SCAN, COPY, PRINT: HOW TO MINIMIZE COPYRIGHT INFRINGEMENT DURING THE 3D TECHNOLOGY REVOLUTION

Aliza Rana*

Increased accessibility of 3D printing and scanning technology is pushing the boundaries of existing copyright law. From affordable countertop 3D printers to iPhones with 3D scanning capabilities, even in its early stages 3D technology is reshaping manufacturing. To manage the friction between the 3D printing community and copyright owners while avoiding the missteps of the film and music industries, it is important to evaluate the options for copyright management under the existing legal framework and consider their business implications. This Note contemplates the imposition of liability on different actors within the 3D scanning and printing community, focusing on online distribution platforms that host 3D scans of copyrighted works. This Note ultimately proposes a solution designed to minimize widespread copyright infringement, protect copyright owners' rights to their works, and promote monitoring by these distribution platforms.

* J.D. Candidate 2019, Columbia Law School; B.A.&Sc. 2015, McGill University. Many thanks to Professor Bert Huang for his invaluable advice in writing this Note. Additional thanks to Luke Budiardjo for his guidance and support, and to the editorial staff of the *Columbia Business Law Review* for their assistance in preparing this Note for publication.

I. INTRODUCTION

Although 3D printing technology has existed since the 1980s, only recently has it developed to the point where at-home 3D printing and scanning have become feasible.[1] In 2011, *The Economist* published an article describing the rise of 3D technology as an "industrial revolution" that would "transform manufacturing and allow more people to start

[1] Jeff Desjardins, *3D Printing Is Finally Changing the Manufacturing Landscape*, VISUAL CAPITALIST (Sept. 27, 2017, 1:14 PM), http://www.visualcapitalist.com/3d-printing-changing-manufacturing [perma.cc/9LZQ-VZXV].

making things."[2] Since then, a wave known as the "Maker Movement" has propelled individual creativity and creation to new heights through the use of 3D technology.[3] Based on a do-it-yourself culture, the Maker Movement focuses on innovation and learning through 3D technology: "[W]hen you give makers the right tools and inspiration, they have the potential to change the world."[4]

Estimates suggest that the 3D printing industry will grow to $26.5 billion by 2021.[5] This prediction is, in part, a result of the increasing accessibility and interest in 3D technology.[6] 3D technology has enabled the creation of a plethora of innovative products, ranging from customized prosthetics for amputees to NASA's printed pizza.[7] Moreover, with recent advances in the quality and pricing of 3D technology, household goods, toys, games, and more can be created at home.[8] Microsoft brought 3D scanning into the home in 2012 with its $250 Kinect device, and now Apple's latest iPhones, as well as Sony's newest flagship phone, offer similar capabilities.[9] These

2 *The Printed World*, THE ECONOMIST (Feb. 10, 2011), http://www.economist.com/node/18114221 [perma.cc/2WMV-PM6J].

3 *See* Tim Bajarin, *Why the Maker Movement Is Important to America's Future*, TIME (May 19, 2014), http://time.com/104210/maker-faire-maker-movement [perma.cc/9JWL-XQUJ]; Jeremiah Owyang, *Maker Movement and 3D Printing: Industry Stats*, JEREMIAH OWYANG (Feb. 13, 2014), http://www.web-strategist.com/blog/2014/02/13/maker-movement-and-3d-printing-industry-stats [perma.cc/3FUN-QXAL].

4 Bajarin, *supra* note 3.

5 *Value of the Additive Manufacturing (3D Printing) Market Worldwide from 2017 to 2021*, STATISTA, https://www.statista.com/statistics/261693/3d-printing-market-value-forecast [perma.cc/HT2M-DM5H].

6 *See* Sukamal Banerjee, *3D Printing: Are You Ready for the New Decentralized Industrial Revolution?*, WIRED (Feb. 2015), https://www.wired.com/insights/2015/02/3d-printing-decentralized-industrial-revolution [perma.cc/7GXW-GABP].

7 Sarah Craig, *Protection for Printing: An Analysis of Copyright Protection for 3D Printing*, 2017 U. ILL. L. REV. 307, 312 (2017).

8 *See, e.g.*, Emily E. Petersen et al., *Impact of DIY Home Manufacturing with 3D Printing on the Toy and Game Market*, TECHS., July 20, 2017, at 1, 17, http://www.mdpi.com/2227-7080/5/3/45/htm [perma.cc/JRX6-C674].

9 Terrence O'Brien, *Microsoft Kinect for Windows Version 1.0 Available Today*, ENGADGET (Feb. 1, 2012),

devices allow users to scan a variety of objects, and even people, into computer-aided design ("CAD") software, which creates a 3D model by translating the original object into a digital file.[10] 3D printers are increasingly affordable and easy to use, allowing individuals to transform these CAD models into physical objects.[11] As a consequence, with a few hundred dollars and minimal software knowledge, individuals now have the capacity to completely replicate existing copyrighted works, thereby eliminating the need to purchase certain mass-manufactured goods.[12] As 3D technology continues to transform manufacturing and distribution from a system of large interconnected market participants to a decentralized network of individual "makers,"[13] it may leave, in some cases,

https://www.engadget.com/2012/02/01/microsoft-kinect-for-windows-version-1-0-available-today [perma.cc/9YXA-HZ2X]; Michael Molitch-Hou, *New Kinect Adapter Gives 3D Builder Full-Color 3D Scanning Powers for 3D Printing*, 3D PRINTING INDUSTRY (Oct. 24, 2014, 10:20 AM), https://3dprintingindustry.com/news/new-kinect-adapter-gives-3d-builder-full-color-3d-scanning-powers-3d-printing-35230; Beau Jackson, *Eerie or Expressive? iPhone X and Xperia XZ1 Released with AR Features and 3D Scanning*, 3D PRINTING INDUSTRY (Sept. 15, 2017, 12:02 PM), https://3dprintingindustry.com/news/3d-scanning-iphone-x-and-xperia-xz1-released-with-ar-features-121268 [perma.cc/PAE7-FK4L].

10 *See* Craig, *supra* note 7, at 313–14. These files can be modified and/or shared with others through online hosting platforms that act as marketplaces for the distribution of 3D CAD files. *See* discussion *infra* Section II.A. The copyright violations associated with the dissemination of 3D CAD files of copyrighted works are discussed in detail *infra* Part III.

11 Cubibot, a 3D printing startup, is conducting a Kickstarter campaign with the goal of launching a $149 countertop 3D printer by February 2018. *See* Lulu Chang, *Cubibot Brings Affordable 3D Printing to the Masses*, DIGITAL TRENDS (Oct. 8, 2017, 8:08 PM), https://www.digitaltrends.com/cool-tech/cubibot-3d-printer [perma.cc/3MXK-Y5TR]. *See also* Drew Prindle, *How Do 3D Printers Work? Here's A Super Simple Breakdown*, DIGITAL TRENDS (Mar. 10, 2018, 12:00 PM), https://www.digitaltrends.com/cool-tech/how-do-3d-printers-work [perma.cc/LJU6-D57B].

12 *See, e.g.*, Rick Brioda, *New 3D Printer? Here's How to Create Your Own Printables*, CNET (Feb. 2, 2016, 2:31 PM), https://www.cnet.com/how-to/new-3d-printer-heres-how-to-create-your-own-printables [perma.cc/H4AR-NRGQ].

13 *See* Banerjee, *supra* note 6.

only a direct connection between the do-it-yourself individuals and the parties that originate ideas.[14]

This shift in manufacturing and distribution means that in cases of copyright infringement, there are no longer capital-rich distributors and manufacturers to sue.[15] Instead, the acts of copyright infringement by individuals are widespread and difficult to detect.[16] Some suggest that 3D printers could implicate "more copyright complications than all the previous advances in technology combined."[17] Analysts predict that "[b]y 2018, 3D printing will result in the loss of at least $100 billion per year in intellectual property globally."[18] Now that 3D technology is available for mass consumer use, corporate and individual copyright owners alike worry that both deliberate and unintentional infringement will impact their bottom-line.[19] Beyond the legal difficulties of holding individual infringers liable, the economics of legal action often prevent copyright owners from moving forward. Litigation costs themselves act as a deterrent, and even in cases where copyright owners choose to incur such costs and pursue legal action, infringers may not have sufficient funds available to pay damages.[20] Therefore, seeking legal recourse for copyright infringement arising from 3D scanning and printing poses three critical problems: (1) identification of the infringer, (2) demonstrability of copyright infringement, and (3) recovery of sufficient damages to make litigation worthwhile.[21] Copyright owners need an alternative framework within which they can

14 *See, e.g.*, Ian Wright, *Should Toy Manufacturers Be Worried About 3D Printing?*, ENGINEERING.COM (July 20, 2017), https://www.engineering.com/AdvancedManufacturing/ArticleID/15299/Should-Toy-Manufacturers-Be-Worried-About-3D-Printing.aspx [perma.cc/UT8V-WGP3].

15 *See* Craig, *supra* note 7, at 326–27.

16 *Id.* at 326.

17 Sarah Swanson, *3D Printing: A Lesson in History: How to Mold the World of Copyright*, 43 SW. L. REV. 483, 483 (2014).

18 *Gartner Reveals Top Predictions for IT Organizations and Users for 2014 and Beyond*, GARTNER (Oct. 8, 2013), https://www.gartner.com/newsroom/id/2603215 [perma.cc/PC6X-43DJ].

19 *See* Craig, *supra* note 7, at 310.

20 *Id.* at 327.

21 *Id.* at 326.

enforce their intellectual property rights without assuming the entire burden of monitoring their intellectual property.[22]

To replace the unambiguous accountability and deep-pockets of large manufacturers and distributors, the "new" distribution and manufacturing process based on 3D technology must be evaluated to determine which intermediaries may be held liable for infringement. Under this "new" process, there are three steps where owners' rights can be infringed: (1) scanning the original object, (2) distributing the 3D scanned file, and (3) printing a copy of the original work.[23] Individuals that actually commit the infringing acts—namely, those who scan, upload, and print—and the intermediaries who facilitate or support their infringing activities—namely, 3D scanner manufacturers, distribution websites, and 3D printer manufacturers—participate in each of these steps.

Part II of this Note describes the step-by-step process of creating 3D scanned and printed objects and explains the current state of copyright doctrine with respect to each of these steps. Part III of this Note analyzes the ability of copyright owners to impose liability on the parties involved in the "new" manufacturing and distribution process enumerated above. Part IV of this Note proposes a two-tiered solution for addressing copyright infringement while incentivizing legal distribution of 3D scanned CAD files.

This Note does not address the creation of derivative works nor the "de novo" replication (from scratch) of works through CAD software. Rather, this Note focuses on the reproduction, or "copying," of works through 3D scanning and printing, as well as the digital distribution of the scanned files through online sharing platforms. This Note will focus on situations where users create 3D scans of existing copyrighted works and upload these scans, with limited editing, to online distribution platforms. Although a variety of derivative scenarios exist, analyzing this simplistic case will provide readers with the

22 *See id.*

23 *See* Aaron Wright, *Copyright and Trademark in 3D*, CARDOZO LAW, https://cardozo.yu.edu/copyright-and-trademark-3d [perma.cc/7L64-S5V4].

necessary technical and legal understanding to evaluate specific instances of potential copyright infringement.[24]

II. OVERVIEW OF 3D TECHNOLOGY & THE RELEVANT COPYRIGHT LAW

A. How Does 3D Printing Work?

3D printing, or additive manufacturing, conceptually encompasses the various technologies that create seamless 3D objects from digital blueprints, often by "adding layer upon layer of material."[25] These blueprints are created from scratch by CAD software ("de novo CAD files") or, increasingly, reverse engineered using a 3D scanner.[26]

3D scanning creates a digital file of an object that can be edited through CAD software.[27] Using a 3D scanner is often an easier first step than generating a de novo CAD file, as it affords greater accuracy, speed, and reliability in reproduction.[28] Once the scan is complete, users can easily use CAD software to clean up or modify the 3D files to more precisely replicate the scanned object or to customize the blueprint to the user's preferences.[29]

---

[24] In many instances, 3D technology, especially with respect to online distribution platforms, will implicate international copyright concerns. However, this analysis falls outside the scope of this Note. Additionally, this Note is limited in scope to purely artistic designs. When copyrighted works have a functional purpose, the "Useful Articles" doctrine would likely apply, adding an additional layer of analysis beyond the scope of this Note. *See, e.g.*, 1 NIMMER ON COPYRIGHT § 2.08 (2018).

[25] *See* Charles W. Finocchiaro, Note, *Personal Factory or Catalyst for Piracy? The Hype, Hysteria, and Hard Realities of Consumer 3-D Printing*, 31 CARDOZO ARTS & ENT. L.J. 473, 473 (2013); *What is 3D Printing*, 3DPRINTING.COM, https://3dprinting.com/what-is-3d-printing [perma.cc/Y9S6-VLGS].

[26] *See* Swanson, *supra* note 17, at 484.

[27] *See generally* CREAFORM EBOOK SERIES, AN INTRODUCTION TO 3D SCANNING (2015) (ebook), https://www.creaform3d.com/sites/default/files/assets/technological-fundamentals/ebook1_an_introduction_to_3d_scanning_en_26082014.pdf [perma.cc/8JRD-V35F].

[28] *See id.*

[29] Craig, *supra* note 7, at 313.

An alternative to creating a de novo CAD file or 3D scanning an object is to acquire a blueprint online; many creators post 3D scanned CAD files on distribution platforms for others to use.[30] Thingiverse,[31] GrabCAD,[32] MyMiniFactory,[33] and Shapeways[34] represent just a few of these online marketplaces. Some platforms also offer software for their users to edit and customize the uploaded files,[35] or provide an option for users to order 3D printed objects directly from the website rather than downloading the file for at-home printing.[36]

These platforms require users to accept various terms and conditions, including terms relating to the ownership of the intellectual property housed on the website.[37] To acknowledge the "authorship" of users that upload files and support the management of their "copyrights," many platforms have adopted licensing options, the most common of which are Creative Commons licenses.[38] Generally, websites require the uploader to grant a license to the website, as well as some form of a license to platform users.[39] The platforms also require uploaders to represent that they maintain intellectual property rights over the uploaded works, and are often to the effect of:

---

30 *Id.* at 313–14.

31 *About Thingiverse*, THINGIVERSE, https://www.thingiverse.com/about [perma.cc/89RM-8QSA].

32 *About GrabCAD*, GRABCAD, https://resources.grabcad.com/company/ [perma.cc/6EWT-EWJ3].

33 *About Us*, MYMINIFACTORY, https://www.myminifactory.com/pages/about_us [perma.cc/Z2WD-4DBN].

34 *Shapeways 3D Printing Marketplace*, SHAPEWAYS, https://www.shapeways.com/marketplace [perma.cc/DS4V-LJQK].

35 *See, e.g.*, *GrabCAD Workbench*, GRABCAD, https://grabcad.com/workbench [perma.cc/8NMG-GLUR].

36 *See, e.g.*, SHAPEWAYS, *supra* note 34.

37 Craig, *supra* note 7, at 313–14.

38 *Id.*; *see generally About the Licenses*, CREATIVE COMMONS, https://creativecommons.org/licenses [perma.cc/Q33F-GV4B]. Creative Commons licenses are discussed further in Subsection IV.A, *infra*.

39 *See e.g.*, *MakerBot Terms of Use*, MAKERBOT, https://www.makerbot.com/legal/terms [perma.cc/4UNN-BMME] (last updated Oct. 17, 2017).

> You hereby represent and warrant that: (a) your User Submissions will not infringe, misappropriate or violate any third party's Intellectual Property Rights, moral rights, privacy or other personal right, or any Law; and (b) you have, and will maintain during and after any termination of this Agreement, all licenses, consents, permissions and approvals required to grant the [secondary licenses].[40]

Once a user accepts the terms and conditions, the website uploads their submitted files for distribution.[41]

One can then acquire the uploaded blueprint by downloading the design from a distribution platform and can then send the file to the printer.[42] The 3D printer will create the object by breaking down the CAD blueprint into 2D slices or layers.[43] These layers are then printed, one on top of another, to create the 3D object.[44] Users can start with a host of different substances—so long as the material can be broken down to a liquid state, it can likely be used in 3D printing.[45] The ease with which replicas of existing copyrighted objects can be created through 3D scanning and printing, as well as the prevalence of intellectual property rights throughout this process, necessitates an evaluation of the relevant legal implications.

B. An Introduction to Relevant Copyright Law

Since the origin of U.S. copyright law, its goal has been to foster the development and dissemination of creativity and innovation.[46] Drafters of the Constitution, under Art. I, Sec. 8, Cl. 8, considered the promotion of "the Progress of Science and

---

[40] *GrabCAD Website Terms of Use*, GRABCAD (June 28, 2016), https://grabcad.com/terms [perma.cc/LNP3-723U].

[41] *See* Craig, *supra* note 7, at 313–14.

[42] *Id.* at 313.

[43] *Id.*

[44] *Id.*

[45] *Id.*

[46] *See* INTERNET POLICY TASK FORCE, DEP'T OF COMMERCE, COPYRIGHT POLICY, CREATIVITY, AND INNOVATION IN THE DIGITAL ECONOMY 3 (2013), https://www.uspto.gov/sites/default/files/news/publications/copyright-greenpaper.pdf [perma.cc/UY35-WPVY].

useful Arts" to be paramount, and conferred such power upon Congress.[47] By offering protection to creators of "original works of authorship fixed in any tangible medium of expression," copyright law has spurred economic, social, and cultural growth.[48]

Although copyright protection exists immediately once an original work of authorship is fixed, in order to legally enforce such protection, the work must be registered.[49] To qualify for registration under the Copyright Act, the work must be an (1) "original" (2) "work of authorship" (3) "fixed in a tangible medium of expression."[50] To meet the "originality" condition, the work must "possess . . . at least some minimal degree of creativity."[51] To qualify as a "work of authorship," the work must also fall within one of the eight enumerated statutory categories, which include "literary works" as well as "pictorial, graphic, and sculptural works."[52] A work is considered "fixed" when it exists in a "sufficiently permanent medium such that the work can be perceived, reproduced, or communicated for more than a short time."[53]

Once it is established that a creator qualifies for statutory copyright protection by meeting the above criteria, the law affords them "exclusive rights in [the] copyrighted works."[54] These include the right to "reproduce" and "distribute copies . . . of the copyrighted work."[55]

47 U.S. CONST. art. I, § 8, cl. 8.

48 17 U.S.C. § 102 (2017); *see* INTERNET POLICY TASK FORCE , *supra* note 46, at 5.

49 *See* U.S. COPYRIGHT OFFICE, COPYRIGHT BASICS 4 (2017), https://www.copyright.gov/circs/circ01.pdf [perma.cc/PR5W-U7QV].

50 *Id.* at 1.

51 Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345 (1991).

52 17 U.S.C. § 102 (2017).

53 *See* U.S. COPYRIGHT OFFICE, *supra* note 49, at 1.

54 17 U.S.C. § 106 (2017).

55 *Id.*

1. How Could 3D Scanning and Printing Infringe Copyright Laws and Who Can Copyright Owners Hold Liable for Such Infringement?

As outlined above, owners' copyrights can be infringed during three stages: (1) scanning the original object, (2) distributing the 3D scanned file, and (3) printing a copy of the original work.[56] The owners' legal rights must be considered concurrently with the economic challenges of enforcement and litigation when considering which party to hold liable for such infringement.

During the first and third steps, both parties involved—the individual scanner/printer and the manufacturer of the scanning/printing device—may incur liability for copyright infringement. The individual scanner may be held directly liable for reproducing a copy of the original copyrighted work[57] in violation of § 106(1).[58] The same goes for individuals who print replicas of copyrighted works.[59] However, it is generally not economically practical to hold individual infringers liable.[60]

Instead, the economics suggest that copyright owners should attempt to hold the device manufacturers of the 3D scanner or printer liable for contributing to or inducing the infringement committed by the individual scanners or printers. The Supreme Court, however, addressed this rationale in the *Betamax* case, where a copyright holder argued that even though Sony had not directly committed any copyright infringement, its sale of a device which made copyright infringement possible made Sony a secondary infringer under the

56 *See* Wright, *supra* note 23, at 4–5.

57 For further analysis on why scans of copyrighted works constitute copies of copyrighted works, *see infra* Subsection III.A.

58 17 U.S.C. § 106 (2017) ("[T]he owner of copyright under this title has the exclusive rights to do and to authorize any of the following: (1) to reproduce the copyrighted work in copies or phonorecords. . . .").

59 *Id.*

60 It is difficult to hold individual infringers liable because of two key economic issues: (1) the infringing activity is widely dispersed; and (2) individual infringers may not have sufficient funds to pay damages to the original owner. *See* Craig, *supra* note 7, at 325–27.

doctrine of contributory liability.[61] In the 1980s, Sony and a handful of other device manufacturers began to produce what are now known as VCRs.[62] VCRs allowed individuals to create copies of video content in their homes, which posed a unique problem at the time.[63] It was common knowledge that VCR owners would use the devices to copy content from broadcast television for use at a later date, and in some cases, to amass collections of copyrighted content copies from broadcast television without permission.[64] And it was, of course, infeasible for the owners of the copyrighted content to stop this widespread infringement by suing the individual owners of VCRs in separate litigation.[65]

Even though it was clear that Sony had provided the means for VCR owners to infringe copyright, the Court found that Sony was not a contributory infringer because Sony did not have knowledge of the particular acts of infringement it facilitated.[66] Since the devices that Sony sold were "capable of substantial noninfringing uses," the Court declined to assume that Sony sold its devices with constructive knowledge that they would be used to infringe copyright.[67]

Under the *Betamax* doctrine, it is unlikely that manufacturers of 3D scanners and printers could be held secondarily liable for making copyright infringement possible. This is particularly true because the instant case of 3D scanners and printers arguably offer users more "substantial noninfringing uses" than that of a VCR.[68] Consequently, attempting to

61 *See* Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 420 (1984) (referred to as the *Betamax* case, or *Betamax*).

62 *Id.* at 422–23.

63 *Id.*

64 *Id.* at 423–24.

65 *Id.* at 420.

66 *Id.* at 456.

67 *Id.*

68 For instance, non-infringing uses of 3D scanners and printers include "medical advancement and enhancements in education and science." *See* Swanson, *supra* note 17, at 505. These non-infringing uses would likely be considered of equal importance to those uses cited as sufficient by the *Betamax* court, which mainly allowed users to record sports, education, and

impose liability on the parties involved in the first and third stages of infringement is neither efficient, nor likely to succeed. Instead, the focus should be on imposing liability during the second stage: distributing the 3D scanned file.

2. Do 3D Scanned Files of Copyrighted Works Infringe the Rights of Copyright Owners?

Assuming that the work being scanned is a copyrighted work, which includes an object with a copyrightable design or component,[69] one may be held liable for infringing the exclusive rights afforded to copyright owners.[70] In particular, the online platforms that distribute scanned files of copyrighted works to the public may be in direct violation of a copyright owner's exclusive right to distribute copies of their work under § 106(3).[71]

This assertion relies on how the courts have evaluated digital 3D files replicating copyrighted works. In *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, the Tenth Circuit applied copyright principles to 3D digital models of Toyota cars created by Meshwerks and concluded that such models were mere copies rather than original expressions deserving copyright protection in their own right.[72] 3D models had scarcely been discussed prior to *Meshwerks*, and, as such, the court relied heavily on the doctrinal treatment of photographs.[73] With

religious programming for later viewing. *Sony Corp. of Am.*, 464 U.S. at 444–46.

69 *See* Mazer v. Stein, 347 U.S. 201, 218–19 (1954) (holding that the fact that the copyrighted object had a useful purpose—here, the statuettes were used as bases for lamps—did not preclude copyright registration).

70 *See* 17 U.S.C. § 106 (2017).

71 *Id.* It is important to note that simply hosting, or "making available," a copy of the original work may not constitute distribution. *See* Jane C. Ginsburg & Luke Ali Budiardjo, *Liability for Providing Hyperlinks to Copyright-Infringing Content: International and Comparative Law Perspectives*, 41 COLUM. J.L. & ARTS 153, 219 (2018). Instead, the copy must be downloaded in order to constitute distribution for the purposes of § 106(3). *See* 17 U.S.C. § 106 (2017).

72 Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc., 528 F.3d 1258, 1264 (10th Cir. 2008).

73 *Id.* at 1263.

photographs, it is not the subject nor the idea of the photograph that is copyrightable, but only the "original depiction of the subject" that can be protected.[74]

The Tenth Circuit cited to a Supreme Court case finding that some photographs lack sufficient minimum originality to qualify for any copyright protection.[75] Relying on this assertion and referencing the discussion of the idea-expression dichotomy in *Feist*, the court emphasized that "works are not copyrightable to the extent they do not involve any expression apart from the raw facts in the world."[76] Works are not copyrightable if they depict an idea without incorporating the author's original expression of the idea.[77]

The Tenth Circuit found that this was the exact intention of Meshwerks.[78] They agreed with the District Court's assessment that "Meshwerks' 'intent was to replicate, as exactly as possible, the image of certain Toyota vehicles,'"[79] and that "Meshwerks' models depict nothing more than unadorned Toyota vehicles—the car *as* car."[80] Though Meshwerks made decisions during the creation of the models, they "reflect none of the decisions that can make depictions of things or facts in the world [deserving of] . . . copyright protection."[81] Instead, these digital models that intended to replicate, as closely as possibly, the physical Toyota vehicles were held to be "(very good) copies of Toyota's vehicles."[82]

Thus, under *Meshwerks*, when a user with intent to depict an original 3D object scans the object, capturing (i.e. copying) its copyrightable properties, the resulting 3D scanned file

74 *Id.* at 1264 (emphasis omitted).

75 *Id.* (citing Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53, 59 (1884)).

76 *Id.* at 1265; *see also* Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345 (1991).

77 *Meshwerks*, 528 F.3d at 1265.

78 *Id.* at 1261.

79 *Id.*

80 *Id.* at 1265.

81 *Id.*

82 *Id.* at 1264.

should constitute an infringing copy of the work.[83] As a result, those who create and distribute certain 3D files can be held liable for infringing copyright owners' rights.

III. THE CHALLENGES OF IMPOSING COPYRIGHT LIABILITY ON ONLINE DISTRIBUTION PLATFORMS

Copyright infringement by online distribution platforms ("ODPs") that share 3D scanned CAD files can be remedied by finding the ODPs directly or secondarily liable for their infringing actions.[84] However, such liability is subject to the Digital Millennium Copyright Act (the "DMCA") and its enumerated exceptions.[85] As a result, finding ODPs directly and/or secondarily liable may not be sufficient to enforce any claims of infringement against these platforms.

A. Can ODPs Be Held Directly Liable?

Direct liability stems from a violation of the copyright owner's exclusive rights under § 106.[86] Specifically, ODPs may be violating copyright owners' distribution rights under § 106(3)[87] and copyright owners' display rights under

83 Though outside of the scope of this Note, it is important to remember that if the user modifies the scan to differentiate it from the original copyrighted work, it may constitute a derivative work or be entitled to its own copyright protection within the statutory definition of term. *See* 17 U.S.C. § 101 (2017). This Note is limited to considering instances where users scan copyrighted objects with the intention of essentially replicating the original object.

84 A detailed evaluation of whether online distribution platforms ("ODPs") can be held directly and/or secondarily liable follows. *See infra* Sections III.A and III.B.

85 See discussion *infra* Section III.C considering the impact of the Digital Millennium Copyright Act (the "DMCA") in finding ODPs liable for copyright infringement.

86 *See* 17 U.S.C. § 106 (2017).

87 *Id.* ("[T]he owner of copyright under this title has the exclusive rights to do and to authorize any of the following: . . . (3) to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending . . . .").

§ 106(5)[88] to the extent that the ODPs host infringing files on their website after they are uploaded by users.

1. ODPs Pass the "Server Test"

In *Perfect 10, Inc. v. Amazon.com, Inc.*, the Ninth Circuit evaluated whether Google's image search results of the plaintiff's nude photos constituted direct infringement of the owner's display and distribution rights.[89] Google's searches displayed reduced size and quality thumbnail versions of the plaintiff's images and, when clicked on, prompted the user to access the full-sized images from the third-party website that hosted the photos.[90] In its analysis of whether direct liability was appropriate, the court developed and applied the "server test," holding liable online platforms that stored electronic information and served it directly to the user.[91] The server test focuses on whether the provider actually hosts the information for users or merely links to it, suggesting that solely linking to infringing content would likely absolve the platform of any direct infringement claim.[92] In its application of the server test to Perfect 10's claims, the District Court found, and the Court of Appeals affirmed, that Google's thumbnails likely constituted direct infringement, but that Google likely would not be found directly liable for linking to full-sized images.[93]

The majority of ODPs would likely not be barred from direct liability under the server test. A quick search on Thingiverse, for example, shows that users can download CAD files

88 *Id.* ("[T]he owner of copyright under this title has the exclusive rights to do and to authorize any of the following: . . . (5) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work, to display the copyrighted work publicly . . . .").

89 *See* Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146, 1159 (9th Cir. 2007).

90 *Id.* at 1155–56.

91 *Id.* at 1159–60.

92 *Id.* at 1159.

93 *Id.* at 1176.

directly from the websites to their computers.[94] Thingiverse does not redirect users to another platform, nor does it link users to an alternative source to procure the CAD file.[95] Many ODPs follow the same process as Thingiverse for transmitting CAD files from their platforms to individual users, and as such, under the server test, may be directly liable for violating copyright owners' distribution and display rights.[96]

2. ODPs Likely Directly Infringe Copyright Owners' Distribution Rights

ODPs are inherently designed for the distribution and dissemination of CAD files for 3D printing.[97] These platforms act as communities for users to share and exchange various 3D printing blueprints, including those that infringe on copyright protection.[98] As explained above, 3D CAD files that replicate copyrighted objects are considered copies of the original work under the existing doctrine.[99]

Copyright law defines "publication" as the distribution of, or offer to distribute, copies of a work to the public through

---

[94] *See, e.g.*, *Search Results for "Star Wars"*, THINGIVERSE, https://www.thingiverse.com/search?q=Star+Wars&sa=&dwh=185a57bbf995bb0 (last visited Apr. 9, 2018); Mark Kotsamanes, *Star Wars—Dark Holocron*, THINGIVERSE (Dec. 14, 2015), https://www.thingiverse.com/thing:1194407 [perma.cc/K2E8-GC2S].

[95] *Id.*

[96] Entering the search-term "Star Wars," for example, on many ODPs offers numerous results that can be downloaded directly to the user's computer. The ODP does not redirect the user to an alternative website nor does it require any information in exchange for the download. Though this may not be the case for all ODPs, the majority offer a similar process for downloading hosted CAD files. *See, e.g.*, *Search Results for "Star Wars"*, *supra* note 94; *Search Results for "Star Wars"*, GRABCAD, https://grabcad.com/library?utf8=%E2%9C%93&query=Star%20Wars (last visited Apr. 9, 2018); *294 Objects Found Matching "Star Wars"*, MYMINIFACTORY, https://www.myminifactory.com/search/?query=Star+wars&tech=&comp=&query=Star+Wars&sortBy= (last visited Apr. 9, 2018).

[97] *See* Craig, *supra* note 7, at 313–14.

[98] *Id.* at 313.

[99] *See supra* Subsection II.B.2.

sale or other transfer of ownership.[100] To augment this broad definition, the Supreme Court has accepted that copies may be distributed electronically.[101] Therefore, by hosting 3D CAD files electronically for users with, at minimum, an offer to distribute these files to the public, it is likely that ODPs' actions may be considered a violation of copyright owners' distribution rights.

3. ODPs May Directly Infringe Copyright Owners' Display Rights

The case for infringement of display rights is less linear. The Copyright Act has defined "display" as "to show a copy of [a work], either directly or by means of a film, slide, television image, or any other device or process . . . ."[102]

Although it has been demonstrated that a 3D CAD file depicting an original copyrighted work constitutes a copy of that work, it may be a stretch to assume liability for displaying an image of the CAD file.[103] In *Perfect 10*, Google image search results displayed Perfect 10's copyrighted photos.[104] Similarly, ODPs' search results display images of 3D scanned CAD files—essentially displaying the functional equivalent of the copies of the original copyrighted works.

Courts may find the instant case to be analogous to the "prima facie case that Google's communication of its stored thumbnail images directly infringes Perfect 10's display right."[105] Alternatively, courts may consider displaying a copy (the image displayed on the ODP) of a copy (the 3D scanned CAD file) of the original copyrighted work to be too far removed to constitute direct infringement of display rights.

100 *See* 17 U.S.C. § 101 (2017).

101 *See* N.Y. Times Co. v. Tasini, 533 U.S. 483, 498 (2001).

102 17 U.S.C. § 101 (2017).

103 *See supra* Subsection II.B.2.

104 *See* Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146, 1159 (9th Cir. 2007).

105 *Id.* at 1160.

B. Can ODPs Be Held Secondarily Liability?

Though there is a strong argument for finding ODPs directly liable for copyright infringement, courts more commonly rely upon secondary liability doctrines, including inducement theory, vicarious liability, and contributory liability, to hold online platforms liable.[106] Secondary liability is based on a predicate alleged act of direct liability.[107] The individual users who: (1) create 3D scans of copyrighted works, (2) upload them to the ODPs, and (3) download them to print (reproduce) the copyrighted works directly commit multiple acts of copyright infringement. Since 3D scanned replicas of copyrighted works constitute copies of the works,[108] these acts, without permission from the copyright owner, infringe on the owner's basic right to reproduce their work under § 106(1), and uploading the scans infringes on the owner's right to distribute under § 106(3).[109] After establishing a direct liability claim on individual infringers, copyright owners may rely on the common law concept of secondary liability to hold responsible those who encourage, facilitate, or profit from the infringing acts.[110]

1. ODPs Would Likely Not Be Held Liable Under Inducement Theory

Inducement theory—a secondary liability theory based on finding evidence of "active steps . . . taken to encourage direct

106 *See, e.g.*, A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1019–24 (9th Cir. 2001), Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd., 545 U.S. 913, 916 (2005); *see also* Xavier Amadei, Note, *Standards of Liability for Internet Service Providers: A Comparative Study of France and the United States with a Specific Focus on Copyright, Defamation, and Illicit Content*, 35 CORNELL INT'L L.J. 189, 198 (2001).

107 *See* K. A. Taipale, *Secondary Liability on the Internet: Towards a Performative Standard for Constitutive Responsibility* 14 (CAS Working Paper Series, Paper No. 04-2003).

108 *See supra* Subsection II.B.2.

109 *See* 17 U.S.C. § 106 (2017).

110 JAMES BOYLE & JENNIFER JENKINS, *Secondary Liability for Copyright Infringement & Safe Harbors in the Digital Age, in* INTELLECTUAL PROPERTY: LAW AND THE INFORMATION SOCIETY 517, 517 (2014).

infringement"—was applied to online platforms in *Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd.*[111] The Supreme Court found that Grokster, a Napster-like peer-to-peer sharing platform, displayed sufficient intent to be held liable under inducement theory, highlighting three key facts: Grokster (1) aimed to satisfy a known source of demand for copyright infringement, (2) did not attempt to develop filtering tools or other mechanisms to diminish the infringing activity, and (3) made money selling advertising space, directing ads to computers, etc.[112]

ODPs do not share these characteristics, nor do they meet the high burden set out in *Grokster*. *Grokster* emphasized that the improper objective of promoting use of the platform for infringement "must be plain and must be affirmatively communicated through words or actions."[113] The standard for satisfying inducement is intentionally difficult to meet.[114] Unlike Grokster, which touted itself as a Napster alternative,[115] ODPs have not to date advertised themselves as platforms for sharing infringing content. Rather than actively inducing infringement, ODPs, at least externally, appear to focus on innovative, non-infringing uses for their platforms, such as the distribution of unique user-created CAD designs.[116] Their compulsory terms and conditions require users to acknowledge and certify that they have intellectual property rights to the content they upload.[117] Many ODPs offer

111 Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd., 545 U.S. 913, 936 (2005) (citing Oak Industries, Inc. v. Zenith Electronics Corp., 697 F. Supp. 988, 992 (N.D. Ill. 1988)).

112 *Id.* at 916.

113 Columbia Pictures Indus., Inc. v. Fung, 710 F.3d 1020, 1034 (9th Cir. 2013).

114 *Id.*

115 *Id.* at 1035.

116 *See, e.g.*, *How it Works*, MYMINIFACTORY, https://www.myminifactory.com/pages/how-it-works [perma.cc/2LKN-SYJW]; *Thingiverse Creative Commons Licenses Explained*, MAKERBOT, https://www.makerbot.com/media-center/2016/03/14/thingiverse-creative-commons-licenses-explained [perma.cc/G67Q-QQAY].

117 *See, e.g.*, *Terms & Conditions*, MYMINIFACTORY, https://www.myminifactory.com/pages/terms-and-conditions

licensing options to their users, which suggests that they intend for uploaded files to be sufficiently original for copyright protection.[118] Notably, larger ODPs including Shapeways and Thingiverse run active blogs and chatrooms that discuss, amongst other topics, the intersection of intellectual property rights and 3D technology.[119] As a result, it is unlikely that ODPs would be found secondarily liable under inducement theory.

2. ODPs May Be Held Vicariously Liable

Conversely, vicarious liability exists when two elements are satisfied: (1) "the defendant must possess the right and ability to supervise the infringing conduct," and (2) "that defendant must have 'an obvious and direct financial interest in the exploitation of copyrighted materials.'"[120] In contrast to other forms of secondary liability, a defendant cannot escape vicarious liability by simply claiming an actual lack of knowledge.[121]

In *A&M Records, Inc. v. Napster, Inc.*, the Court of Appeals, affirmed a likelihood of success on the merits in finding Napster vicariously liable for its users' infringing activity and stayed the preliminary injunction (with some modification of

[perma.cc/7WSS-VCS7]; *MakerBot Terms of Use*, MAKERBOT, https://www.makerbot.com/legal/terms (last updated Oct. 17, 2017) [perma.cc/4UNN-BMME]; *GrabCAD Website Terms of Use*, GRABCAD, https://grabcad.com/terms (last updated June 28, 2016) [perma.cc/HQ4M-G6S5]; *Shapeways Content Policy and Notice Takedown Procedure*, SHAPEWAYS, https://www.shapeways.com/legal/content_policy [perma.cc/H73B-W6ZQ] (last updated Feb. 22, 2017).

118 *See* Duann, *Creative Commons and Digital Design Downloads*, SHAPEWAYS MAGAZINE (Oct. 29, 2010), https://www.shapeways.com/blog/archives/628-creative-commons-and-digital-design-downloads.html [perma.cc/E6SF-A94Y]; *Thingiverse Creative Commons Licenses Explained*, MAKERBOT (Mar. 14, 2016), https://www.makerbot.com/media-center/2016/03/14/thingiverse-creative-commons-licenses-explained [perma.cc/A79M-3QGB].

119 *See id.*

120 3 NIMMER ON COPYRIGHT § 12.04(A)(2) (2018).

121 *Id.*

scope) for A&M Records.[122] In its decision, the court evaluated whether Napster satisfied the two requirements of vicarious liability.[123] Since "Napster's future revenue [was] directly dependent upon 'increases in userbase,'" and "[m]ore users register[ed] with the Napster system as the 'quality and quantity of available music increase[d],'" the court found that Napster's financial interest was sufficiently obvious and direct for vicarious liability.[124] With respect to the supervision prong, the court found that Napster's ability to police its users would likely constitute sufficient supervision.[125] However, it highlighted that there were boundaries as to how much control Napster could and actually did exert.[126]

Napster's treatment of the supervision prong warranted additional clarification from the Ninth Circuit in *Perfect 10* six years later.[127] In *Perfect 10*, the court explained that both a legal right and a practical ability to control the infringing activity are required before one can be considered vicariously liable.[128] In contrast to *Napster*, the court found that Google was not vicariously liable as it did not possess the legal right nor the practical ability to control the infringing activity.[129] The court relied in part on the fact that the infringing activity was taking place on third-party websites that Google could not control and stressed the impracticality of placing Google in a supervisory role.[130] The Ninth Circuit highlighted that the right to remove something from an online platform does not necessarily constitute the right to stop infringement.[131]

122 *See* A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1029 (9th Cir. 2001).

123 *Id.* at 1022–23.

124 *Id.* at 1023.

125 *Id.* at 1023–24.

126 *Id.*

127 *See* Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146, 1157 (9th Cir. 2007).

128 *Id.* at 1173.

129 *Id.* at 1173–74.

130 *Id.*

131 *Id.*

With this background in mind, it is likely that ODPs have an adequate financial interest to satisfy the first requirement of vicarious liability. Arguments for ODPs' financial interest in the infringing activity would likely follow the same rationale posited in *Napster*: ODPs depend on increases in their userbase to generate current and/or future revenue, with some ODPs even deriving direct profit from sales based on user-uploaded files.[132]

ODPs also have some ability to control access to their systems. ODPs more closely resemble Napster than Google in that they are closed systems that theoretically and legally control which files users upload, distribute, and, in some cases, sell, in contrast to Google's open internet system that has no control over the files hosted on third-party websites. However, courts instead may rely on *Perfect 10*'s assertion that legal right does not equate to practical ability, and consider factors such as the ease of uploading and downloading files on ODPs and the volume of hosted files to indicate that these platforms do not practically have the ability to control the infringing activity.

The DMCA includes an express prohibition on imposing an affirmative duty to monitor infringing activity for online platforms, including ODPs.[133] Discussed in further detail below, the Act may signal to courts that imposing a "control" obligation on ODPs directly conflicts with Congress's intentions in enacting the DMCA, and may sway courts away from finding vicarious liability in these circumstances.[134] Ultimately, whether courts would find ODPs vicariously liable is debatable, but would likely rest on whether a court is convinced that ODPs maintain sufficient practical and legal control over the files distributed across their platforms.

---

[132] *See, e.g.*, *Shapeways 3D Printing Marketplace*, SHAPEWAYS, https://www.shapeways.com/marketplace [perma.cc/93WD-FXNM] (offering a 3D printing service that creates objects from a variety of CAD designs with different colors, finishes, sizes, and materials).

[133] 17 U.S.C. § 512(m) (2017).

[134] *See infra* Subsection III.C.1.

3. ODPs May Be Held Contributorily Liable

Alternatively, ODPs may be found contributorily liable for the actions of their users. "One who, with knowledge of the infringing activity, induces, causes, or materially contributes to the infringing conduct of another, may be held liable as a 'contributory' infringer."[135] The two requirements for liability under contributory infringement are as follows: (1) material contribution to the activity, and (2) actual or constructive knowledge of the infringing activity.[136]

Contributory infringement in the online context was evaluated alongside vicarious liability in *Napster*, where the Ninth Circuit found that Napster would likely be liable for contributing to its users' infringing actions.[137] Napster easily satisfied the "material contribution" requirement.[138] Considering that its goal was to allow users to easily find and download music and that, without it, users would not have the same access to potentially infringing MP3 files, Napster's actions were found to constitute a material contribution to the infringing activity.

The "knowledge" prong, however, proved more difficult to satisfy. Prior to *Napster*, *Betamax* held that "if the product is widely used for legitimate, unobjectionable purposes," then constructive knowledge should not constitute contributory infringement.[139] Acknowledging that Napster could not be held to satisfy the "knowledge" requirement simply by acting as a peer-to-peer sharing platform,[140] the court instead applied the

135 Gershwin Pub. Corp. v. Columbia Artists Mgmt., 443 F.2d 1159, 1162 (2d Cir. 1971).

136 *Intentional Inducement of Copyright Infringements Act of 2004: Hearing on S. 2560 Before the Comm. on the Judiciary*, 108th Cong. 2 (2004) (Statement of Marybeth Peters, Register of Copyrights).

137 *See* A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1021–22 (9th Cir. 2001).

138 *Id.*

139 Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 442 (1984).

140 As explained above, *Betamax* would limit this because peer-to-peer sharing platforms have substantial non-infringing uses. *See Sony Corp. of Am.*, 464 U.S. at 417. In *Napster*, the District Court held that platform did

"knowledge" requirement from *Religious Technology Center v. Netcom On-Line Communication Services, Inc.*[141] *Netcom* suggested that, with respect to online platforms, "evidence of actual knowledge of specific acts of infringement is required" to be held liable for contributory infringement.[142] The *Napster* court accordingly stated that if the system operator becomes aware of specific acts of infringement and fails to remove the infringing material, they have both sufficient knowledge and are contributing to the infringement, thus satisfying both requirements of contributory liability.[143]

Similar to Napster, ODPs exist to ease the distribution of 3D CAD files amongst users and without the platforms, users would not have the same access to infringing files. This rationale should suffice to satisfy the "material contribution" requirement. Turning to the "knowledge" requirement, constructive knowledge would likely be insufficient under *Betamax* as there are "legitimate, unobjectionable purposes" for using ODPs, including the distribution of novel 3D creations. Rather, the heightened requirement of actual knowledge from *Napster* and *Netcom* would apply to ODPs. Again, § 512(m) of the DMCA shifts responsibility from the ODPs, who are absolved of any duty to monitor infringing activity, to the copyright owners and others, who must provide actual knowledge to ODPs of the specific acts of infringement. Since the enactment of the DMCA, the issuance of a notice and takedown can generate such proof of actual knowledge, discussed in detail in Subsection IV.B.1, *infra*. ODPs would only be found contributorily liable if such actual notice was provided.

not have substantial non-infringing uses but the Court of Appeals reversed, explaining that the District Court failed to recognize the platform's potential uses by only considering what the technology was currently being used for. *See Napster*, 284 F.3d at 1020–21.

141 *See Napster*, 284 F.3d at 1021–22.

142 *Id.* (citing Religious Tech. Ctr. v. Netcom On-Line Commc'n Servs., Inc., 907 F. Supp. 1361, 1371 (N.D. Cal. 1995)).

143 *Id.*

C. The Digital Millennium Copyright Act

As discussed above, ODPs may be held directly liable for copyright infringement, as well as secondarily liable under the doctrines of vicarious and contributory infringement. However, these sources of liability are subject to the DMCA, legislation that introduced the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty into U.S. law in addition to addressing other significant copyright issues arising from the online era.[144]

The DMCA was enacted to "facilitate the development of electronic commerce in the digital age."[145] Amongst other legislation, the DMCA added § 512 to the Copyright Act to limit copyright infringement liability for online service providers. ODPs, as platforms "offering the transmission, routing, or providing of connections for digital online communications, between or among points specified by a user, of material of the user's choosing, without modification to the content of the material as sent or received," qualify as online service providers under the DMCA.[146] Importantly, the DMCA contains a safe harbor provision for online service providers under § 512(c).[147]

1. ODPs' Safety Net: § 512(c) of DMCA

The safe harbor provision of the DMCA shields from liability internet service providers who store infringing material at the direction of their users so long as they satisfy the criteria outlined in § 512.[148] To be eligible for the safe harbor provision, ODPs must meet the general threshold conditions under § 512(i): they must (1) adopt, implement, and inform subscribers of the policy requiring the termination of subscriptions or

144 U.S. COPYRIGHT OFFICE, THE DIGITAL MILLENNIUM COPYRIGHT ACT OF 1998: U.S. COPYRIGHT OFFICE SUMMARY (1988), https://www.copyright.gov/legislation/dmca.pdf [perma.cc/V6RK-QH43].

145 U.S. COPYRIGHT OFFICE, EXECUTIVE SUMMARY: DIGITAL MILLENNIUM COPYRIGHT ACT SECTION 104 REPORT https://www.copyright.gov/reports/studies/dmca/dmca_executive.html [perma.cc/D6YE-57UB].

146 17 U.S.C. § 512(k)(1)(A) (2017).

147 17 U.S.C. § 512(c) (2017).

148 *Id.*

account access to the ODP for repeat infringers, and (2) accept standard technical measures "used by copyright owners to identify or protect copyrighted works."[149] Furthermore, under § 512(c)(2), ODPs must designate an agent to receive notifications of alleged infringement and make the agent's contact information available to the public as well as to the Copyright Office.[150]

Once these threshold requirements are met, the specific conditions for the safe harbor provision under § 512(c)(1) must be evaluated.[151] First, ODPs must not have actual knowledge of nor be aware of the facts or circumstances giving rise to the infringing activity.[152] Courts have imposed a heightened knowledge standard beyond the requirements under the plain reading of the statute. In *Viacom Int'l, Inc. v. YouTube, Inc.*, the Second Circuit interpreted § 512(c)(1)(A) "to require actual knowledge or awareness of specific instances of infringement" rather than general "red flag knowledge."[153] The Ninth Circuit confirmed this understanding in *UMG Recordings, Inc. v. Shelter Capital Partners LLC*, mirroring the knowledge requirement for contributory liability described in *Napster*.[154] Even when an ODP has specific knowledge of infringing activity, it is still covered by the safe harbor provision so long as it expeditiously removes or prevents access to the infringing content.[155]

Secondly, ODPs cannot receive "financial benefit directly attributable to the infringing activity, in a case in which the service provider has the right and ability to control such activity."[156] The Second and Ninth Circuits have explicitly

149 17 U.S.C. § 512(i) (2017).

150 17 U.S.C. § 512(c)(2) (2017).

151 17 U.S.C. § 512(c)(1) (2017).

152 *Id.*

153 *See* Viacom Int'l, Inc. v. YouTube, Inc., 676 F.3d 19, 31 (2d Cir. 2012).

154 *See* UMG Recordings, Inc. v. Shelter Capital Partners LLC, 718 F.3d 1006, 1020–22 (9th Cir. 2013); see also *supra* Subsection II.B.2 and accompanying footnotes.

155 17 U.S.C. § 512(c)(1)(C) (2017).

156 17 U.S.C. § 512(c)(1)(B) (2017).

rejected applying *Napster*'s interpretation of the "direct financial benefit prong" under vicarious liability to the statute, stating that this standard does not translate to the DMCA requirements.[157] Instead, courts have focused on the second half of the requirement, emphasizing that the "DMCA requires more than the mere ability to delete and block access to infringing material after that material has been posted in order for the [ODP] to be said to have 'the right and ability to control such activity.'"[158] To satisfy this, courts have held that the ODP must "exert . . . substantial influence on the activities of users," which could mean having "high levels of control over activities of users" or inducing infringing activity as seen in *Grokster*.[159] Since qualification for the DMCA safe harbor has been interpreted such that "control of users" predicates the "direct financial benefit" that ODPs receive, most ODPs would fall under the safe harbor protection of the DMCA.

Additionally, as previously discussed, § 512(m) expressly absolves ODPs of any affirmative duty to monitor their platforms for infringing content, placing the burden of detecting and rectifying infringement on copyright owners.[160] Compliance with the requirements of § 512—namely, by reacting expeditiously when informed of infringing content and maintaining a relatively passive role as a peer-to-peer network rather than as an actively monitored website—should enable ODPs to escape liability for copyright infringement under the DMCA's safe harbor provision.[161]

IV. POTENTIAL SOLUTIONS FOR REDUCING MASS INFRINGEMENT

In order to effectively solve the problem of mass copyright infringement posed by 3D technology, a solution must be

157 *See UMG Recordings*, 718 F.3d at 1026–31; *Viacom Int'l*, 676 F.3d at 36.

158 *See UMG Recordings*, 718 F.3d at 1029 (citing Ellison v. Robertson, 189 F. Supp. 2d 1051, 1061 (C.D. Cal. 2002)).

159 *Id.* at 1030.

160 17 U.S.C. § 512(m) (2017).

161 17 U.S.C. § 512(c) (2017).

derived that incentivizes the various parties involved to act in a legal and mutually beneficial way. As evidenced by the struggles that the music industry faced when confronted with Napster and its successor technologies, in order to minimize illegal distribution of copyrighted works, widespread infringement must be combated with a solution that offers consumers affordable, easy, and legal access to the works they seek.[162] It is also vital to recognize the likelihood of dramatic adoption of and innovation in 3D technology over time. This evolution will inevitably impact ODPs and the electronic transfer of copyrighted works. New legal constraints, as well as solutions implemented in the near future, should account for possible ODP forms that have not yet been adopted and may have not yet been considered. For a solution to be durable, it must create the right incentives for the various parties involved, recognizing that this technology is still in its infancy. To date, such a solution does not exist.

A. Solutions That Have Been Attempted

Some ODPs have implemented Creative Commons licenses to protect works posted to their websites.[163] Creative Commons is a non-profit organization offering six types of global licenses that creators can apply to their works to simplify the distribution of digital content.[164] These licenses afford creators a "standardized way to grant copyright permissions to their creative work" such that "licensors get the credit for their work they deserve."[165] The licenses support the open-source culture promoted by the Maker Movement while allowing copyright owners to reserve some rights to their work, including whether to allow derivative creations or commercial use of their work.[166]

---

162 *See* Finocchiaro, *supra* note 25, at 474–75.

163 *See* Duann, *supra* note 118; *Thingiverse Creative Commons Licenses Explained*, *supra* note 118.

164 *See About the Licenses*, supra note 38.

165 *See* 7*id.*

166 *See* Craig, *supra* note , at 316.

However, Creative Commons licenses do not replace copyright registration or statutory protection, and in some instances, may be invalid at the outset. When users upload files to most ODPs, they are offered the option to apply a Creative Commons license. As discussed throughout this Note, many of the files uploaded by users are not their own creations, but rather infringing works. ODPs have not yet implemented any tools to distinguish between infringing and non-infringing works, in part, because of the DMCA's exemption from any obligation to monitor infringing activity on their platforms. As a result, Creative Commons licenses can be applied to infringing content such that instead of protecting the original author's copyright, the license affords the infringer perceived "protection" from subsequent infringement. And, as required by the Creative Commons licenses, the infringer who licenses the work will be credited for the creation rather than the original author. This directly applies to cases where 3D scanned CAD files of a copyrighted works are uploaded to ODPs.[167] If an original creator discovers their work is being falsely attributed to someone else, there is no simplified path for seeking recourse. Instead, Creative Commons directs copyright owners to contact the individual websites and/or services that host the infringing content, citing that it "does not host the Content made available through CC Search."[168] Rather than deterring infringing activity, these Creative Commons licenses afford infringers certain superficial protections without addressing whether these licenses are valid and appropriate, thereby arguably creating more harm than good in cases of infringing works.[169]

167 *See About the Licenses*, supra note 38; *see generally Terms of Use*, CREATIVE COMMONS, https://creativecommons.org/terms (last updated Nov. 7, 2017) [perma.cc/3VCG-YXGT].

168 *See Terms of Use, supra* note 167.

169 *See generally* Michael Weinberg, *Bringing Creative Commons and 3D Printing Closer Together*, SHAPEWAYS MAGAZINE (July 20, 2016), https://www.shapeways.com/blog/archives/26337-bringing-creative-commons-and-3d-printing-closer-together.html [perma.cc/7XUD-FJA8]; Michael Weinberg, *BY-3D? Creative Commons Attribution and 3D Printing*, SHAPEWAYS MAGAZINE (Oct. 28, 2015),

Alternatively, some have suggested that rather than addressing the problem of copyright infringement through ODPs, it should be 3D printer manufacturers that must monitor this activity instead.[170] One proposed solution is to require that 3D printers have internet connectivity to allow for "3D printing imprinting or stamping" and to potentially connect to a database similar to the central repository described below.[171] However, as previously explained, existing copyright law exempts 3D printer manufacturers from being held liable for copyright infringement under *Betamax* and it would be impractical to hold the individuals who use 3D printers liable for infringing acts. Further, 3D printer manufacturers lack the appropriate incentives to take such action under existing copyright doctrine.

Instead of attempting to reverse existing doctrine or lobby for additional legislation, the solution should work within the bounds of the existing laws to limit infringing activity. Disney is attempting one such solution: It recently patented an anti-scanning reflective material that would prevent 3D scanning of its popular characters and figurines.[172] Stressing that "a person with a 3D printer may copy nearly any 3D object even without access to the digital file originally used by a manufacturer," Disney has expressed hope that its new technology will limit such copyright infringement.[173] Ironically, Disney will

https://www.shapeways.com/blog/archives/22679-by-3d-creative-commons-attribution-and-3d-printing.html [perma.cc/23VC-7PE6].

170 *See* Shlomit Yanisky-Ravid & Kenneth S. Kwan, *3D Printing the Road Ahead: The Digitization of Products When Public Safety Meets Intellectual Property Rights—A New Model*, 38 CARDOZO L. REV. 921, 951 (2017); *see* Swanson, *supra* note 17, at 511–14.

171 Yanisky-Ravid & Kwan, *supra* note 170, at 951–53.

172 *See* Corey Clarke, *Disney Publishes Patent for Anti-Scanning Filament 3D Printing Method*, 3D PRINTING INDUSTRY (June 12, 2017, 2:48 PM), https://3dprintingindustry.com/news/disney-publishes-patent-anti-scanning-filament-3d-printing-method-115659 [perma.cc/SAH5-4E9Z]; Clare Scott, *Disney Files Patent Application for "Anti-Scanning" Material that Would Make Figurines Harder to Scan and 3D Print*, 3DPRINT.COM (June 9, 2017), https://3dprint.com/177483/disney-anti-scanning-patent [perma.cc/8D3A-26R3].

173 Clarke, *supra* note 172.

use 3D printers to apply its anti-scanning reflective material.[174] However, this patented technology is not yet available to the masses, and even if Disney's technology becomes widely available, the technology imposes an additional burden on copyright owners. This burden, for some, may not be practical or economical to implement.

Hasbro represents another solution. Hasbro has instead revised its licensing policy with respect to one of its most recognizable brands, My Little Pony.[175] Partnering with Shapeways, a large ODP, Hasbro developed a profit-sharing agreement for the creation and sale of 3D printed My Little Pony figurines designed by select 3D artists.[176] Hasbro has been commended for developing a way to retain its IP rights while embracing the 3D technology revolution.[177]

However, larger companies such as Disney and Hasbro have the resources and market power to remain competitive despite ODPs promulgating infringing scans of their works, whereas most copyright owners do not. The goal of copyright protection is to spur innovation and creativity, both on behalf of individuals and companies of all sizes.[178] Rather than adopt solutions that are only practical for certain product lines or certain companies, this Note suggests a solution that would minimize copyright infringement through ODPs for the majority of copyright owners and incentivize self-regulation by the intermediaries that support infringing activity.

174 *Id.*

175 *See* Duann, *Hasbro & Shapeways Enable 3D Printing Fan Art with SuperFanArt*, SHAPEWAYS MAGAZINE (July 21, 2014), https://www.shapeways.com/blog/archives/16759-hasbro-shapeways-enable-3d-printing-fan-art-with-superfanart.html [perma.cc/ZYH7-HZLL]; Erin Carson, *3D Printing: Overcoming the Legal and Intellectual Property Issues*, ZDNET (Aug. 1, 2014, 7:41 AM), http://www.zdnet.com/article/3d-printing-overcoming-the-legal-and-intellectual-property-issues [perma.cc/E8PH-T6EB]; Craig, *supra* note 7, at 342.

176 *Id.*

177 *Id.*; *see* Carson, *supra* note 175.

178 *See* INTERNET POLICY TASK FORCE, *supra* note 46, at 5–6.

B. Proposed Solution

For any solution to adequately address the existing and future concerns posed by 3D scanning and printing, it must embrace 3D technology and open-source distribution while incentivizing the parties involved to monitor and address acts of copyright infringement. Acknowledging that a drastic change in copyright law is unrealistic, and likely not an immediately implementable solution, this Note instead proposes a solution rooted in the behavioral economics concept of nudging.[179] Rather than forcing ODPs to self-regulate or change their model, this solution offers a first step, while working within the DMCA, that should provide sufficient encouragement for ODPs to make such changes of their own accord.

1. How to Use the DMCA to Hold ODPs Liable: Notice and Takedown

Considering the safety net that the DMCA provides ODPs, the best course of action for copyright owners to remedy infringement is to issue takedown notices pursuant to the DMCA requirements listed under § 512(c).[180] If the ODPs fail to comply with the notice and takedown, they can then be held liable for either direct infringement of distribution or display rights, or secondarily liable through contributory or vicarious liability, as demonstrated above.[181] Not all takedown notices must be complied with—the issuance of a notice does not necessarily mean that there is a viable copyright claim.[182] However, in the case of a 3D scanned CAD file of a copyrighted

179 Nudge theory is based on the premise that people choose the easiest option available and that paternalism while maintaining freedom of choice (i.e., "libertarian paternalism") can be beneficial rather than coercive—especially in the realm of policy creation. "A nudge steers the paternalized person, but always leaves open the option for the paternalized person to choose another course." Thomas C. Leonard, *Richard H. Thaler, Cass R. Sunstein, Nudge: Improving Decisions About Health, Wealth, and Happiness*, CONST. POL. ECON., Aug. 22, 2008, at 356–60 (book review).

180 17 U.S.C. § 512(c) (2012).

181 *See supra* Subsections III.A–B.

182 Swanson, *supra* note 17, at 498.

work where the copyrighted aspect of the work was captured within the CAD file, this would almost always constitute a valid copyright claim and, as such, the ODPs would likely be held liable for non-compliance with the notice and takedown.

That being said, issuing notice and takedowns imposes enormous costs on copyright owners who either have to locate, identify, and send notices themselves or pay others to do so.[183] Rather than force each copyright owner to conduct this burdensome process in isolation, owners should employ technology to combat the digital distribution of their works.

2. Create a Central Repository

In order to address the distribution of infringing works through ODPs, the solution should involve the creation of a database of copyrighted CAD files that utilizes an algorithm to scour ODPs for infringing files. Copyright owners could thereby take advantage of the ease with which 3D scans can be created by submitting a CAD file of their work to a central repository designed to detect infringing activity online. With the data from the repository, the algorithm would search files distributed by ODPs, comparing the hosted CAD files with the files submitted by copyright owners. Since the content hosted on ODPs is public and easily searchable, there would be no need to seek permission from the platforms. If the algorithm detects sufficient similarity to a copyrighted work, an alert would be sent to the copyright owner, who could then evaluate the allegedly infringing file and determine whether to send a notice and takedown in accordance with the DMCA. Online notice and takedown services already exist for images, videos, text, and audio.[184] This solution would extend protection to 3D technology.

Though it would be ideal to house the central repository within the Copyright Office—where copyright owners could simply include a CAD file with their "required deposit" for

183 Craig, *supra* note 7, at 331.

184 *See, e.g.*, *Takedowns*, DMCA, https://www.dmca.com/Takedowns.aspx [perma.cc/926E-DLLF].

copyright registration[185]—it is unlikely that a government entity would assume such responsibility. It is more likely that an independent third party or consortium would create this repository, charging copyright owners a nominal fee in exchange for the "automated" notice and takedown service. Once the service is created, takedown notices would start to flood ODPs, providing platforms with the requisite "actual knowledge" to be held liable for the infringing content. Consequently, ODPs would have no choice but to adopt some solution to address the infringing content distributed through their websites. This first step would relieve copyright owners from the burden of independently scanning and searching for infringing uses of their work online and, more importantly, would signal to infringers that this activity is illegal and under surveillance.

The above process closely mirrors YouTube's Content ID system, which allows copyright owners to submit audio and video recordings to its database.[186] YouTube then compares every uploaded video to the files in its database to determine whether the video includes copyrighted material.[187] If infringing material is found, YouTube will take direction from the copyright owner as to how to proceed, offering options including blocking the video, tracking viewership statistics, or generating ad revenue to be shared with the uploader.[188]

The goal of the first step of this solution is to incentivize ODPs to take action to monitor and address infringing activity. Step two of this solution would be driven by the ODPs themselves: They could adopt YouTube's model of self-monitoring, or, more realistically, implement a third-party solution to manage their distributed content. YouTube has been successful with its Content ID system largely because Google

185 *See generally* U.S. COPYRIGHT OFFICE, DEPOSIT REQUIREMENTS FOR REGISTRATION OF CLAIMS TO COPYRIGHT IN VISUAL ARTS MATERIAL (2015) https://www.copyright.gov/circs/circ40a.pdf [perma.cc/AN52-DEJT].

186 *See How To Manage Your Copyrights on YouTube: How Content ID Works*, YOUTUBE (Sept. 28, 2010), https://support.google.com/youtube/answer/2797370?hl=en [perma.cc/Q7Z4-9KQZ].

187 *Id.*

188 *Id.*

(YouTube's parent company) is ideally positioned to self-monitor, especially considering its search functionality and sheer size. ODPs are not in the same position. Since the central repository would already have a database of copyrighted 3D scanned files, it can easily offer its scouring services to ODPs so that they can compare user-submitted files with copyrighted material before the files are posted to the ODP for distribution. Serving as an intermediary between copyright owners and ODPs, the central repository would efficiently minimize infringing activity without overly burdening either party.

V. CONCLUSION

As the use and development of 3D technology continues to expand, minimizing copyright infringement becomes increasingly important. Under current law, individual copyright owners do not have a meaningful way to monitor infringing activity and enforce their rights to their work. Rather than relying on the courts and Congress to craft a solution, the 3D printing community and the impacted copyright owners should work together to minimize infringing activity. These stakeholders should implement a flexible, fair, and feasible solution that benefits all parties involved. This Note proposes one such solution: incentivizing the private sector to implement a solution designed to minimize copyright infringement and fulfill the DMCA's objective of facilitating e-commerce, while putting the responsibility on the stakeholders to self-regulate and fund the solution.