

# THE LEFT SHARK, THRONES, SCULPTURES AND UNPRINTABLE TRIANGLE: 3D PRINTING AND ITS INTERSECTIONS WITH IP

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## I. INTRODUCTION

Three-dimensional (3D) printing has emerged as one of the most significantly disruptive technologies in the digital economy. From the manufacturing of guns to food preparation,<sup>1</sup> it has the potential to revolutionize (and improve) many aspects of our lives, in much the same way the Internet has revolutionized communication. The process of 3D printing involves the preparation of a computer-assisted digital (CAD) file, which may be derived from pictures or drawings, scanned from goods using a 3D scanner, or made using 3D modeling software.<sup>2</sup> Such a file

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<sup>1</sup> See, e.g., Nick Bilton, *The Rise of 3-D Printed Guns*, N.Y. TIMES, Aug. 14, 2014, <http://www.nytimes.com/2014/08/14/fashion/the-rise-of-3-d-printed-guns.html> (discussing 3D printing of firearms); Jacopo Prisco, *Foodini' Machine Lets You Print Edible Burgers, Pizza, Chocolate*, CNN (Dec. 31, 2014, 1:06 AM), <http://www.cnn.com/2014/11/06/tech/innovation/foodini-machine-print-food/> (examining the “Foodini,” a 3D printer capable of producing “edible ingredients squeezed out of stainless steel capsules”).

<sup>2</sup> See ANDREAS GEBHARDT, UNDERSTANDING ADDITIVE MANUFACTURING: RAPID PROTOTYPING - RAPID TOOLING - RAPID MANUFACTURING 4 (Hanser 2011) (explaining that the 3D printing process begins with a “3-dimensional CAD data set” that is “typically obtained by 3D CAD design or by scanning or other

can easily be distributed, copied, modified and then ‘printed’ by a printer device, using fine strands of molten plastic, ceramic, or even metal powder.<sup>3</sup> This makes it possible to turn digital content into physical objects at the press of a button.<sup>4</sup> The technology’s potential as a game changer, in this respect, presents challenging legal questions, which need to be addressed before the technology becomes more commonplace.

This article explores how existing intellectual property (“IP”) law affects the rights of consumers who embrace 3D printing, by examining points of intersection between IP law and the technology. These intersections have yet to receive critical discussion in the academic literature, judicial decisions, or legislation. It won’t be long before legislatures, judges and policy-makers are called upon to regulate aspects of 3D printing activities and sort out the many issues that 3D printing gives rise to. The resolution of the issues that arise will affect the accessibility of the technology and determine the limits to the rights of manufacturers to control and to enforce their IP rights in the use of the technology.

The discussion starts with a brief description of the steps and processes in 3D printing activity. The section that follows explores how the different activities in 3D printing intersect with IP laws, with reference to three recent incidents regarding use of other technologies: the “Left Shark,” a backup dancer that ended up stealing the spotlight at this year’s Super Bowl half-time show;<sup>5</sup> iron throne from HBO’s series *Game of Thrones*;<sup>6</sup> and the Penrose triangle, an optical illusion that cannot exist in normal three-dimensional Euclidean space.<sup>7</sup> This article concludes with recommendations as to possible approaches on how best to balance the rights of consumers, innovators, and other stakeholders in dealing with conflicts over IP rights that relate to 3D printing. In this respect, it is proposed that realizing the full

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imaging technologies”).

<sup>3</sup> See *id.* at 33 (stating that 3D printing can be accomplished “using various methods, such as plastics, metals, or ceramics, supplied as powders, fluids, solids, foils or sheets”).

<sup>4</sup> See Matthew Rimmer, *Inventing the Future: Intellectual Property and 3D Printing*, ELGAR BLOG (Oct. 18, 2012), <http://elgarblog.com/2012/10/18/inventing-the-future-intellectual-property-and-3d-printing-by-matthew-rimmer/> (noting that 3D printing technology “allows people to download designs and turn them into physical objects . . . at the press of a button”).

<sup>5</sup> See *infra* note 45 and accompanying text.

<sup>6</sup> See *infra* note 44 and accompanying text.

<sup>7</sup> See *infra* notes 53–56 and accompanying text.

potential of 3D printing technology requires an express recognition of user's rights in respect to certain activities in 3D printing. Such recognition will ensure greater access for everyone to culture, knowledge, information, and education in the use of the technology.

## II. 3D PRINTING: THE PHENOMENON

Also referred to as additive manufacturing,<sup>8</sup> 3D printing is a process whereby a solid object is produced, based on a digital model in a computer,<sup>9</sup> similar to how a cartridge printer prints letters on paper. In his 2013 State of the Union address, U.S. President Barack Obama declared, "3D printing . . . has the potential to revolutionize the way we make almost everything."<sup>10</sup> The Economist lauded 3D printing as marking the arrival of a "third industrial revolution."<sup>11</sup> Moreover, a Canadian newspaper, The Globe and Mail, reported that 3D printing is expected to "drive innovation" and "open a new world of both challenges and opportunities in Canada."<sup>12</sup>

Developments in three aspects of 3D printing have brought technology to the forefront of discussion where law and technology intersect: 3D printing machines, computer assisted design (CAD) files, and the materials used to print physical goods.<sup>13</sup> First, the expiry of patents on industrial 3D printers has rendered them accessible at consumer prices.<sup>14</sup> It is envisaged

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<sup>8</sup> See GEBHARDT, *supra* note 2, at 2 (noting that the terms "Additive Manufacturing" and "3D Printing" are interchangeable).

<sup>9</sup> *Id.* at 4.

<sup>10</sup> Doug Gross, *Obama's Speech Highlights Rise of 3-D Printing*, CNN (Feb. 13, 2013, 3:22 PM), <http://www.cnn.com/2013/02/13/tech/innovation/obama-3d-printing>.

<sup>11</sup> Special Report, *A Third Industrial Revolution*, ECONOMIST (Apr. 21, 2012), <http://www.economist.com/node/21552901>.

<sup>12</sup> Brenda Bouw, *The 3-D Printing Revolution Has Begun*, GLOBE & MAIL (Feb. 01, 2013, 5:00 AM), <http://www.theglobeandmail.com/report-on-business/small-business/sb-digital/innovation/the-3-d-printing-revolution-has-begun/article8043259/>.

<sup>13</sup> See Alan Earls & Vinod Baya, *The Road Ahead for 3-D Printers*, PWC TECH. FORECAST, [http://www.pwc.com/en\\_US/us/technology-forecast/2014/3d-printing/features/future-3d-printing.jhtml](http://www.pwc.com/en_US/us/technology-forecast/2014/3d-printing/features/future-3d-printing.jhtml) (last visited Apr. 26, 2015) (discussing emerging trends in 3-D printer performance and how 3-D printers will better process multiple types of materials).

<sup>14</sup> See John Hornick & Dan Roland, *Many 3D Printing Patents are Expiring Soon: Here's A Round Up & Overview of Them*, 3D PRINTING INDUSTRY (Dec. 29, 2013), <http://3dprintingindustry.com/2013/12/29/many-3d-printing-patents-expiring-soon-heres-round-overview/> (discussing several key 3D printing patents that are expiring and how the "post-patent expiration flood of low-cost,

that “soon, probably in the next few years, the market will be ready for a mainstream 3D printer sold by the millions at Walmart and Costco.”<sup>15</sup> Even individuals who do not own a 3D printer can access the technology from a growing number of online 3D printing platforms, merely by uploading their own design files over the Internet.<sup>16</sup> The U.S. Postal Service Office predicts significant increases in its revenue thanks to 3D printing, as customized objects are ordered online for printing and same-day delivery.<sup>17</sup>

The second element of 3D printing involves a CAD file containing instructions to be sent to a printer, guiding the creation of a tangible object.<sup>18</sup> A CAD file can be designed from scratch using a 3D modeling program, producing a digital representation of the object to be printed.<sup>19</sup> A 3D scanner can also be used to replicate an existing product in a digital file; or else a photograph can be taken, or a drawing made of an object, which can then be converted into a CAD file.<sup>20</sup> Such a file can be easily modified, distributed and redistributed to other users through an increasing number of file-sharing websites.<sup>21</sup>

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consumer grade 3D printers excites those who believe patents are holding the technology back”).

<sup>15</sup> Chris Anderson, *The New MakerBot Replicator Might Just Change Your World*, WIRED MAG. (Sept. 19, 2012, 3:15 PM), <http://www.wired.com/2012/09/how-makerbots-replicator2-will-launch-era-of-desktop-manufacturing/>.

<sup>16</sup> For example, Shapeways, Inc., the leading 3D printing service provider, reported that it had printed more than one million products for over 300,000 users by the middle of 2013. *Made in the USA: Stories of American Manufacturers: Hearing Before the H. Comm. on Small Bus.*, 113th Cong. 83–84 (2013) (statement of Jim Allen, Dir., Shapeways, Inc.), available at <http://www.gpo.gov/fdsys/pkg/CHRG-113hhrg81699/html/CHRG-113hhrg81699.htm>.

<sup>17</sup> See OFFICE OF INSPECTOR GEN., U.S. POSTAL SERV., IF IT PRINTS, IT SHIPS: 3D PRINTING AND THE POSTAL SERVICE, at i (2014), available at [https://www.uspsoig.gov/sites/default/files/document-library-files/2014/rarc-wp-14-011\\_if\\_it\\_prints\\_it\\_ships\\_3d\\_printing\\_and\\_the\\_postal\\_service.pdf](https://www.uspsoig.gov/sites/default/files/document-library-files/2014/rarc-wp-14-011_if_it_prints_it_ships_3d_printing_and_the_postal_service.pdf) (“3D printing could lead to an increase in packages delivered by the Postal Service worth \$485 million in new annual revenues.”).

<sup>18</sup> See GEBHARDT, *supra* note 2, at 5 (explaining that the CAD data set “is submitted to a machine that executes two elementary process steps per layer in order to create the part”).

<sup>19</sup> See *id.* at 4 (stating that CAD data sets may be obtained by “3D CAD design”).

<sup>20</sup> See *id.* (noting that CAD data sets may also be obtained by “screening or other imaging technologies”).

<sup>21</sup> For example, another leader in 3D printing, MakerBot, has a website called Thingiverse that is dedicated to CAD files of some standard goods. THINGIVERSE, <http://www.thingiverse.com> (last visited Apr. 26, 2015). MakerBot describes Thingiverse as “a place for you to share your digital designs with the

The third component of 3D printing is the material used to make the output, namely the tangible, 3D printed object. Just like an inkjet printer uses toner to print documents, a 3D printer uses molten or powder plastics, glass, ceramics, or metal sintering powders, as well as a wide range of other materials, depending on the area of application.<sup>22</sup> There are also liquid baths and post-production chemicals used in 3D printing that have become available at consumer prices.<sup>23</sup>

The simplified process of producing almost any kind of object, using a combination of the above elements, means that there are no limits on what 3D printing technology can produce. From the printing of everyday consumer goods,<sup>24</sup> to that of human organs,<sup>25</sup> food,<sup>26</sup> cars,<sup>27</sup> airplane wings,<sup>28</sup> and other large structures,

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world . . . so that all can benefit from them.” Rimmer, *supra* note 4.

<sup>22</sup> See GEBHARDT, *supra* note 2, at 33 (stating that 3D printing can be accomplished “using various materials, such as plastics, metals, or ceramics, supplied as powders, fluids, solids, foils, or sheets”). Depending on the area of 3D application, such as in the field of medicine, diverse materials are used: wood-like materials, bonelike materials, organic compounds, thin film transistors, and others. See John F. Hornick, *3D Printing and the Future (or Demise) of Intellectual Property*, 1 3D PRINTING & ADDITIVE MFG. 34, 34–43 (2014).

<sup>23</sup> See Robert E. Yoches et al., *Securing IP Rights in a 3D-Printing World*, FINNEGAN (Dec. 18, 2013), [http://www.finnegan.com/resources/articles/articles\\_detail.aspx?news=d262620e-11d2-4033-9b5b-6b29bb1345d6](http://www.finnegan.com/resources/articles/articles_detail.aspx?news=d262620e-11d2-4033-9b5b-6b29bb1345d6) (stating that “liquid baths and postproduction chemicals [are] used during printing and finishing” of 3D models).

<sup>24</sup> See, e.g., Jonathan Salem Baskin, *What Happens When 3D Printing Turns Consumer Products Into Digital Content?*, FORBES (Mar. 6, 2014, 1:13 PM), <http://www.forbes.com/sites/jonathansalembaskin/2014/03/06/what-happens-when-3d-printing-turns-consumer-products-into-digital-content/> (exploring the effects of 3D printing on everyday consumer products).

<sup>25</sup> See, e.g., Brandon Griggs, *The Next Frontier in 3-D Printing: Human Organs*, CNN (Apr. 5, 2014, 11:00 AM), <http://www.cnn.com/2014/04/03/tech/innovation/3-d-printing-human-organs/> (discussing the developments in 3D printing with respect to the recreation of human organ tissue).

<sup>26</sup> See, e.g., Michael Molitch-Hou, *Print2Taste Emerges with the Bocusini Food 3D Printer*, 3D PRINTING INDUSTRY (Apr. 24, 2015), <http://3dprintingindustry.com/2015/04/24/print2taste-emerges-with-the-bocusini-food-3d-printer/> (examining the “Bocusini,” a German company’s new 3D system that can print “a wide variety of foods”); Matt McCue, *Will 3D Printed Food Become as Common as the Microwave*, FORTUNE (Feb. 26, 2015, 7:00 AM), <http://fortune.com/2015/02/26/3d-food-printing/> (providing a brief discussion of the 3D food printer “Foodini”).

<sup>27</sup> See, e.g., Julianna Goldman, *Are 3D-Printed Cars the Next Big Thing?*, CBS NEWS (Jan. 23, 2015, 6:59 PM), <http://www.cbsnews.com/news/the-roadblocks-ahead-for-the-3d-printed-car/> (discussing Local Motor’s process for the 3D manufacturing of motor vehicles).

<sup>28</sup> See, e.g., Stephen Harris, *New Technology Paves the Way for 3D-Printed*

including houses and large buildings,<sup>29</sup> or even bases on the moon and Mars,<sup>30</sup> 3D printing holds significant potential to transform the economic landscape of product development, manufacturing, and distribution.<sup>31</sup>

### III. INTERSECTIONS WITH IP

The widespread accessibility of 3D printing has triggered a number of legal issues in its regulation. An emerging body of literature has analyzed the implications of consumer 3D printing in the field of IP across different jurisdictions.<sup>32</sup> Bradshaw,

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*Aircraft Wings*, ENGINEER (July 22, 2013), <http://www.theengineer.co.uk/aero-space/news/new-technique-paves-the-way-for-3d-printed-aircraft-wings/1016759.article> (analyzing BAE System's technique for building aircraft wings with 3D printers).

<sup>29</sup> See, e.g., Tuan C. Nguyen, *Yes, That 3D-Printed Mansion is Safe to Live in*, WASH. POST, Feb. 5, 2015, <http://www.washingtonpost.com/blogs/innovations/wp/2015/02/05/yes-that-3d-printed-mansion-is-safe-to-live-in/> (critiquing the construction of "the world's tallest 3D-printed building" in Suzhou Industrial Park, China).

<sup>30</sup> See, e.g., Fiona Graham, *Download, Print, Build Your Martian Homes in 24 Hours*, BBC NEWS (Sept. 16, 2014), <http://www.bbc.com/news/business-29208276> (discussing the construction technology "Contour Crafting," which involves the 3D printing of concrete buildings to be used in established a potential Martian settlement); Megan Gannon, *3D Printer Could Transform Moon Dirt Into Lunar Base*, SPACE.COM (Dec. 4, 2012, 6:20 AM), <http://www.space.com/18694-moon-dirt-3d-printing-lunar-base.html> (explaining how moon dust may be used by astronauts "to repair broken parts, manufacture spare ones, and maybe even build structures").

<sup>31</sup> See THOMAS CAMPBELL ET AL., ATL. COUNCIL, STRATEGIC FORESIGHT REPORT: COULD 3D PRINTING CHANGE THE WORLD? 1 (2011), *available at* [http://www.atlanticcouncil.org/images/files/publication\\_pdfs/403/101711\\_ACUS\\_3DPrinting.PDF](http://www.atlanticcouncil.org/images/files/publication_pdfs/403/101711_ACUS_3DPrinting.PDF) ("3D Printing/Additive Manufacturing (AM) is a revolutionary emerging technology that could up-end the last two centuries of approaches to design and manufacturing with profound geopolitical, economic, social, demographic, environmental, and security implications.").

<sup>32</sup> See AUSTRAL. GOV'T, AUSTRALIAN INTELLECTUAL PROPERTY REPORT 2014, at 27–29 (2014), *available at* <http://www.ipaustralia.gov.au/uploaded-files/reports/intellectual-property-report-2014-low-res.pdf> (providing an industry snapshot of 3D printing in Australia); see also EPRS Author, *Legal Aspects of 3D Printing*, EUR. PARLIAMENTARY RES. SERV. (Mar. 17, 2014), <http://epthinktank.eu/2014/03/17/legal-aspects-of-3d-printing/> (noting the implications of 3D printing in the European Union but also recognizing that "the legal aspects of additive layer manufacturing have been discussed mainly in the United States"); accord Kyle Dolinsky, *CAD's Cradle: Untangling Copyrightability, Derivative Works, and Fair Use in 3D Printing*, 71 WASH. & LEE L. REV. 591, 626–81 (2014) (exploring the legal issues pertaining to 3D printing in the United States); Davis Doherty, Note, *Downloading Infringement: Patent Law as a Roadblock to the 3D Printing Revolution*, 26 HARV. J.L. & TECH. 353, 358–61 (2012) (discussing patent infringement liability as it relates to 3D printing technology).

Bowyer and Haufe observed that:

[A]s with home computers, [3D printing] may have wider effects. The convergence of the Internet, digitized music and media players has had dramatic consequences for music copyright. 3D printing technology may have similar implications for artistic copyright, design right, trademarks and patents, but in a rather more diverse legal framework.<sup>33</sup>

For example, individuals may prepare a CAD file that is copied from an existing copyright-protected or patent-protected good using a scanner.<sup>34</sup> When producing or re-producing a digital copy of such a physical good through 3D printing, difficult questions about copyright or patent infringement arise.

The problem becomes more difficult when the design of the good is purely functional,<sup>35</sup> but the non-functional features of the good depicted in the CAD file are inseparable from its functional features.<sup>36</sup> In such cases, the good depicted in the CAD file may not have been protected either as architectural design, as industrial design or as sculpture.<sup>37</sup> In copyright law, the distinction between functional and non-functional features is resolved through the doctrine of conceptual separability<sup>38</sup> and the doctrine of merger.<sup>39</sup> The doctrine of conceptual separability says that copyright exists over a work if its aesthetic features can be identified separately from its use as a good.<sup>40</sup> According to the

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<sup>33</sup> Simon Bradshaw et al., *The Intellectual Property Implications of Low-Cost 3D Printing*, 7 SCRIPTED 5, 29 (2010), available at <http://www2.law.ed.ac.uk/ahrc/script-ed/vol7-1/bradshaw.pdf>.

<sup>34</sup> See, e.g., MICHAEL WEINBERG, IT WILL BE AWESOME IF THEY DON'T SCREW UP: 3D PRINTING, INTELLECTUAL PROPERTY, AND THE FIGHT OVER THE NEXT GREAT DISRUPTIVE TECHNOLOGY 6 (Pub. Knowledge 2010), available at <https://www.publicknowledge.org/files/docs/3DprintingPaperPublicKnowledge.pdf> (stating that a consumer can obtain a CAD file from either a pre-created CAD plan on the Internet or by using a 3D scanner).

<sup>35</sup> See Haritha Dasari, Note, *Assessing Copyright Protection and Infringement Issues Involved with 3D Printing and Scanning*, 41 AIPLA Q.J. 279, 290–91 (2013) (discussing the implications of the functionality doctrine on digital models).

<sup>36</sup> *Id.* at 291.

<sup>37</sup> See Richard G. Frenkel, *Intellectual Property in the Balance: Proposals for Improving Industrial Design Protection in the Post-TRIPS Era*, 32 LOY. L.A. L. REV. 531, 544 (1999) (“If an article has ‘an intrinsic utilitarian function,’ . . . it is a useful article which can only be copyrighted if its artistic features are capable of being identified separately from its useful features.”).

<sup>38</sup> See *Pivot Point Int’l, Inc. v. Charlene Products, Inc.*, 372 F.3d 913, 931 (7th Cir. 2004) (providing a practical test for determining “conceptual separability”).

<sup>39</sup> See *Genesee Brewing Co. v. Stroh Brewing Co.*, 124 F.3d 137, 145 n.6 (2d cir. 1997) (defining the “merger doctrine”).

<sup>40</sup> See Barton R. Keyes, Note, *Alive and Well: The (Still) Ongoing Debate*

doctrine of merger, an expression of an idea may not be copyrightable if the idea and its expressions are so tied together that there is no other way to express it.<sup>41</sup>

Questions have already arisen as to whether copyright subsists over the shape, configuration, pattern and aesthetic aspects of a physical good depicted in a CAD file.<sup>42</sup> In one instance, a takedown notice was issued for CAD files that produced figurines based on the game Warhammer and were uploaded to the Internet.<sup>43</sup> In another instance, HBO sent a cease and desist order to a designer who was selling 3D printed iPhone docks modelled after the iron throne in the series *Game of Thrones*.<sup>44</sup> In a recent incident, Katy Perry's lawyers sent a cease and desist letter to an artist who created and printed a Left Shark figure, which was depicted in the artist's halftime show in the 2015 Super Bowl.<sup>45</sup> In this instance, questions would arise as to whether there is a distinction between the idea of a shark dancing as depicted in the halftime show and an expression of it in a drawing of in other formats.

In all the above circumstances, the first order of questions that arises is whether copyright subsists in the underlying work that forms the basis for the CAD file.<sup>46</sup> In cases where the good

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*Surrounding Conceptual Separability in American Copyright Law*, 69 OHIO ST. L.J. 109, 100–11 (2008) (discussing the evolution of conceptual separability).

<sup>41</sup> Michael D. Murray, *Copyright, Originality, and the End of the Scenes a Faire and Merger Doctrines for Visual Works*, 58 BAYLOR L. REV. 779, 788–93 (2006) (exploring the merger doctrine in the area of copyright protection).

<sup>42</sup> See *infra* notes 43–45 and accompanying text.

<sup>43</sup> Bryan J. Vogel, *Casting 3D Printing's Coming IP Litigation: Usual Suspects and Dark Horses*, BLOOMBERG BNA (Oct. 11, 2013), <http://www.bna.com/casting-3d-printings-coming-ip-litigation-usual-suspects-and-dark-horses/>; see also Kyle Dolinsky, Note, *CAD's Cradle: Untangling Copyrightability, Derivative Works, and Fair Use in 3D Printing*, 71 WASH. & LEE L. REV. 591, 595–96 (2014) (“Copyright holders have issued takedown notices per the Digital Millennium Copyright Act (DMCA) to websites that allow users to download 3D computer-aided design (CAD) files.”).

<sup>44</sup> Vogel, *supra* note 43; see also Nathan Hurst, *HBO Blocks 3-D Printed Game of Thrones iPhone Dock*, WIRED.COM (Feb. 13, 2013), <http://www.wired.com/2013/02/got-hbo-cease-and-desist/> (explaining how HBO denied 3D printer Fernando Sosa rights to print a 3D model of the “Iron Throne” from the *Game of Thrones* television series).

<sup>45</sup> See Andrew Wheeler, *3D Printed Left Shark Issue Leaves Katy Perry Drowning In Criticism*, 3D PRINTING INDUSTRY (Feb. 6, 2015), <http://3dprintingindustry.com/2015/02/06/3d-printed-left-shark-issue-leaves-katy-perry-drowning-in-criticism/> (discussing the legal battle between 3D printer Fernando Sosa and singer Katy Perry over the rights to print a 3D model of the Super Bowl halftime stage dancer “Left Shark”).

<sup>46</sup> See Desari, *supra* note 35, at 293 (“When assessing the originality of

depicted in a CAD file is copyright protected, the second order of questions is whether its CAD file is a derivative work of the copyrightable work.<sup>47</sup> In this case, a question would arise as to whether an owner of the original work continues to assert monopoly over the CAD file as falling in the immediate scope of the copyright.<sup>48</sup> This, in part, would depend on whether the CAD file is a direct replica of the underlying work, or whether it is sufficiently transformed, tweaked, and modified to constitute an independently copyright protectable work.<sup>49</sup> Given the unique aspects of the technology in this respect, it would be difficult to determine whether a CAD file is an adaptation of a copyright-protected work, or an independent original work in itself.

Even if the question of originality of the CAD file is resolved, such as when there are sufficient degrees of creativity over the CAD file that distinguish it from the underlying work,<sup>50</sup> it is not clear the categories under which a CAD file may be protected. Questions would arise as to whether a CAD file fits into the categories of copyright subject matter<sup>51</sup> as a digital file (like a PDF file); as a design (along with architectural plans and other

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digital models for copyright purposes, the law considers whether the creator based the model off of a copyrighted work.”); *see also* 17 U.S.C. § 103(a) (2012) (“[P]rotection for a work employing preexisting material in which copyright subsists does not extend to any part of the work in which such material has been used unlawfully.”); *Schrock v. Learning Curve Int’l, Inc.*, 586 F.3d 513, 523 (7th Cir. 2009) (“[T]he author of a derivative work must have permission to make the work from the owner of the copyright in the underlying work.”).

<sup>47</sup> *See* Dasari, *supra* note 35, at 282 (“[M]odels created from a preexisting copyrighted or public domain work can only gain protection as a derivative work.”); *see also* 17 U.S.C. § 101 (defining “derivative work” as “a work based upon one or more preexisting works”).

<sup>48</sup> *See* 17 U.S.C. § 103(b) (“The copyright in such [derivative] work [must be] independent of, and [must] not affect or enlarge the scope, duration, ownership, or subsistence of, any copyright protection in the preexisting material.”).

<sup>49</sup> *See* Dasari, *supra* note 35, at 293, 296 (“A digital model independently created on the computer using a CAD program without assistance from a 3D scanner qualifies as original under the Copyright Act so long as the model exhibits a modicum of creativity. . . . When a 3D scanner is used to capture an object as a digital model, the law must consider whether the change in dimension or medium constitutes enough creativity and originality to qualify for copyright protection.”); *see also* 17 U.S.C. § 103(b) (“The copyright in a . . . derivative work extends only to the material contributed by the author of such work, as distinguished from the preexisting material employed in the work.”).

<sup>50</sup> *See* Dasari, *supra* note 35, at 297 (“[A] court will consider whether . . . the author made changes that were more than ‘merely trivial’ to the copyrighted work.”).

<sup>51</sup> *See* 17 U.S.C. § 102(a) (listing eight categories of copyright subject matter).

technical drawings); as a software (written in a computer code for a 3D printer to read); or as a picture (based on the visual component of a CAD file).

An example can be drawn from a recent controversy involving the Penrose triangle optical illusion.<sup>52</sup> In 1934, the Swedish artist Oscar Reutersvärd created the first “impossible” or “Penrose” triangle and the mathematician Roger Penrose popularized it in the 1950s by explaining that the triangle is “impossibility in its purest form.”<sup>53</sup> In 2011, a designer created a CAD file for the triangle and challenged others to see how it might have been done.<sup>54</sup> When another individual replicated the 3D rendering and posted it on the Internet, the original CAD file designer sent a copyright infringement notice – despite not being the original owner of copyright of the Penrose triangle.<sup>55</sup> Rather, the author of the CAD file claimed copyright over the digital file.<sup>56</sup> There are incidents where individuals were asked to remove CAD files of 16<sup>th</sup> century sculptures, unduly extending copyright protection to sculptures that have been in the public domain for long time.<sup>57</sup>

These incidents raise the question as to whether copyright exists in the CAD file itself. Given the unique features of a CAD file, it is not clear as to whether CAD files fit into the categories of copyrightable subject matter.<sup>58</sup> This, in turn, brings the dilemma deeper into the scope of copyrightable subject matter and authorship, which is already in a state of flux with respect to software, video games and works generated by computer

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<sup>52</sup> See *infra* notes 53–56 and accompanying text.

<sup>53</sup> See AL SECKEL, *MASTERS OF DECEPTION: ESCHER, DALÍ & THE ARTISTS OF OPTICAL ILLUSION* 83 (Sterling Publ'g 2004).

<sup>54</sup> Mike Masnick, *Is This The First DMCA Notice Over 3D Printer Plans?*, TECHDIRT (Feb. 22, 2011, 5:28 AM), <https://www.techdirt.com/articles/20110221/22375313196/is-this-first-dmca-notice-over-3d-printer-plans.shtml>.

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> An artist was asked to remove a CAD file of Michelangelo's famous 16<sup>th</sup> century sculpture of Moses that sits on the campus of Augustana College in Sioux Falls, South Dakota. See Mike Masnick, *College Claims Copyright on 16th Century Michelangelo Sculpture, Blocks 3D Printing Files*, TECHDIRT (Jan. 23, 2015, 10:32 AM), <https://www.techdirt.com/articles/20150122/17181429784/college-claims-copyright-16th-century-michelangelo-sculpture-blocks-3d-printing-files.shtml>.

<sup>58</sup> *But see* Dasari, *supra* note 35, at 290 (arguing that CAD files and “digital models can be classified as PGS works of authorship under the [copyright] statute”). See also 17 U.S.C. § 102(a)(5) (2012) (providing copyright protection for “pictorial, graphic, and sculptural works”).

programs.<sup>59</sup>

Given the lack of clarity on the infringing and non-infringing nature of some of the activities in 3D printing,<sup>60</sup> the technology necessitates the re-examination of third party liability for the actions of those who use their services in the course of 3D printing.<sup>61</sup> Individuals may and do share CAD files with other individuals through peer-to-peer file sharing systems and over the Internet.<sup>62</sup> Given the ease at which individuals may create, copy, share and modify CAD files in an age of the Internet,<sup>63</sup> 3D printing brings unique dilemma regarding the liability of intermediaries for copyright infringement. The *Digital Millennium Copyright Act* (DMCA)<sup>64</sup> introduces the notice and takedown rules, exempting intermediaries from liability for copyright infringements if they respond to takedown requests and actually takedown copyright infringing content when they know content on their websites infringes copyright.<sup>65</sup> 3D printing will bring the application of these obligations on intermediaries to the forefront. As an early sign of things to come, Thingiverse<sup>66</sup>—a CAD file sharing website—has been forced to remove files on numerous occasions, on the ground that CAD files uploaded via the website infringe copyrights.<sup>67</sup> Therefore, 3D

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<sup>59</sup> See generally Andrew J. Wu, *From Video Games to Artificial Intelligence: Assigning Copyright Ownership to Works Generated by Increasingly Sophisticated Computer Programs*, 25 AIPLA Q. J. 131 (1997) (discussing the copyrightability and ownership of derivative and non-derivative computer-generated works).

<sup>60</sup> See *supra* notes 58–59 and accompanying text.

<sup>61</sup> See Preeta Reddy, Note, *The Legal Dimension of 3D Printing: Analyzing Secondary Liability in Additive Layer Manufacturing*, 16 COLUM. SCI. & TECH. L. REV. 222, 238–244 (2014) (examining “secondary liability” as it applies to “third parties that facilitate the use of 3D printing technology, and which may be liable for the contributory infringement of parties that employ their services or platforms.”).

<sup>62</sup> See, e.g., *id.* at 227 (“Another major development in personal 3D printing is the creation of websites that allow the public to upload and share designs, like Thingiverse and Shapeways.”).

<sup>63</sup> See Lucas S. Osborn, *Of PhDs, Pirates, and the Public: Three-Dimensional Printing Technology and the Arts*, 1 TEX. A&M L. REV. 811, 823–24 (2014) (stating that “[t]he ease with which people can scan three-dimensional objects and manipulate and share the resulting CAD files promises a new era of creativity and artistic flourishing”).

<sup>64</sup> Pub. L. No. 105-304, 112 Stat. 2860 (1998) (codified as amended in scattered sections of 17 U.S.C.).

<sup>65</sup> *Id.* § 202(a), 112 Stat. at 2879–80 (codified as amended at 17 U.S.C. § 512(c)(1)(C) (2012)).

<sup>66</sup> THINGIVERSE, <http://www.thingiverse.com> (last visited Apr. 26, 2015).

<sup>67</sup> Bryan J. Vogel, *The Maker Community and IP: Lessons from the Digital*

printing technology necessitates the re-examination of Internet intermediaries' liability for the action of those who use their services in the course of 3D printing.<sup>68</sup>

U.S. courts have held that manufacturing and providing peer-to-peer file sharing software that enables sharing copyright-protected content over the Internet constitutes "authorizing" infringement by others since peer-to-peer file sharing technologies are primarily used to infringe copyright.<sup>69</sup> It is not clear, therefore, whether 3D printing service providers, and even manufacturers of 3D printers and 3D printing raw materials may be treated in the same way as peer-to-peer file sharing service providers, as self-serve photocopy service providers or as Internet service providers.

3D printing will also have significant implications in patent law.<sup>70</sup> A manufacturer may have patent rights over a good or over a method of producing it.<sup>71</sup> In this case, the manufacturer acquires the right of "constructing and using the invention and selling it to others."<sup>72</sup> In the use of 3D printing, the extent to which a patent owner can control activities that consumers engage with—whether they can remake the good, print parts of the good, or replicate the good—is not clear.<sup>73</sup>

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*Millennium Copyright Act*, INSIDE3DP (Nov. 17, 2014, 12:06 AM), <http://www.inside3dp.com/maker-community-ip-lessons-digital-millennium-copyright-act/>.

<sup>68</sup> Jeremy de Beer & Christopher D. Clemmer, *Global Trends in Online Copyright Enforcement: A Non-Neutral Role for Network Intermediaries?*, 49 JURIMETRICS 375, 375–76 (2009); Jeremy de Beer, *Legal Strategies to Profit from Peer Production*, 46 CAN. BUS. L.J. 269, 270–72 (2008).

<sup>69</sup> See *Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd.*, 545 U.S. 913, 919 (2005) ("[O]ne who distributes a device with the object of promoting its use to infringe copyright, as shown by clear expression or other affirmative steps taken to foster infringement, is liable for the resulting acts of infringement by third parties.").

<sup>70</sup> See generally Devin R. Desai & Gerard N. Magliocca, *Patents, Meet Napster: 3D Printing and the Digitization of Things*, 102 GEO. L.J. 1691, 1703–1705 (2014) (discussing the impact 3D printing will have on the patent industry).

<sup>71</sup> See Patent Act, R.S.C. 1985, c. P-4, s. 2 (Can.) (defining a patentable "invention" as "any new and useful art, process, machine, manufacture or composition of matter . . ."); see also 35 U.S.C. § 101 (2012) ("Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter . . . may obtain a patent therefor . . .").

<sup>72</sup> Patent Act, R.S.C. 1985, c. P-4, s. 42 (Can.).

<sup>73</sup> See generally Jeremy de Beer & Robert J. Tomkowicz, *Exhaustion of Intellectual Property Rights in Canada*, 25 CAN. INTELL. PROP. REV. 3, 3 (2009) (discussing the "doctrine of exhaustion" and how "the rights of intellectual property owners do not extend to enable control over uses of material objects

In the U.S., the “doctrine of exhaustion” prevents the seller from controlling what the consumer can do with goods they lawfully purchased.<sup>74</sup> However, the U.S. Supreme Court has recently decided that the doctrine of exhaustion is not applicable to self-replicating technologies, specifically, to genetically modified crops.<sup>75</sup> Under these circumstances, it is pertinent to examine whether consumers’ use of 3D printing to “print” a replica of a good, its spare parts, or replacements will be treated as a use of “self-replicating technology,” and hence, infringement of patent rights.

3D printing technology also brings new questions in patent law with respect to the possible distribution of patent-infringing 3D printing CAD files over the Internet.<sup>76</sup> Courts may be confronted with a question as to whether Internet service providers, website hosts and content administrators would be considered to have induced patent infringement in cases when Internet users share CAD files.<sup>77</sup>

Another possible issue with respect to 3D printing arises in patent law as manufacturers attempt to control the behavior of consumers who purchased their goods.<sup>78</sup> While some in the manufacturing industry have embraced 3D printing technology and built new businesses models on it,<sup>79</sup> a number of manufacturers have tried to limit the expansion of the technology through different strategies including use of manufacturing control systems.<sup>80</sup> From the manufacturers/IP owners’

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embodying intellectual property”).

<sup>74</sup> See Amelia Rinehart, *Contracting Patents: A Modern Patent Exhaustion Doctrine*, 23 HARV J.L. & TECH. 483, 484 (2010) (“The patent exhaustion doctrine, also known as the first sale doctrine . . . operates to ‘exhaust,’ or extinguish, the exclusive rights of sale and use as to patented articles sold with the patent owner’s authorization.”).

<sup>75</sup> *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1764 (2013).

<sup>76</sup> See Doherty, *supra* note 32, at 358–61 (arguing that because “the underlying CAD files and the objects themselves” are “potentially patentable or patented” Internet service providers “have the capability to generate widescale patent infringement”).

<sup>77</sup> *Id.*

<sup>78</sup> Antonio Regalado, *Nathan Myhrvold’s Cunning Plan to Prevent 3-D Printer Piracy*, MIT TECH. REV. (Oct. 11, 2012), <https://www.techdirt.com/articles/20121012/01535020687/just-as-key-3d-printing-patents-get-closer-to-expiring-intellectual-ventures-patents-3d-printing-drm.shtml>.

<sup>79</sup> *Id.*; see also Daniel Cohen et al., *3-D Printing Takes Shape*, MCKINSEY Q. (Jan. 2014), <https://www.techdirt.com/articles/20121012/01535020687/just-as-key-3d-printing-patents-get-closer-to-expiring-intellectual-ventures-patents-3d-printing-drm.shtml>.

<sup>80</sup> See, e.g., *infra* note 82 and accompanying text.

perspective, 3D printing challenges the IP system on the scope and extent of restrictions that IP laws should allow owners to use technology control systems that prevent certain activities in 3D printing.<sup>81</sup>

For example, the firm Intellectual Ventures has acquired patent in respect of a “manufacturing control system” to prevent consumers from using CAD files for 3D printing.<sup>82</sup> A manufacturing control system works like a digital rights management system (also called a digital lock), to prevent the copying, sharing and use of digital content (music, videos, software) after initial sale.<sup>83</sup> If there is no authorization for a printer to print a CAD file, the control system will prevent it from doing so.<sup>84</sup> While the sweeping scope of the patent claim sparked controversy for its restriction on unauthorized printing of any CAD files,<sup>85</sup> questions also arise as to whether circumventing such technologies would be considered infringement in patent law,<sup>86</sup> similar to the circumvention of digital locks under the DMCA,<sup>87</sup> thereby expanding the controversy over these technologies in copyright law to the realm of patent law.<sup>88</sup>

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<sup>81</sup> Bryan Vogel, *3D Printing: Potential Patent Law Problems Other IP Law Protections*, LAW.COM (Oct. 14, 2014), <http://www.law.com/sites/jdsupra/2014/10/14/3d-printing-potential-patent-law-problems-other-ip-law-protections/?slreturn=20150322202416>.

<sup>82</sup> U.S. Patent No. 8,286,236 (filed Jan. 31, 2008).

<sup>83</sup> See Ian Kerr, *Digital Locks and the Automation of Virtue*, in FROM “RADICAL EXTREMISM” TO “BALANCED COPYRIGHT”: CANADIAN COPYRIGHT AND THE DIGITAL AGENDA 247, 249 (Irwin Law 2010).

<sup>84</sup> See, e.g., Gary Richmond, *Wikiweapons and Printing 3D Guns: It's Just a Stalking Horse for What's to Come*, FREE SOFTWARE MAG. (May 17, 2013, 5:25 AM), [http://www.freesoftwaremagazine.com/articles/wikiweapons\\_and\\_printing\\_3d\\_guns\\_its\\_just\\_stalking\\_horse\\_whats\\_come](http://www.freesoftwaremagazine.com/articles/wikiweapons_and_printing_3d_guns_its_just_stalking_horse_whats_come) (“Intellectual Ventures was granted a patent filed back in 2008 that effectively seems to prevent a 3D printer working by embedding a digital authorisation code in the object file.”).

<sup>85</sup> See Paul Marks, *Patent Could Shackle 3D printers with DRM*, NEWSIDENTIST (Oct. 16, 2012, 3:29 PM), <http://www.newscientist.com/blogs/onepercent/2012/10/patent-could-shackle-3d-printers-drm.html> (“One of the greatest benefits of 3D printing technology - the ability to make replacements or parts for household objects like toys, utensils and gadgets - may be denied to US citizens thanks to the granting of a sweeping patent that prevents the printing of unauthorised 3D designs.”).

<sup>86</sup> See generally Patent Act, R.S.C. 1985, c. P-4, s. 55–59 (Can.) (proscribing rules governing patent infringement).

<sup>87</sup> See Digital Millennium Copyright Act, Pub. L. No. 105-304, 112 Stat. 2860 (codified as amended in scattered sections of 17 U.S.C.).

<sup>88</sup> See generally Peter K. Yu, *Anticircumvention and Anti-Anticircumvention*, 84 DENV. U. L. REV. 13, 16–32 (2006) (discussing the arguments for and against

3D printing will also have impacts in the realm of trademark law.<sup>89</sup> Issues in trademark law arise if a good with a registered mark or with a distinctive shape trademark is printed displaying such a mark.<sup>90</sup> Even in the absence of a mark displayed on a 3D-printed good, conflicts may arise between two traders if a trader passes off printed goods for original models.<sup>91</sup>

#### IV. CONCLUSION: TOWARDS USER-FRIENDLY RESOLUTION

It is apparent, therefore, that 3D printing requires the re-examination of existing views on IP in the era of emerging technology. On the one hand, this brings an opportunity for the development of the law in areas where the existing system does not fulfill current and future needs. On the other hand, 3D printing may trigger aggressive litigation, or restrictive IP law reform that will constrain consumers' ability to tinker with their 3D printer machines; create designs for their goods; customize and print their designs for their own use, and share their discoveries and creations. There has been unprecedented IP law reform in the wake of other disruptive technologies, such as cassette recorders,<sup>92</sup> MP3 players,<sup>93</sup> computers,<sup>94</sup> peer-to-peer file

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digital rights management (DRM) system circumvention tools).

<sup>89</sup> See generally James Grace, Note, *The End of Post-Sale Confusion: How Consumer 3D Printing Will Diminish the Function of Trademarks*, 28 HARV. L.J. & TECH. 263, 275–81 (analyzing the impact of commercial 3D printing on trademark law with respect to “post-sale confusion”).

<sup>90</sup> See *id.* at 281 (“3D printing may blur the line between authentic and counterfeit products, calling the very notion of product authenticity into question.”).

<sup>91</sup> See, e.g., *id.* at 279 (“3D printing may disturb the market for certain luxury, rare, or out-of-production automobile replacement parts. Indeed, . . . mechanics . . . may decide to 3D print certain components rather than incur the time and expense of ordering them through traditional channels.”).

<sup>92</sup> See, e.g., Digital Millennium Copyright Act, Pub. L. No. 105-304, § 103(a), 112 Stat. 2860, 2870–72 (1998) (codified as amended at 17 U.S.C. § 1201(k) (2012)) (providing restrictions on the circumvention of copyright protection via analog video cassette recording devices).

<sup>93</sup> See, e.g., *id.* § 202(a), 112 Stat. at 2877–86 (codified as amended at 17 U.S.C. § 512 (2012)) (limiting an online service provider's liability for copyright infringement); see also *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004, 1025 (9th Cir. 2001) (discussing the application of § 512 to the unauthorized downloading and uploading on MP3 files).

<sup>94</sup> See, e.g., Act of Dec. 12, 1980, Pub. L. No. 96-517, § 10(b), 94 Stat. 3015, 3028 (codified as amended at 17 U.S.C. § 117 (2012)) (limiting copyright infringement liability with respect to an owner of a copy of a computer program who creates another copy of that computer program).

sharing,<sup>95</sup> and the Internet,<sup>96</sup> largely due to intense lobbying by impacted industry players in digital music, movies, and video games.<sup>97</sup> There is no question that 3D printing brings challenging questions to existing IP law much in the same way as other disruptive technologies.<sup>98</sup> Given the proclivity of impacted industries to resort to threats of unwarranted suits that restrict the accessibility and development of the technology,<sup>99</sup> questions also arise as to how IP law and policy should be crafted to encourage cultural creativity and participation through the unrestrained use and sharing of discoveries and creativity via 3D printing technology.

The question remains, therefore, whether IP law will follow the path that sheltered innovators and technology users from lawsuits at the hands of entertainment industry with respect to recording devices, or the path that allowed industry players in digital music, movies, and video games to easily sue users of emerging technologies such as peer-to-peer file sharing.<sup>100</sup> Recent legal reform and jurisprudential development regarding emerging technologies appear to be largely built on utilitarian economic views that conceptualize IP as a tool to preserve owners' exclusivity control over their work.<sup>101</sup> Unlike technologies of the past, however, reforms to the law are needed to strike a

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<sup>95</sup> See, e.g., *supra* note 93 and accompanying text.

<sup>96</sup> See, e.g., *supra* note 93 and accompanying text.

<sup>97</sup> See JESSICA LITMAN, *DIGITAL COPYRIGHT* 31 (Prometheus Books 2001) ("In 1998, copyright lobbyists persuaded Congress to enact a twenty-six-thousand-word, fifty-page coda to the copyright statute setting forth a new and convoluted series of rights and exceptions for digital copyright.").

<sup>98</sup> See WEINBERG, *supra* note 34, at 15 (summarizing the potential of 3D printing to interfere with entrenched intellectual property protections).

<sup>99</sup> See Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 44 B.C. L. REV. 509, 512 (2003) (explaining that weak copyright lawsuits are anti-competitive because they may be used to "impair performance in [a] shared market or even to exclude [others] from the market completely").

<sup>100</sup> See generally PEER-TO-PEER FILE SHARING AND SECONDARY LIABILITY IN COPYRIGHT LAW (Alain Strowel ed., 2009) (documenting the response of various copyright-centered industries innovation in emerging technologies); Desai & Magliocca, *supra* note 70 at 1693–94 (2013) (comparing the disruption created by digitization in the copyright industry with that in the patent industry); see also ELECTRONIC FRONTIER FOUND., *RIAA v. THE PEOPLE: FIVE YEARS LATER* 1–2 (2008), available at <https://www.eff.org/files/eff-riaa-whitepaper.pdf> (discussing lawsuits used by the music industry at the end of the twentieth century to combat copyright infringement through peer-to-peer file sharing).

<sup>101</sup> Elizabeth L. Rosenblatt, *Intellectual Property's Negative Space: Beyond the Utilitarian*, 40 FLA. ST. U. L. REV. 441, 444 (2013); ROBERT P. MERGES, *JUSTIFYING INTELLECTUAL PROPERTY* 2–4 (Harvard Univ. Press 2011).

balance between the rights of users of the technology and IP owners before the technology becomes common consumer good.

The appropriate approach to striking a balance between IP owners and individuals in accessing 3D printing in the age of the digital economy, ought to envision IP as a means of regulating the promotion of culture as a form and source of “participation, livelihood, and shared meaning.”<sup>102</sup> This approach departs from utilitarian orientation and instead, draws inspiration from an eclectic cluster of IP social planning theories that, besides owner’s rights, also focus on the right of the user to access innovation and creativity.<sup>103</sup> This approach is vividly reflected in Canadian legal tradition that strives to balance the rights of copyright holders with that of the public needs to engage with copyright protected work.<sup>104</sup> In 2002, the Supreme Court of Canada advocated for balance between owner’s rights and user’s rights in copyright law stating:

The proper balance . . . lies not only in recognizing the creator’s rights but in giving due weight to their limited nature. In crassly economic terms it would be as inefficient to overcompensate artists and authors for the right of reproduction as it would be self-defeating to undercompensate them.<sup>105</sup>

Two years later, the Court emphasized its approach:

In order to maintain the proper balance between the rights of a copyright owner and users’ interests, [the Copyright Act] must not be interpreted restrictively . . . . ‘User rights are not just loopholes.

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<sup>102</sup> MADHAVI SUNDER, *FROM GOODS TO A GOOD LIFE: INTELLECTUAL PROPERTY AND GLOBAL JUSTICE* 8–11 (Yale Univ. Press 2012). *See generally* NUSSBAUM, MARTHA, C., *WOMEN AND HUMAN DEVELOPMENT: THE CAPABILITIES APPROACH* (Cambridge Univ. Press 2000) (discussing global development planning and public policy in the context of international feminism).

<sup>103</sup> These approaches include: open access; open source; access to knowledge (A2K); creative commons; open development; and cultural economy. *See, e.g.*, William Fisher, *Theories of Intellectual Property*, in *NEW ESSAYS IN LEGAL AND POLITICAL THEORY OF PROPERTY* (Stephen Munzer ed., Cambridge Univ. Press 2001); LAWRENCE LESSIG, *FREE CULTURE: HOW BIG MEDIA USES TECHNOLOGY AND THE LAW TO LOCK DOWN CULTURE AND CONTROL CREATIVITY* (Penguin Press 2004); *ACCESS TO KNOWLEDGE IN THE AGE OF INTELLECTUAL PROPERTY* (Gaëlle Krikorian & Amy Kapczynski eds., Zone Books 2010); Lea Shaver, *The Right to Science and Culture*, 2010 *WIS. L. REV.* 121 (2010); STEVE WEBER, *THE SUCCESS OF OPEN SOURCE* (Harvard Univ. Press 2004); *PERSPECTIVES ON FREE AND OPEN SOURCE SOFTWARE* (Joseph Feller et al. eds., MIT Press 2005).

<sup>104</sup> *See* DYNAMIC FAIR DEALING: CREATING CANADIAN CULTURE ONLINE 4–5 (Rosemary J. Coombe et al. eds., Univ. Toronto Press 2014) [hereinafter DYNAMIC FAIR DEALING].

<sup>105</sup> *Théberge v. Galerie d’Art du Petit Champlain inc.*, [2002] 2 S.C.R. 336, para. 31 (Can.).

Both owner rights and user rights should therefore be given the fair and balanced reading that befits remedial legislation.<sup>106</sup>

In 2012, the Supreme Court of Canada issued a series of decisions that preserved the balance between owners of IP rights and users in the digital environment as it was with traditional artistic and literary works in a non-digital environment.<sup>107</sup> In a similar fashion, the *Copyright Modernization Act of 2012*<sup>108</sup> attempted to address digital challenges to copyright law by regulating the infringing activity of individuals using the Internet in the privacy of their homes as balanced against a number of new defenses to copyright infringement.<sup>109</sup> The Act uniquely recognizes users' right to generate music remixes, mash-up videos, home movies etc. over the Internet.<sup>110</sup> It also incorporates broad exceptions and limitations to owners' rights that allow users to exploit copyright protected content using the Internet.<sup>111</sup>

Given the role of the Internet in 3D printing activities, there are a number of parallels that can be created between users' rights in accessing copyright protected digital content and that of 3D printing technology.<sup>112</sup> There ought to be considerations in copyright law that would allow individuals to freely create, copy, improve upon and distribute CAD files. Such considerations are

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<sup>106</sup> CCH Canadian Ltd. v. Law Soc'y of Upper Can., [2004] 1 S.C.R. 339, para. 48 (Can.).

<sup>107</sup> See, e.g., Entm't Software Ass'n v. Soc'y of Composers, Authors & Music Publishers of Can., [2012] 2 S.C.R. 231, para. 12 (Can.). See generally THE COPYRIGHT PENTALOGY: HOW THE SUPREME COURT OF CANADA SHOOK THE FOUNDATIONS OF CANADIAN COPYRIGHT LAW (Michael Geist ed., Univ. Ottawa Press 2013), available at <http://www.press.uottawa.ca/sites/default/files/9780776620848.pdf> (discussing the implications of the five July 12, 2012 Supreme Court of Canada decisions regarding copyright protection).

<sup>108</sup> Copyright Modernization Act, S.C. 2012, c. 20 (Can.).

<sup>109</sup> *Id.* s. 41.25(1).

<sup>110</sup> *Id.* s. 29.21; see also Peter K. Yu, *Can the Canadian UGC Exception Be Transplanted Abroad?*, 26 INTELL. PROP. J. 175, 177–78 (2014) (discussing section 29.21 of the Canadian Modernization Act).

<sup>111</sup> Copyright Modernization Act, s. 29; see also Sara Wei-Ming Chan, *Canadian Copyright Reform—'User Rights' in the Digital ERA*, 67 U. TORONTO FAC. L. REV. 235, 245–46 (2009) (analyzing the legal issues implicated by the "photocopying and distribution of legal materials"). See generally DYNAMIC FAIR DEALING, *supra* note 104, at 3–4 (discussing the lack of attention given to "digital cultural creation and regimes of law and social regulation" with respect to Canada's Copyright Act).

<sup>112</sup> See David Vaver, *Copyright and the Internet: From Owner Rights and User Duties to User Rights and Owner Duties*, 57 CASE W. RES. L. REV. 731, 736 (2007).

necessary since it is likely that, under existing law, 3D printing will face legal challenges that are just beginning to unfold.<sup>113</sup>

Thus, users' rights in various 3D printing activities ought to be incorporated into copyright law to encourage cultural creativity and participation through individuals' unconstrained use and sharing of their discoveries and creativities. Similarly, private use defenses can be expanded in patent law to accommodate consumers' ability to access the technology. This will have significance to consumers whose particular needs can be met at an affordable cost by easily customizing virtually anything for their day-to-day consumption.

Balancing the rights of IP owners and users of technology, through the recognition of users' rights in 3D printing, will help in realizing societal benefits of 3D printing and guide the technology's development and its impact on individuals' lives, on the economy and on general public welfare, unconstrained by future litigation. Thus, there is a need for IP law and policy around 3D printing that views IP as an instrument serving social and cultural values in a balanced environment for consumers, manufacturers and IP owners.

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<sup>113</sup> See, e.g., *Panel Discusses Legal, Ethical Concerns of 3D Printing*, AM. BAR ASS'N (Aug. 9, 2014, 10:21 AM), [http://www.americanbar.org/news/abanews/aba-news-archives/2014/08/panel\\_discusses\\_lega.html](http://www.americanbar.org/news/abanews/aba-news-archives/2014/08/panel_discusses_lega.html) (discussing the "[l]egal and ethical concerns" associated with 3D printing and the subsequent need for "new regulatory considerations" with respect to 3D printing of medical devices).