A NEW TECHNOLOGY CHALLENGES THE EXISTING INTELLECTUAL PROPERTY FRAMEWORK

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D printing has made great strides in the past decade. Some believe this technology will usher in a second industrial revolution. But disruptive technologies do not disrupt only markets; they occasionally present challenges for pre-existing legal frameworks as well. In the case of 3D printing in particular, some of the very characteristics that make the technology innovative also raise legal questions with no easy answers. As this technology develops, cutting-edge businesses may find that some of their products slip between the cracks of traditional intellectual property fields, and may profit from planning accordingly with creative legal strategies.

What Is 3D Printing?
A 3D printer is a machine that can turn a blueprint into a physical object.1 Send a 3D printer a design for a wrench, and it will build a physical working wrench.2 Scan a coffee mug with a 3D scanner, send the file to the printer, and produce hundreds of identical mugs as holiday gifts for your co-workers.3

3D printing differs from typical mold or cast manufacturing.4 Instead of taking a block of material and cutting away until it produces an object, a digital image is created using a Computer Aided Design (CAD) file.5 The CAD file is a detailed plan used to “print” the desired object layer by layer using a mixture of inks and additives ranging from plastics to metals and specially developed clays, depending on the end product.6

Some commentators expect 3D printing to usher in nothing less than a second industrial revolution.7 In 2013, the McKinsey Global Institute named the technology as one of twelve disruptive innovations that will transform life, business, and the global economy.8 Recent advances, including the expiration of certain first-generation patents and the wider availability of key 3D manufacturing components like lasers, have also sparked rapid development of this promising technology.9

Companies in turn are staking their claims. Over the last decade, more than 6,800 applications related to 3D printing were filed at the Patent and Trademark Office.10 Experts expect an annual economic impact of $235-$250 billion by 2025.11

A survey conducted by 3D printing consultants, Wohlers Associates, found that 3D printing is already used for manufacturing in many sectors, including the consumer-products, automotive, health, and aerospace industries.12 Applications currently range from the creation of visual aids to direct product manufacturing.13

In fact, designers already use 3D printing to create skateboards,14 haute couture dresses,15 and parts of jet engines.16 The U.S. military uses 3D printing to manufacture tools at will on the battlefield.17 Scientists have also used 3D printing to replace damaged sections of coral reefs (a process that normally takes thousands of years),18 in addition to printing our 3D models of ultrasounds so that parents can see their child in three dimensions before birth.19

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Perhaps more intriguing are the prospects for the near future. Some observers expect that entire living spaces will be printed with extremely large machines.20 MIT is laying the foundation for printing food.21 The potential medical applications include applications ranging from customized wrist splints22 to replacement tissue, organs, bone, and cartilage.23

3D Printing and the Existing Intellectual Property Framework
While the potential applications of 3D printing are astounding, this technology will present novel challenges in the legal realm.

The fact that 3D printing depends substantially on digital technology means that the Internet will be an important medium for both authorized and unauthorized distribution of 3D designs. Some business models will profit from this ease of replication, while others will see it as a liability to be thwarted. By the same token, some will derive significant advantage from the legal ambiguity surrounding certain subtleties of the domestic and international intellectual property regimes as applied to 3D printing, while others will find the lack of clarity stifling. For all involved, an accurate and informed understanding of the status quo ante is a necessary first step in developing sustainable business models, proposed public policy revisions, and other responsible reactions to the promise afforded by this new technology.

To that end, we present here a very brief overview of relevant principles from three U.S. fields of intellectual property law: copyright, patent, and trademark.

Copyright
U.S. copyright law deals primarily with creative works such as books, movies, photographs, and the like, but it also protects certain limited categories of technical products such as architectural drawings and computer software. At a high level, copyright’s treatment of 3D printing will likely work as follows:

For 3D-printed objects themselves, some will be at least partially protected by copyright, but many will not, under the longstanding principle that so-called “useful articles” fall outside copyright’s purview. The CAD files that generate 3D-printed objects will be protected by copyright. But just as other forms of computer software receive a “thin” scope of protection, 3D-printing CAD files may in some instances lack a copyright robust enough to prevent third parties from creating their own, very similar files that generate the exact same objects.

The copyrightability of three-dimensional objects is an issue that U.S. law has wrestled with for many decades. The fact that a particular object was “built” using a 3D printer vel non does not affect the operative legal inquiry.24 In general, a physical object such as a lamp,25 a bicy-
cle rack, or a belt buckle is protected by copyright to the extent that its purely creative or aesthetic features are “conceptually separable” from its utilitarian function. Thus, a 3D-printed statuette of Mickey Mouse would clearly be protected by copyright, while a 3D-printed spoon devoid of artistic embellishment would not.

Easy cases like these are separated by a grey area in which categorizing objects as protectable or not is a “particularly difficult” analytical challenge, but for better or worse, the challenge is a familiar one for copyright lawyers and courts. Regardless, many of the breakthrough uses of 3D printing that commentators have recently lauded—uses in medicine, manufacturing, and the like—appear to fall clearly on the purely “functional” side of the divide, in which a threedimensional object is a “useful article” and therefore unprotected by copyright.

The copyright analysis applicable to the CAD files that generate 3D-printed objects also implicates reasonably well-established legal principles. As a rule, computer software files are protected by copyright; if you have written a program from the ground up, no one can copy verbatim the code that program consists of without infringing your copyright. By the same token, the copyright in a computer program written to yield a particular outcome, or carry out a certain purpose, may well not prevent a second-comer from independently writing its own computer program that yields the same outcome or achieves the same purpose. For 3D-printing CAD files, the upshot is that copyright law will, at least in principle, prevent someone from simply taking the file and distributing it without permission; but much of the time, copyright law will not prevent someone from writing a new CAD file that replicates the same resulting object (at least where the resulting object itself is an unprotected “useful article”).

A tricky and still unresolved question is whether copyright law will prevent someone from simply using a CAD file to run a 3D print job without permission of the owner of the copyright in the CAD file. One line of cases suggests that regardless of whether the resulting object is protected by copyright, using a copyright-protected CAD file to run a print job creates a temporary copy of the computer program itself in the printer’s random access memory (RAM), and thus runs afoul of the rightsholder’s statutory entitlement to control all “copies” of the work. These cases have, however, proven controversial, and it remains unclear whether courts will extend their reasoning to the unexplored terrain that 3D printing presents.

Patent

Two types of patents could apply to 3D-printed objects: design patents, which protect new and original ornamental design features, and utility patents, which protect useful inventions that are novel and non-obvious.

In the 3D-printing context, just as in other domains, design patents could proscribe the use or distribution of a copycat product with features that infringed a protected original. Design patents were, for example, the form of intellectual property protection that Crocs used to protect its unique shoe design against similar-looking competition. The legal principle that a design patent must be respected holds just as true in the 3D printing world as elsewhere.

Utility patents in the 3D printing context similarly will present applications with familiar analogues in related areas. Although courts have yet to fully develop the law surrounding eligibility for utility patents in the context of modern 3D-printing technology, patents involving semiconductor lithography—a longstanding type of 3D printing—are instructive. These patents are available to protect innovative features of a semiconductor and innovative processes to create particular features. Utility patents are also likely to protect innovative and useful 3D-printed objects and printing processes. Because utility patents are available only for inventions, a utility patent would not be available for every new design for a 3D-printed object, but only designs that also embody some kind of useful, novel, and non-obvious invention. On the other hand, when a utility patent is available, its protections are broad. Because patents protect inventions rather than particular designs, a patent on a 3D-printed invention or 3D-printing process will cover any object or process that embodies the invention, even if its design looks different from what the inventor originally created. Patents also reach further than copyrights because patent law applies even when an invention was independently derived. An end user can therefore infringe a patent whether or not he is aware of the original invention.

All of that said, without changes to the current law, enforcing patent rights in the context of 3D printing may prove difficult because of the potentially dispersed nature of infringements. Much like the music industry attempting to enforce its copyrights against music pirates, patent-holders will face a type of infringement that thus far has been atypical in the patent sphere where individual end users commit the infringing acts by printing objects based on CAD files whose origins may be difficult to track. Even if a patentholder can identify and sue the CAD file’s distributor, it will need to show the additional elements of knowledge of the patent and of the infringement to hold the distributor indirectly liable for the end users’ infringement.

Trademark and Trade Dress

Trademark and trade dress are forms of intellectual property that protect the goodwill generated from the public’s identification of a product’s source and standard of quality. When consumers associate a good or service with a particular purveyor, trademark and trade dress may prevent third parties from producing confusingly similar goods. While many trademarks are words or logos, under prevailing doctrine “almost anything at all that is capable of carrying meaning” can merit trademark or trade dress protection, including any distinctive and non-functional packaging, product design, or other characteristic. For example, courts have recognized trade dress protection for uniquely shaped bottles, silverware, and more—but only if the object’s design gives rise to a distinct association with a specific manufacturer.
For 3D printing, trademark and trade dress may thus provide fairly limited protection. If a trademark is a word or logo, simply removing the mark from a 3D-printed object could substantially obviate any legal obstacle to further distribution. To be sure, a physically distinctive object that satisfies the standards for trade dress would enjoy less easily circumvented protection. But many 3D-printed objects will not satisfy those standards, and will thus fall outside the protection of trademark law altogether.

At present, there is little case law confronting the intellectual property implications of copying physical objects by 3D printing, especially on a large scale. Many of the most interesting questions surrounding 3D printing are only beginning to emerge. Yet in light of the widely predicted increased use of this technology, the legal implications of easy and ubiquitous 3D copying may well be of interest not only to companies contemplating a presence in 3D printing markets, but also to those simply in the business of producing goods potentially subject to automated replication, whether authorized or not.

### ENDNOTES


2. Id.

3. Id.


13. Id. at 8.


15. Id.


19. Id.


27. See Kieselstein-Cord v. Accessories by Pearl, Inc., 632 F.2d 989 (2d Cir. 1980).


29. See Kieselstein-Cord, 632 F.2d at 993.


37. Id.


39. See Kieselstein-Cord, 632 F.2d 989.


42. PBS, *supra* note 18.

43. Weinberg, *supra* note 1, at 22.

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