis device comprised largely of 3D-printed parts that assists individuals with muscular disabilities.⁴³ Alice then uploads that design to both Thingiverse and Shapeways. Bob is a consumer who downloads the design file and prints a copy of the object from Thingiverse, and who also orders a custom-printed copy from Shapeways. The following subparts discuss the modes of liability for the involved parties, without concern for the practicality of recovering from any particular party.

38. Independent invention is a viable defense to a claim of *willful* infringement, however. *SRI Int’l, Inc. v. Advanced Tech. Labs., Inc.*, 127 F.3d 1462, 1465 (Fed. Cir. 1997) (holding that independent invention “should be taken into account and given appropriate weight” when determining whether infringement was willful).

39. 35 U.S.C. § 271(a) (2006).

40. *Id.* § 271(b).

41. *Id.* § 271(c).

42. U.S. Patent No. 6,821,259 (filed Dec. 21, 2001).

43. See 3D Printed “Exoskeleton” Lets a Little Girl Lift Her Arms and Play, STRATASYS, <http://www.stratasys.com/Resources/Case-Studies/Medical-FDM-Technology-Case-Studies/Nemours.aspx> (last visited Dec. 22, 2012). Orthotics present an obvious application for 3D printing because of the relative ease of customizing design files. In theory, users could use their own measurements to modify a template file and then print custom orthotics for a fraction of the cost of professionally made orthotics.

A. Direct Infringement

Direct infringement presents the simplest question: which actors make, use, offer to sell, or sell the infringing design for the purposes of § 271(a)? As a passive host for the design files, Thingiverse is innocent of any direct infringement. Alice is also not liable for uploading the CAD file, though she may be liable for any copies of the object that she printed in the process of developing her design.⁴⁴ On the other hand, Bob established his liability for making a WREX once he printed the design at home. (Bob is, of course, also liable as a user of the patented invention.) Similarly, Shapeways is liable for both manufacturing and selling Bob's requested copy of the patented invention (and as a commercial entity, is the most likely target of Nemours's infringement suit). However, under the Shapeways Terms and Conditions, Alice will be liable to Shapeways for any legal costs and judgments the company incurs as a result of her infringing design.⁴⁵

B. Indirect Infringement: Induced and Contributory Infringement

Since Alice and Thingiverse are not liable for direct infringement, Nemours may instead attempt to proceed against them on an indirect infringement theory: induced infringement or contributory infringement. Induced infringement is, in essence, "aiding and abetting another's direct infringement"⁴⁶ and requires a showing that the defendant had the specific intent to cause another to infringe upon the patent in question.⁴⁷ Contributory infringement "may include either the sale of a component of a patented machine, manufacture, combination or composition (including a component used in a claimed system), or the sale of a material or apparatus for use in practicing a patented process."⁴⁸ Which indirect infringement theory is appropriate would de-

44. The narrow "experimental use" common law exception may apply so long as Alice had no commercial goal in mind, but discussion of that doctrine is beyond the scope of this Note. See generally 5 DONALD S. CHISUM, CHISUM ON PATENTS § 16.03[1] (2012) (collecting cases addressing the experimental use doctrine).

45. See *Shapeways Terms and Conditions*, SHAPEWAYS, http://www.shapeways.com/terms_and_conditions (last updated Feb. 2012) ("Should your User Generated Content nevertheless be found to be infringing and/or in violation of any law, you will defend Shapeways against third party claims, and be held liable for all (direct and indirect) damages and costs incurred by Shapeways with respect to such claims.").

46. 5 CHISUM, *supra* note 44, § 17.04; see also *Nat'l Presto Indus., Inc. v. W. Bend Co.*, 76 F.3d 1185, 1194 (Fed. Cir. 1996) ("The statutory liability for inducement of infringement derives from the common law, wherein acts that the actor knows will lead to the commission of a wrong by another, place shared liability for the wrong on the actor.").

47. See *Symantec Corp. v. Computer Assocs. Int'l, Inc.*, 522 F.3d 1279, 1292 (Fed. Cir. 2008).

48. *Arris Group, Inc. v. British Telecomms. PLC*, 639 F.3d 1368, 1376 (Fed. Cir. 2011) (internal quotation marks omitted).

pend on the facts underlying the infringement. For example, indirect infringement would be appropriate if Alice's design directly embodies the WREX, while contributory infringement would be appropriate if her design allowed Bob to print replacement parts that he used to reconstruct, rather than repair, a legitimate copy of WREX.⁴⁹ Either theory requires a showing of direct infringement by *someone*,⁵⁰ but in this hypothetical, even the single instance by Bob or by Shapeways would suffice. Note that Alice and Thingiverse lack the requisite specific intent, and so Nemours must rely on establishing a *prima facie* case of contributory infringement.

Nemours would have one more major hurdle in establishing its *prima facie* case. Following the Supreme Court's decision in *Global-Tech Appliances, Inc. v. SEB S.A.*,⁵¹ both induced and contributory infringement now have identical knowledge components favorable to an unwitting defendant: to succeed, the plaintiff must show that the contributory or inducing infringer had knowledge of the underlying patent and knowledge that infringement would result from her actions.⁵² Though our hypothetical scenario assumes that there was no actual knowledge of infringement, Nemours's case is not lost yet. The Court went on to hold that the criminal law doctrine of "willful blindness" applies to § 271(b)'s knowledge requirement (and, by implication, to § 271(c)'s knowledge requirement): if the defendant (1) "subjectively believe[s] that there is a high probability that a fact exists," and (2) "take[s] deliberate actions to avoid learning of that fact," then knowledge will be imputed.⁵³ While the contours of willful blindness remain to be established, Nemours may well be able to establish a *prima facie* case against Alice under certain scenarios. For example, if its claim is based on a reconstruction theory,⁵⁴ it may argue that she had actual knowledge of the patent and was willfully blind to the risk of infringement-by-reconstruction. However, Nemours will be unlikely to proceed against Thingiverse, as Thingiverse's status as a passive host of content will make it difficult to establish either knowledge or willful blindness on its part.

49. Repair of a patented item does not constitute infringement, while reconstruction does; however, the line between the two is an uncertain one. See generally Mark D. Janis, *A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law*, 58 MD. L. REV. 423 (1999). While this doctrine is beyond the scope of this Note, suffice it to say that the capabilities of 3D printers are specially suited to forcing the question of where the line between reconstruction and repair lies.

50. See *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1320–22 (Fed. Cir. 2009).

51. 131 S. Ct. 2060 (2011).

52. *Id.* at 2068.

53. *Id.* at 2070.

54. See *supra* note 49.

IV. BRINGING THE PATENT REGIME INTO THE ERA OF DIGITAL INFRINGEMENT

All parties acting in good faith would probably prefer to avoid the expense and hassle of litigation.⁵⁵ But the current patent law framework, which focuses on structuring relationships where all relevant parties are legally sophisticated, provides inadequate guidance to the parties in our hypothetical scenario. Shapeways could ultimately find its business model untenable as a result of overwhelming legal risk. Patentees could lose the power to assert their rights if an infringing design goes viral on Thingiverse. And DIYers may choose not to share their creations if they find their peers facing patent infringement lawsuits. What is needed is a remedy that allows legitimate, good faith patentees to assert their rights while preserving the benefits that accrue to the public from freely shared designs. This Part will discuss the self-help remedies available under the current system, and then proceed to suggest a solution modeled on copyright law.

A. Self-Help in the Age of Digital Reproduction

From the patent-holder's perspective, the traditional response — a cease-and-desist letter — will likely seem the best response. A patentee who discovers infringing designs on Thingiverse or Shapeways can draft a straightforward cease-and-desist letter and demand that the infringing designs be removed. As a direct infringer who does not rely on any particular design for its revenue stream, Shapeways is likely to comply without protest. And though Thingiverse is likely neither directly nor indirectly liable at the time it receives the letter,⁵⁶ receipt of the letter may suffice to impute the knowledge and intent necessary for subsequent indirect infringement liability.⁵⁷ Thus Thingiverse would likewise have a strong incentive to comply, or risk litigation.

The cease-and-desist letter is not without its weaknesses, however. One potential issue is that the patent-holder may be unable to contact the DIYer who uploaded the infringing design, as Thingiverse users operate under pseudonyms, with no method of direct contact available through the Thingiverse site. Since the patent-holder has

55. According to the American Intellectual Property Law Association's 2011 report, even when the amount in controversy is under \$1 million, the average cost of litigation through discovery is almost \$500,000, and litigation through judgment is over \$900,000. The costs increase as the amount in controversy increases. See *American Intellectual Property Law Association Report of the Economic Survey*, INTELL. PROP. INS. SERVICES CORP., <http://www.patentinsurance.com/iprisk/aipia-survey> (last visited Dec. 22, 2012).

56. See *supra* Part III.

57. Cf. *Fujitsu Ltd. v. Netgear Inc.*, 620 F.3d 1321, 1332 (Fed. Cir. 2010) (holding that letters from the patent-holder raised questions of material fact as to alleged infringer's knowledge and intent for the purposes of induced infringement).

insufficient leverage over Thingiverse to force disclosure, identifying the DIYer may require substantial resources. Identifying the DIYer may be important because of a second potential issue: if the DIYer feels aggrieved by a subsequent removal (perhaps considering it unjust that her independent invention does not shield her from infringement⁵⁸) she may act to distribute her design widely through other channels before the patentee has an opportunity to take further legal action to find her and enjoin her actions. The DIYer may be aided in her efforts further by the “Streisand Effect” — the widely noted Internet phenomenon wherein an attempt to suppress information ultimately has the effect of publicizing it more widely.⁵⁹ Thus a simple cease-and-desist letter may have the perverse effect of severely undermining a patentee’s rights.

Once the threat of litigation becomes apparent, the actors likely to be charged with infringement will similarly act to protect their interests. Thingiverse has instituted a policy that provides for the removal of material that infringes on any intellectual property right,⁶⁰ and Shapeways has implemented a “notice take down” system that purports to be in accordance with the DMCA, but the ambiguous language of the procedure refers to “intellectual property right holders” and may indicate that patent holders can also request takedowns.⁶¹

DIYers and users of downloaded designs are in a more precarious situation, however. One strategy they can follow is to rely upon structural disincentives to litigation: principally, the fact that most consumers are effectively judgment-proof given the amount of recovery necessary to justify an infringement suit. Under this strategy, they can

58. Cf. Joe Mullin, *How Juror Misconceptions Affect Patent Trials*, TEX. LAWYER (Jan. 26, 2009), <http://www.law.com/jsp/tx/PubArticleTX.jsp?id=1202427746115> (describing the common belief among laypersons that patent infringement arises only from actual copying).

59. The “Streisand Effect” is a phenomenon named for Barbara Streisand’s failed attempt in 2003 to sue an environmental photographer for posting aerial photographs of her Malibu house on his website; instead of removing the image, the publicity created by the suit drew further attention to the photos. See Wendy Seltzer, *Free Speech Unmoored in Copyright’s Safe Harbor: Chilling Effects of the DMCA on the First Amendment*, 24 HARV. J.L. & TECH. 171, 215 & n.229 (2010) (citing Andy Greenberg, *The Streisand Effect*, FORBES.COM (May 11, 2007, 6:00 AM), http://www.forbes.com/2007/05/10/streisand-digg-web-tech-cx_ag_0511streisand.html) (discussing the “Streisand Effect” with respect to DMCA takedown notices).

60. See *Intellectual Property Policy*, THINGIVERSE, <http://www.thingiverse.com/legal/ip-policy> (last visited Dec. 22, 2012). Note that Thingiverse’s policy also reflects awareness of the notice problem and attempts to disclaim knowledge of infringement:

Notification from a copyright or other rights owner or from a person authorized to act on behalf of the copyright or other rights owner that fails to comply substantially with the provisions above shall not be considered as providing actual knowledge or an awareness of facts or circumstances from which infringing or otherwise unauthorized activity is apparent.

Id.

61. See *Shapeways Content Policy and Notice Take Down Procedure*, SHAPEWAYS, http://www.shapeways.com/legal/content_policy (last visited Dec. 22, 2012).

simply ignore any concern of infringement. However, if infringement becomes too widespread, patent-holders may eventually litigate in order to make an example out of some individuals (or with the goal of extracting an early-stage settlement), thereby creating a disincentive for others to infringe by raising the potential costs of infringement.⁶² Alternatively, DIYers may limit their sharing to non-public websites, thus reducing the chance that patent-holders will discover potentially infringing designs.⁶³ Patentees may be content with such a development, but relegation to the shadows would undermine the public benefits of 3D printing technology, as both infringing and non-infringing designs would likely be placed outside of the public's reach. The safest course of action is for DIYers simply to comply with all cease-and-desist letters, though this will result in over-compliance, as not all letters will identify actual acts of infringement (and some may even be sent in bad faith⁶⁴).

Given the options above, the best-case scenario is an uneasy détente between patentees, websites, and DIYers: (1) websites rely on takedown policies to discourage lawsuits; (2) patentees employ takedown policies and cease-and-desist letters, and perhaps convince websites to provide access to pseudonymous users; and (3) DIYers comply with all cease-and-desist requests. So long as all the players act in good faith, such a system could be sustainable. However, as soon as a party acts to undermine the détente (e.g., patentees seek settlement payments from allegedly infringing DIYers as a revenue stream without regard for claim validity, bad faith patent holders pursue litigation in an attempt to shut down Shapeways or Thingiverse, or DIYers flout cease-and-desist letters), the system risks falling apart, with ordinary users ultimately suffering the greatest economic detriment in the form of lost consumer surplus. Legal safeguards can help prevent this outcome.

62. Compare this hypothetical to the actual behavior of Lodsys, LLC. After obtaining patent licensing fees from Apple, Lodsys claimed that iPhone application developers were independently liable for licensing fees. The company then sued seven small developers (including some individuals) for infringement on its patents. See Florian Mueller, *Lodsys Sues 7 App Developers in East Texas, Disagrees with Apple; Android also Targeted*, FOSS PATENTS (May 31, 2011, 11:14 PM), <http://www.fosspatents.com/2011/05/lodsys-sues-7-app-developers-in-eastern.html>. The Recording Industry Association of America ("RIAA") pursued, and eventually abandoned, a similar strategy in its efforts to address infringing music downloads. See, e.g., David Kravets, *Copyright Lawsuits Plummet in Aftermath of RIAA Campaign*, WIRED: THREAT LEVEL (May 18, 2010, 1:24 PM), <http://www.wired.com/threatlevel/2010/05/riaa-bump> ("The RIAA . . . has said its lawsuits were largely a public relations effort, aimed at striking fear into the hearts of would-be downloaders.").

63. Notorious file-sharing website The Pirate Bay currently maintains a list of print designs available as Torrents. See *Physibles*, THE PIRATE BAY, <https://thepiratebay.se/browse/605> (last visited Dec. 22, 2012).

64. Cf. Cory Doctorow, *Universal Music Accused of Using Fraudulent DMCA Notices as a Negotiating Tactic in Licensing Music from Other Labels*, BOING BOING (July 20, 2011, 5:43 AM), <http://boingboing.net/2011/07/20/universal-music-accu.html>.

B. A Digital Millennium Patent Act?

While consumer-level 3D printing is a new development, the legal issues it presents should be familiar to anyone who was using the Internet during the mid-1990s. That period presented copyright owners, primarily the film and music industries, with an unfamiliar threat. Technological developments in file formats, together with widely available broadband access, transformed illicit copying from a high-cost analog process (with the concomitant quality degradation over multiple generations of copies) into a nearly costless, totally lossless, and easily distributed digital process. As concerns mounted over the potential of the new digital medium, member states of the World Intellectual Property Organization signed a new copyright treaty in 1996,⁶⁵ which Congress implemented by passing the DMCA in 1998.⁶⁶ Central to the DMCA was a notice-and-takedown provision — combined with a safe harbor provision for content hosts — that arguably paved the way for sites like YouTube.⁶⁷

The DMCA notice-and-takedown and safe harbor provisions point the way toward a basic legal framework that can both help patentees more easily assert their rights, and protect the nascent “inventive commons” developing within the 3D printing community. The basic idea is two-fold: (1) implement a standardized notice-and-takedown procedure for websites such as Thingiverse and Shapeways that grants a safe harbor from liability, so long as the sites did not have actual knowledge of infringement; and (2) establish a limited “innocent independent inventor” defense that protects DIYers and hosting websites.

1. Notice and Takedown

The DMCA provides that

[a] service provider shall not be liable for monetary relief, or, except as provided in subsection (j), for injunctive or other equitable relief, for infringement of copyright by reason of the storage at the direction of

65. World Intellectual Property Organization Treaty, Apr. 12, 1997, pmbL., S. Treaty Doc. No. 105-17 (1997) (“*Recognizing* the need to introduce new international rules and clarify the interpretation of certain existing rules in order to provide adequate solutions to the questions raised by new economic, social, cultural and technological developments . . .”).

66. THE DIGITAL MILLENNIUM COPYRIGHT ACT OF 1998; U.S. COPYRIGHT OFFICE SUMMARY 1 (1998), available at <http://www.copyright.gov/legislation/dmca.pdf>.

67. See David Kravets, *10 Years Later, Misunderstood DMCA is the Law That Saved the Web*, WIRED: THREAT LEVEL (Oct. 27, 2008, 3:01 PM), <http://www.wired.com/threatlevel/2008/10/ten-years-later> (arguing that the DMCA played a crucial role in the development of important technologies and websites).

a user of material that resides on a system or network controlled or operated by or for the service provider, if the service provider —

(A)(i) does not have actual knowledge that the material or an activity using the material on the system or network is infringing;

(ii) in the absence of such actual knowledge, is not aware of facts or circumstances from which infringing activity is apparent; or

(iii) upon obtaining such knowledge or awareness, acts expeditiously to remove, or disable access to, the material⁶⁸

Thus a copyright owner can have infringing material taken down by sending notice to a content host, such as YouTube, that includes the statutorily required information, such as identification of the work supposedly infringed.⁶⁹ If the individual who uploaded the material believes the takedown was in error, she can send the content host a “counter notification” to have the material reinstated.⁷⁰ Adherence to these procedures immunizes the content host from liability for removing and reinstating the material,⁷¹ though parties who misuse either the notice-and-takedown or counter-notice provisions may be liable for resulting damages (including attorneys’ fees).⁷²

The basic structure for a patent notice-and-takedown system would be much like that established by the DMCA. A patentee who believes a hosted design embodies her patented invention first sends an appropriate notice to the hosting site. That notice should contain the information necessary to make a determination as to the legitimacy of the infringement allegation: (1) the number of the infringed patent; (2) the claims allegedly infringed; and (3) a brief, non-legal explanation for the belief that the claims are infringed. The website will then remove the identified design and send a copy of the notice to the DIYer, along with (4) a standard information packet, provided by the patent-holder, with basic information about the nature of patent rights. Websites that comply with these requirements should be insulated from infringement liability, including liability for unknowing

68. 17 U.S.C. § 512(c)(1) (2006 & Supp. V 2011).

69. *See id.* § 512(c)(3).

70. *Id.* § 512(g)(2)–(3).

71. *Id.* § 512(g)(1), 512(g)(4).

72. *Id.* § 512(f).

direct infringement that results from printing copies of a DIYer's design.

Items (1) and (2) are self-explanatory. The inclusion of item (3) reflects the fact that the language of patent claims is often extremely difficult for non-lawyers to understand: a DIYer, faced with a patent and a set of claims, would likely struggle to identify how her design infringes on those claims. A good faith explanation in plain English, giving a sense of what the patent covers, would help legitimize the takedown request in the eyes of the DIYer. Since use of these explanations at claim construction hearings could create a perverse incentive to err on the side of over-broad claims in the notice, notices should be inadmissible for construction purposes. But in order to discourage making claims that go far beyond the text of the patent, notices *should* be admissible evidence to support a defense of patent misuse.⁷³

Item (4) is a partial solution to the problem identified in Part IV.A. Because of the popular misunderstanding of patent infringement as “copying” or “stealing,”⁷⁴ many DIYers could take offense at the accusation of infringement, and perhaps be motivated to seek avenues for noncompliance. Educating the DIYer as to the nature of patent rights is a low-cost method for reducing resistance.

Like the DMCA notice-and-takedown procedure, the DIYer should also have the opportunity to respond with a counter-notice. Here, the counter-notice should be available in cases where the original notice was clearly wrong. For example, the plain English description may indicate that the patentee simply misunderstood what the DIYer's design actually does. Or, even more basic, the upload date for the DIYer's design may give her creation priority over the patentee's claims, rendering the question of actual infringement moot.⁷⁵ Upon receiving an appropriate counter-notice, a website should then be able to reinstate the DIYer's design without incurring liability for itself. Moreover, if the original notice shows evidence of bad faith, the DIYer should be able to seek a penalty from the patent-holder, and any subsequent litigants should be able to use the notice as evidence of patent misuse.

Though the DMCA's notice-and-takedown provisions have been the target of some criticism — notably for abuse of the takedown pro-

73. See generally 6 CHISUM, *supra* note 44, § 19.04 (discussing the patent misuse doctrine, which allows courts to refuse to enforce a patent whose owner has engaged in some forms of inequitable behavior with regard to that patent).

74. See Joe Mullin, *Patent Defendants Aren't Copycats. So Who's The Real Inventor Here?*, THE PRIOR ART (Feb. 11, 2009), http://thepriorart.typepad.com/the_prior_art/2009/02/copying-in-patent-law.html.

75. See 35 U.S.C. § 102 (2006).

cess⁷⁶ — a patent-oriented version would likely lack the DMCA’s weaknesses. One study of DMCA takedown notices gave some support for these criticisms, finding that thirty-one percent of notices were flawed due to uncertain rights (e.g., the copyright owner was entitled to “thin” or no protection, or the alleged infringer had a clear fair use argument),⁷⁷ and that many requests to de-index a site from a search engine appeared to be submitted by businesses targeting competitors.⁷⁸

Distinctions between patent and copyright law obviate some concerns that these observations might raise, however. First, there would be no analogue in a “patent DMCA” to de-indexing requests. While mere *knowledge* of infringement may suffice to turn indexing into contributory copyright infringement,⁷⁹ secondary patent infringement requires *intent*.⁸⁰ Thus existing patent doctrine should suffice to shield even risk-averse indexers. Second, the fact that patent applications must first pass through a patent examiner will diminish the risk of substantively flawed claims. Third, the risk of raising patent misuse claims should serve as a deterrent against overreaching claims in many cases: so long as the underlying patent is valuable, the risk of losing its economic value will likely outweigh the potential gain in inappropriately suppressing a freely available design. Finally, in spite of all its flaws, the DMCA has arguably been successful in facilitating a transition into the digital age;⁸¹ though currently absent, a patent version would be similarly worthwhile so long as it facilitated the forthcoming 3D printing movement.

2. A Novel Defense

While it would go far in enforcing a multi-party détente, the proposed DMCA-like safe harbor would not address the liability for any direct infringement engaged in by users and DIYers. Patentees looking to take advantage of this could avoid the notice-and-takedown system altogether and directly apply legal threats to DIYers, perhaps with the intent to collect settlement payments.⁸² Alternatively, a pa-

76. See, e.g., Mike Masnick, *Copyright as Censorship: Newport Television Abusing DMCA To Try To Silence Criticism*, TECHDIRT (July 12, 2011, 2:51 PM), <http://www.techdirt.com/articles/20110712/03450915054/copyright-as-censorship-newport-television-abusing-dmca-to-try-to-silence-criticism.shtml>.

77. Jennifer M. Urban & Laura Quilter, *Symposium Review: Efficient Process or “Chilling Effects”? Takedown Notices Under Section 512 of the Digital Millennium Copyright Act*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 621, 667 (2006).

78. *Id.* at 651.

79. See 3 MELVILLE B. NIMMER AND DAVID NIMMER, NIMMER ON COPYRIGHT § 12.04[3][a] (2012).

80. See 5 CHISUM, *supra* note 44, § 17.01.

81. See Kravets, *supra* note 67.

82. As a model, consider the actions of the “copyright troll” Righthaven. Righthaven’s business model entailed seeking out individual bloggers who copied newspaper content, and

tentee could decide simply to sue the direct infringers, perhaps with the intent to send a message to other DIYers or downloaders. But DIYers and downloaders are likely to have been unaware that they were infringing any patents; moreover, neither party would have obtained financial gain from its actions. In essence, neither the DIYers nor the downloaders are culpable, and neither would be unjustly enriched. Because of the negative effect the imposition of liability could have on the inventive commons in this scenario, the equitable approach would be to insulate these parties from liability.

To codify this approach, patent law should incorporate an “innocent independent inventor” defense to liability, which would provide that direct infringement liability will not attach if the infringer (1) had no actual knowledge of the patent at issue (where “actual knowledge” includes willful blindness), and (2) was not making commercial use of the patented invention, or otherwise attempting to profit financially from it. Such a rule would still allow patent owners to prevent the sharing of infringing designs by contacting the DIYer, either directly or through the notice and takedown system, and thereby bestow the requisite knowledge to impose liability for any subsequent commercial infringement.

V. PRESERVING THE INVENTIVE COMMONS: A MODEST PROPOSAL

Thus far, this Note has focused on patentees’ rights, and on the possibility that user-generated innovation might lead to direct or indirect infringement upon an existing patent. However, the spread of user-generated innovation into the realm of patentable objects also presents a threat to users who commit their ideas to the inventive commons when they share them on sites like Thingiverse or Shapeways. Because these DIYer inventions provide all the purported benefits of patents — invention, disclosure, and “commercialization” in a readily usable format — without any need for monopolies, special care should be taken to ensure that these inventions remain in the public domain. Simply put, the public should not be “paying” for the same benefits it can obtain for free.

In theory, a patent application should fail for lack of novelty⁸³ or obviousness⁸⁴ if a DIYer has previously created and shared a design

sending letters threatening to sue for copyright infringement unless the blogger paid a requested sum as a settlement. Although some of the bloggers probably had viable fair use claims, most submitted the requested payment rather than risk the threat of litigation. See James DeBriyn, Note, *Shedding Light on Copyright Trolls: An Analysis of Mass Copyright Litigation in the Age of Statutory Damages*, 19 UCLA ENT. L. REV. 79, 88–90 (2012) (summarizing Righthaven’s business model).

83. 35 U.S.C. § 102 (2006).

84. 35 U.S.C. § 103 (2006).

that is substantially similar to what is being claimed. But overworked patent agents are unlikely to go digging through every website that hosts shared print schematics on the off chance that they may turn up a piece of relevant prior art.⁸⁵ Because DIYers are unlikely to be informed of or concerned with legal requirements,⁸⁶ their inventions could fail to be anticipatory for the purposes of § 102 and § 103.⁸⁷ This Part will briefly discuss how shared user-generated inventions might not be effective as prior art, and will conclude with a suggested solution.

A. Prior Invention, But Not Prior Art

As prior art, DIYers' creations will likely raise questions of both novelty under § 102 and obviousness under § 103. A design made available for download on a site such as Thingiverse is potentially "described in a printed publication, or in public use, . . . or otherwise available to the public," and a design made available on a site like Shapeways is "on sale" for the purposes of determining novelty.⁸⁸ However, both sites present potential problems with the scope of prior art — specifically, what qualifies as analogous art for the purposes of the obviousness analysis.⁸⁹

In most respects, user-generated inventions that are shared online clearly satisfy these provisions. A design file would qualify as a printed publication and, because *anyone* could print a copy, would be sufficiently enabling for a person having ordinary skill in the art ("PHOSITA") to practice the invention.⁹⁰ Prior to the 2011 amendments to the Patent Act, the Thingiverse database would have had to satisfy a murky "public accessibility" requirement to qualify as prior art.⁹¹ Proper cataloging appears key to the availability of publications

85. See Jay P. Kesan, *Taking Stock of the U.S. Patent System*, in 2 *INTELLECTUAL PROPERTY AND INFORMATION WEALTH* 227, 228 (Peter K. Yu ed., 2007) (discussing problems with the patent system resulting from examiners' inadequate resources for searching prior art); Mike Masnick, *Why Do We Assume Patents Are Valid When Patent Office's Own Numbers Show They Get Things Wrong All the Time?*, *TECHDIRT* (Aug. 20, 2012, 3:07 AM), <http://www.techdirt.com/articles/20120816/01045920068/why-do-we-assume-patents-are-valid-when-patent-offices-own-numbers-show-they-get-things-wrong-all-time.shtml> (noting that patent examiners average only eighteen hours per patent application).

86. MakerBot Industries CEO Bre Pettis sums up the spirit of the Thingiverse DIY community thusly: "Thingiverse is a wonderful and chaotic community that is focused more on doing things than on law practices." E-mail from Bre Pettis, CEO, MakerBot Industries, to Davis Doherty (Apr. 18, 2011) (on file with author).

87. See generally 1 CHISUM, *supra* note 44, § 3.02.

88. 35 U.S.C. § 102(a) (2006).

89. See 5 CHISUM, *supra* note 44, § 5.03[1][a].

90. See, e.g., *In re Donohue*, 766 F.2d 531, 533 (Fed. Cir. 1985) (discussing the rule that prior art must enable a PHOSITA to make the invention).

91. See, e.g., *In re Hall*, 781 F.2d 897, 898–99 (Fed. Cir. 1986) (discussing the public accessibility rule).

as prior art: a graduate thesis catalogued by name but not subject did not qualify as a printed publication,⁹² but a single copy of a thesis that has been properly catalogued in a single library did qualify.⁹³ For a site like Thingiverse, site searching (in this case, Google) plays the role of cataloging. But the site itself is not organized under any particular subject categorization, so whether a specific design is readily available depends heavily upon the description that the user-innovator provides. If a user-generated invention fails to qualify as prior art because it is insufficiently searchable, then a subsequent commercial inventor who obtains a patent on the same idea may effectively remove that particular design from the commons.

Searchability may be relevant to determining what qualifies as analogous art for the purposes of analyzing obviousness under § 103. Under the obviousness analysis, only prior art from the same field of endeavor as the invention, or prior art reasonably pertinent to the same problem addressed by the invention, is considered.⁹⁴ Cross-linked inventions, such as the derivative inventions listed on Thingiverse,⁹⁵ may help expand the sphere of what a court would consider analogous art by explicitly leading a PHOSITA through a chain of connected inventions. Subject-matter classifications may further help cement a design's claim to be analogous art, as a PHOSITA may be expected to consider all designs falling within related classifications. But without these electronic signposts, a patentee may monopolize an invention that is effectively part of the common stock of knowledge by way of obviousness.

B. Establishing a Central Inventive Commons

3D printing technology has the potential to open up a vast commons of inventive ideas, stocked with user-generated innovations. Such a commons would generate substantial social good, serving the disclosure function of patent law without the need to offer monopolies in exchange. Growth of this commons, and preservation of the knowledge users commit to it, should be a priority for members and supporters of this growing community of user-innovators. With that in mind, this Note concludes by proposing an organization with a mission analogous to that of Creative Commons in the realm of copy-right⁹⁶ — call it Inventive Commons (“IC”).

92. *In re Cronyn*, 890 F.2d 1158, 1161 (Fed. Cir. 1989).

93. *Hall*, 781 F.2d at 899–900.

94. *See In re Wood*, 599 F.2d 1032, 1036 (C.C.P.A. 1979).

95. *Newest Derivatives*, THINGIVERSE, <http://www.thingiverse.com/derivatives> (last visited Dec. 22, 2012).

96. *See About*, CREATIVE COMMONS, <http://creativecommons.org/about> (last visited Dec. 22, 2012).

IC would be a nonprofit corporation, operating in conjunction with the U.S. Patent and Trademark Office (“USPTO”) as a public-private partnership (“PPP”).⁹⁷ The theory underlying the PPP structure is that IC should be a mission-driven nonprofit, much like Creative Commons, while serving an important quasi-governmental role in helping to ensure that only truly novel and nonobvious patents are issued. By remaining distinct from the USPTO and the rest of the executive branch, IC would be able to serve as an effective mediator between DIYers — some of whom may be skeptical of the USPTO and the patent system — and the executive branch. As an independent corporation, IC would also be free of the restrictions of administrative law, thereby empowering it to make rapid changes to its strategy as circumstances may require.⁹⁸ Finally, IC could be self-funded, charging applicants and the government fees for access to its databases, with USPTO-mandated fee schedules that ensure access to small-entity applicants.

The mission of Inventive Commons would be to take all steps to ensure that unpatented innovations are quickly and accurately identified as part of the commons, and that no patent applicant succeeds in removing ideas from that commons.⁹⁹ Unlike Creative Commons, Inventive Commons would play an active role in establishing and maintaining the stock of public information. The organization would actively solicit and collect user-generated designs, and index them so as to maximize the sphere of anticipatory and analogous prior art.¹⁰⁰ Information would be available to help DIYers ensure that descriptions of their creations are sufficiently informative and accurate. Employees of the organization would apply subject-matter tags to inventions in a manner consistent with USPTO classification. And both patent agents and patent applicants would have access to a

97. PPPs “combine the resources of government with those of private agents,” including not-for-profit organizations. Chris Skelcher, *Public-Private Partnerships and Hybridity*, in *THE OXFORD HANDBOOK OF PUBLIC MANAGEMENT* 347, 347 (Ewan Ferlie et al. eds., 2005).

98. See Matthew P. Gelfand, Note, *A Perfect (Copyright) Union: Uniting Registration and License Designation*, 25 HARV. J.L. & TECH. 711, 728 (2012) (“Public-private partnerships have recently received increased attention by government officials and other stakeholders, as governments look to the special competencies of non-profit organizations and private companies to more efficiently accomplish tasks traditionally delegated to government agencies.”).

99. Cf. Jason Schultz & Jennifer M. Urban, *Protecting Open Innovation: The Defensive Patent License as a New Approach to Patent Threats, Transaction Costs, and Tactical Disarmament*, 26 HARV. J.L. & TECH. 1 (2012).

100. While such use may raise concerns of copyright infringement for design files not obtained under an implicit or explicit license, creating a searchable index of the files would likely qualify as fair use. See *Perfect 10, Inc. v. Amazon.com, Inc.*, 508 F.3d 1146, 1168 (9th Cir. 2007) (concluding that Google would be likely to succeed in its fair use defense for its use of thumbnail image files).

searchable index of the Inventive Commons registry, providing a simple method for finding relevant prior art.

VI. CONCLUSION

Recent history has seen intellectual property law outpaced by the rapid progress in digital technology. With copyright law, the response was chaotic — uncertainty over the future of digital music, extensive litigation, the eventual rise and fall of companies like Napster and Grokster — with consumers forced to wait for the dust to settle. In spite of its flaws, the legislative response finally brought some certainty to the field, and allowed for the rise of YouTube, the Apple App Store, Facebook, and other services that have reshaped the way that consumers use the Internet. Our experience in solving the digital copyright crisis should serve as a lesson in addressing the coming 3D printing revolution: the problems that will arise are foreseeable, and the potential solutions have already been tested. Rather than letting history repeat itself, we should take this rare opportunity to proactively fix the system.