



WHAT'S THE DEAL WITH COPYRIGHT AND 3D PRINTING?

Introduction[†]

3D printing provides an opportunity to change the way we think about the world around us.¹ It merges the physical and the digital. People on opposite sides of the globe can collaborate on designing an object and print out identical prototypes every step of the way. Instead of purchasing one of a million identical objects built in a faraway factory, users can customize pre-designed objects and print them out at home. Just as computers have allowed us to become makers of movies, writers of articles, and creators of music, 3D printers allow everyone to become creators of things.

3D printing also provides an opportunity to reexamine the way we think about intellectual property. The direct connection that many people make between “digital” and “copyright” is largely the result of a historical accident. The kinds of things that were easiest to create and distribute with computers – movies, music, articles, photos – also happened to be the types of things that were protected by copyright. Furthermore, it happened to be that the way computers distribute things – by copying – was exactly the behavior that copyright regulated. As a result, copyright became an easy way to (at least attempt to) control what people were doing with computers.

That connection between copyright and digital begins to break down as one moves away from movies, music, articles, and photos, and towards gears, cases, robots, and helicopters. As the connection frays, it serves as a reminder that not everything – not even every digital thing – is protected by copyright. In fact, most (but by no means all) physical objects are not protected by any type of intellectual property right. That means that anyone is free to copy, improve, distribute, or incorporate those objects as they see fit.

This freedom is not a new development, nor is it a loophole. 3D printers do not take away intellectual property rights any more than computers grant them. But they do provide an opportunity for people to reexamine old assumptions about how the system works.

However, the copyright habit is a hard one to break. For many people exposed to 3D printing for the first time, the question that follows “is it real?,” “how does it work?,” and “how can I get one?” is “what about piracy?” And by piracy, they usually mean copyright infringement.

This whitepaper does not directly answer the piracy question. 3D printing is a tool and, like any tool, can be used for productive and not-so-productive purposes. Making unauthorized copies of physical objects protected by copyright is copyright infringement, whether those copies are made with a 3D printer or a whittling knife. It will happen.

Instead, this paper is an attempt to answer the unvoiced question that comes before concerns about piracy: is this object protected by copyright in the first place? After all, if there is no underlying copyright there can be no infringement of that right.

Of course, copyright is not the only type of intellectual property. Just because a thing is not protected by copyright does not mean that it is not protected by a right such as patent or trademark. In fact, many objects are not protected by copyright precisely because they are the type of “useful object” that is (or can be) protected by patent.²

That being said, copyright looms so large over our digital lives that it merits a special investigation. Readers interested in a broader discussion of the intersection of intellectual property and 3D printing (and an examination of how policy may evolve to accommodate the latter within the former) may be interested in our previous whitepaper *It Will Be Awesome if They Don’t Screw it Up: 3D Printing, Intellectual Property, and the Fight Over the Next Great Disruptive Technology.*³

[†]Thanks to Leily Faridzadeh and Joe Newman for helping with research on issues in this whitepaper.

¹ Although this whitepaper is expressed in the language of 3D printing, much of it is applicable to an entire host of technologies that can broadly be categorized as “digital manufacturing.” These digital manufacturing technologies – which include things like low cost computer aided design (CAD) programs, digital scanners, CNC mills, and laser cutters bring high precision manufacturing into the hands of individuals and small business owners in a way that may fundamentally change the economics of manufacturing and creation. While 3D printing tends to get the most attention, the real change will come as people become comfortable with all of these technologies.

² Unless otherwise mentioned, for the purposes of this paper, discussion of “patents” is limited to traditional utility patents, not design patents. While design patents can protect works that are also protected by copyright, see, e.g. *Mazer v. Stein*, 347 U.S. 201, 217 (1954), they are also relatively narrow and easily avoided by manipulating the digital design for a physical object.

³ Available here: <http://www.publicknowledge.org/it-will-be-awesome-if-they-dont-screw-it-up>.

A Quick Review: Types of Intellectual Property and How Law Works

Before going further, it is worth reviewing two things: how copyright fits in with patent and trademark, and how law works in the United States.

Copyright, Patent, and Trademark

Copyright, patent, and trademark are the three primary types of intellectual property. Generally speaking, copyright covers creative works, patent covers technical works, and trademark covers the ways in which goods are identified in the marketplace. This section will focus primarily on the relationship between copyright and patent, as trademark is a slightly different animal and is less important to the analysis.⁴

In the United States, copyright and patent rights can both be traced to the Constitution and are designed to encourage the creation and dissemination of creativity and knowledge.⁵ The rights are related but do not overlap: copyright and patent are mutually exclusive⁶ and their types of coverage are different in important ways.

Copyright covers artistic, creative works. Essentially, copyright covers the types of things that you would look to an artist to produce: paintings, movies, novels, and sculptures.

Copyright automatically protects those works from the moment they are written down (or painted, or filmed – the technical term is “fixed in a tangible medium”).⁷ Copyright also protects an “original” work that is not unique in the world as long as the author was unaware of existing versions. In most cases, copyright protection lasts for the life of the author plus 70 years after her death. Finally, copyright infringement can be an expensive proposition. The law allows rightsholders to assume – without the burden of actually proving harm – damages of up to \$150,000 for willful acts of infringement.⁸ All of this means that copyright is very easy to get, lasts a very long time, and is expensive to infringe upon.

In contrast, patent covers useful articles – things that do things. Essentially, patent covers the types of things that you would look to an engineer or scientist to produce: machines, technical systems, and compounds. Unlike copyrights, you need to apply for a patent before you can get any protection.

In addition to paying the application costs and being willing to wait, in order to get a patent you need to prove that your machine, system, or compound is actually new and nonobvious to society as a whole – not just new to you. If you get your patent, it will last for 20 years. If someone infringes on your patent, you need to prove damages. Compared to a copyright, a patent is hard to get and does not last very long.

Copyright	Patent
Covers artistic, creative works	Covers useful articles
Automatically protects a work upon fixation	Must be applied for
Work does not have to be new to society	Work must be new to society
Lasts for the life of the author plus 70 years after death	Lasts for 20 years
Law assumes damages for infringement	Must prove damages from infringement

Figure 1: Characteristics of Copyright and Patent Protection

⁴Unlike copyright and patent, trademark is not designed to encourage creation so much as it is designed to give consumers confidence that a manufacturer they trust stands behind the goods they are purchasing. Also, of the three, trademark is the only type of right that is not drawn from the Constitution. For a more detailed discussion, see *It Will Be Awesome*.

⁵The Constitution grants Congress the power “[t]o promote the progress of science and the useful arts, by securing for a limited times to authors and inventors the exclusive right to their respective writings and discoveries.” U.S. Const. art. I, § 8, cl. 8.

⁶Copyright law explicitly excludes the “mechanical or utilitarian aspects” of a pictorial, graphic, or sculptural work from protection and limits protection of designs of useful articles so that it does not include “the utilitarian aspects of the article” itself. 17 U.S.C. § 101. Also, a “procedure, process, system, method of operation” described by a copyrighted work (an article, for example) is excluded from copyright. 17 U.S.C. § 102(b). In contrast, patents are generally available for “any new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101.

⁷While there are good reasons to register your work protected by copyright, that registration is not a prerequisite for protection.

⁸17 U.S.C. § 504 (c)(2).

In a practical sense, copyrights and patents are mutually exclusive. If you have a useful article you cannot protect it with a copyright. Conversely, you will not be issued a patent on an artistic work.⁹ That means that if something is eligible for patent protection – even if it does not have patent protection – it cannot be protected by copyright.

This dichotomy is part of the reason why most of the physical world is not protected by any type of intellectual property. Most physical objects serve some utilitarian function, which means that they are not eligible for copyright protection. However, even though they can generally be described as being in the patent sphere, these objects are, in all likelihood, not protected by patent. Why?

First, most physical objects are not really new or nonobvious enough to secure patent protection. Of those truly new and nonobvious objects, only a portion of them are worth the trouble of patenting. And of those that actually have been granted patent protection, only a small portion will still be protected under patent's 20-year term.¹⁰ The result of all of this is that only a small portion of the objects coming out of a 3D printer will actually be protected by intellectual property: those objects protected by copyright and some number of useful objects protected by an active patent. The rest – those objects that do something but are unprotected by patent – will be free to be used by anyone for any purpose.

This stands in stark contrast to many of the things that we traditionally think of as being created on a computer (the emails, pictures, movies, etc.), almost all of which will be automatically protected by copyright for the rest of the author's life plus an additional 70 years.

That is why this paper focuses on copyright. Being able to identify when copyright does and does not protect an object is the first step in knowing if copying or building upon it will lead to trouble.

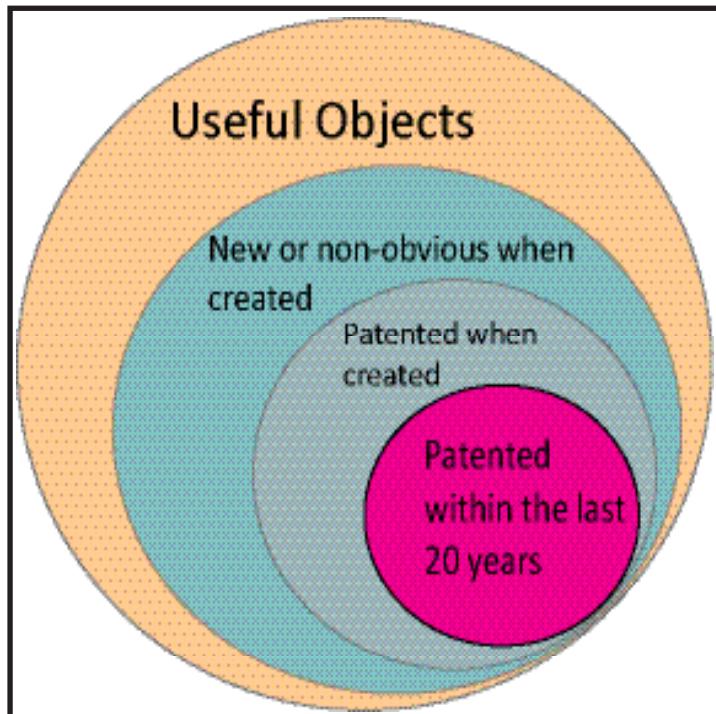


Figure 2: Only a small percentage of useful objects will be protected by an active patent at any time

⁹As alluded to above in footnote 2, *supra*, an exception to this is a design patent. See, e.g., *In re Yardley*, 493 F.2d 1389, 181 USPQ 331.

¹⁰This means, for example, that for many readers the patent on every part of the computer or television they had growing up has expired.

How US Law Works

Not surprisingly, widespread access to 3D printing is likely to raise some novel legal issues. “Novel legal issues” is another way of saying “questions without concrete answers.” That uncertainty can be frustrating, and it means that this paper will not always contain easy-to-apply answers to reasonable questions. It also means that, as more cases are brought that involve these issues, the answers may start to change. Nonetheless, this section may make it easier to understand how we can simultaneously have laws and not know how they apply to a situation.

The United States uses a common law system. Under this system, Congress passes laws and courts apply those laws to specific situations. Courts explain why and how they applied the law the way they did in judicial decisions. The next time a case comes up regarding the same law, courts and lawyers look to that past decision for guidance on how to apply the law in the new case. Often they will fight about how analogous the facts of the old case are to the facts of the new case, and therefore how applicable the old logic is to the new set of facts.

Over time, the logic in these individual decisions is distilled and abstracted into a series of rules. These rules are applied to new cases. When fact patterns are relatively consistent – robbing a bank is essentially the same act every time – this

system is fairly straightforward. However, when patterns change, both sides struggle to convince a court that the new pattern is analogous to the facts that produced the rule that it prefers.

As a result, it can be hard to generalize about rules for complicated problems that come up only rarely or that have never come up in the past. After all, every past decision is based on a specific set of facts, so if there are not very many decisions it can be hard to abstract a handful of rulings into a more general rule. This is further complicated by the fact that the United States is broken up into 11 judicial zones (plus the District of Columbia and a special Federal Circuit) called “circuits.” Each circuit can have a different set of rules on how to apply a given law. In theory, these “circuit splits” are eventually settled by the Supreme Court, but that can take some time. In the meantime, the law is simply applied differently in different parts of the country.

All of this is just a long way of explaining a simple point: some of the copyright questions raised by 3D printing do not have good, universal answers.

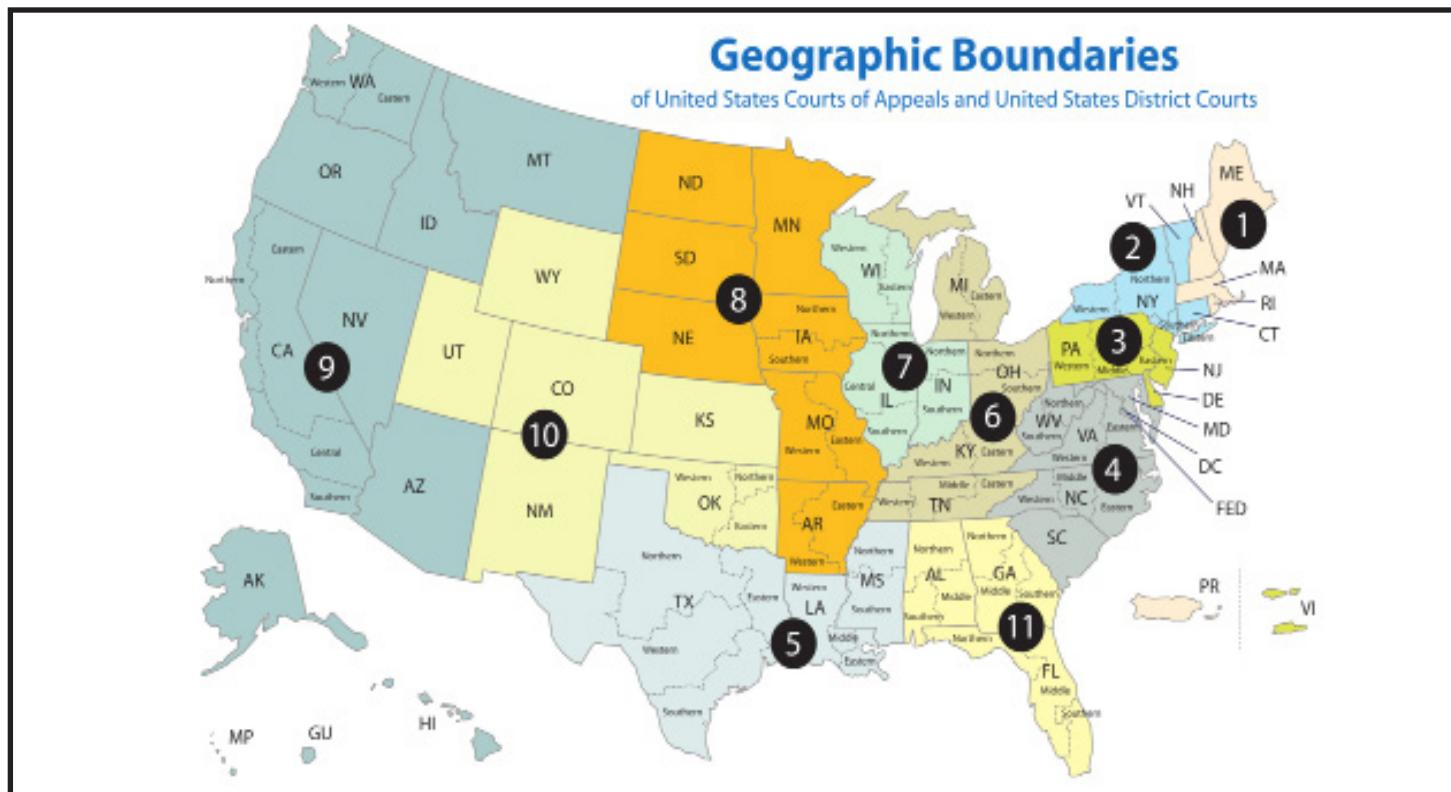


Figure 3: US Federal Circuits

3D Printing Fits Within the Existing Online Copyright System

Over the past fifteen years, a fairly robust system has evolved to deal with websites that host copyright-protected content that is uploaded by users – a broad category that includes everything from massive sites like YouTube to personal blogs that allow comments. The good news is that, thus far, the system has been able to handle copyright-protected 3D printing-related content about as well as it handles everything else. While this might strike some as faint praise, at a minimum it suggests that the online copyright rules do not need to be rewritten just to accommodate the appearance of 3D printing on the scene.¹¹

This system is governed by rules enacted as part of the Digital Millennium Copyright Act (DMCA). The core concept is fairly straightforward: websites that host content for others are not copyright experts. They are not courts or police. As such, forcing them to police their sites for copyright infringement is neither desirable nor tenable.

It is not desirable because the costs associated with evaluating every file uploaded to a site for potential copyright infringement would make starting a new site almost impossible. It is not tenable because identifying copyright infringement is not a mechanical process. Simply recognizing that an uploaded file matches a file protected by copyright is merely the first of many steps to identifying infringement. This is a process better left to courts, not private companies.

Therefore, the DMCA requires the hosting sites to act as impartial messengers between uploaders and rightsholders. Anyone can upload a file to a site. If a rightsholder objects, they send that site a request to take down the file (known colloquially as a “DMCA takedown notice”).¹² When the site gets that request it takes the file down and alerts the uploader about the notice. The uploader then has two choices: accept the takedown or fight it. If the uploader chooses to fight, she notifies the site that there is no infringement. The site then reposts the file and informs the rightsholder that the file is back up. At that point, the rightsholder has two

choices: accept that the file is noninfringing and move on or sue the uploader for copyright infringement. Critically, at no point in this process does the site evaluate the claims of either side.

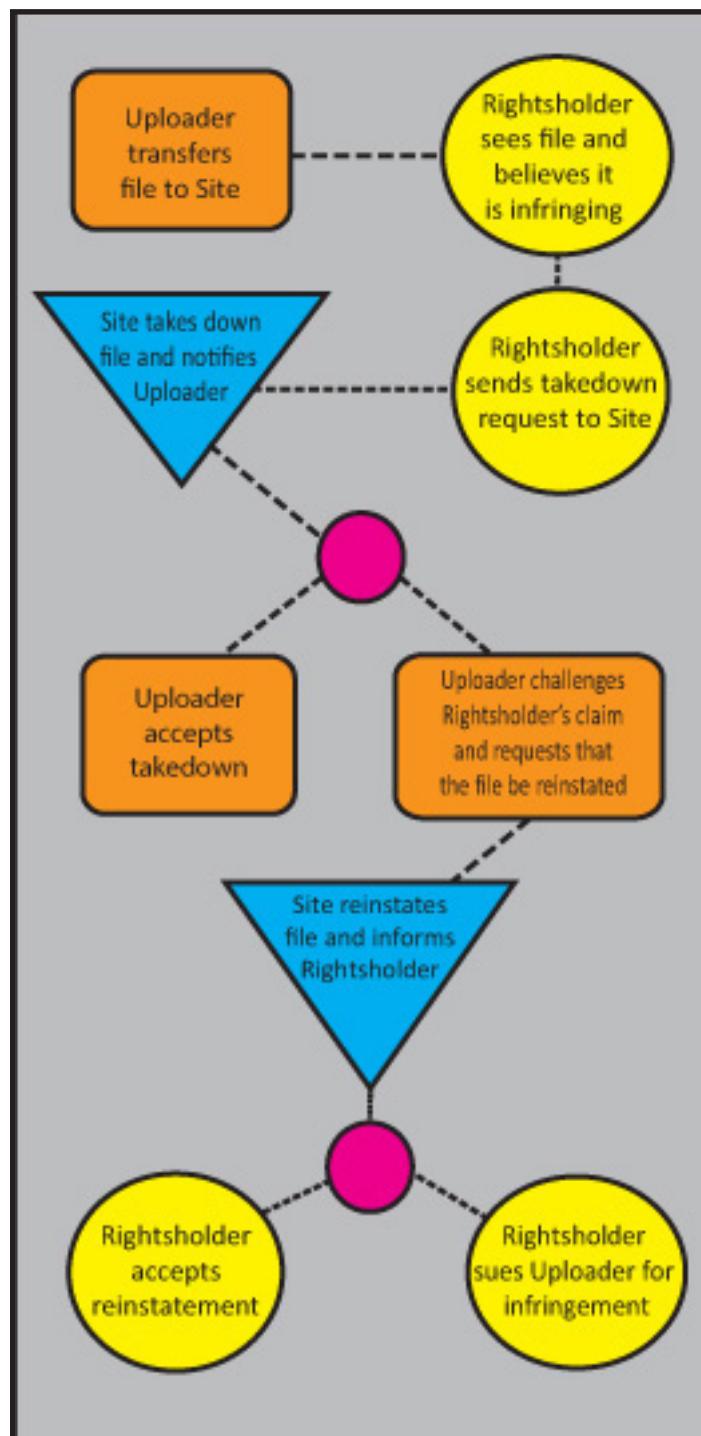


Figure 4: DMCA takedown flow chart

¹¹ That is not to suggest that the system is perfect. For a series of concrete ways to improve copyright, check out www.internetblueprint.org.

¹² For more information about this process, ChillingEffects.org hosts an extensive archive of takedown notices as well as information and resources for further understanding how it all works.

That System Generally Works

More broadly, this process that allows rightsholders to request works be taken down without going to court informs how many rightsholders patrol all of their rights online. For physical objects protected by copyright, this system appears to be working. When someone uploads the file for an object that is protected by copyright, rightsholders have successfully requested that it be taken down.¹³ Conversely, we have also seen companies avoid making copyright claims that were not supported by law.¹⁴

...But Sometimes It Doesn't

Of course, just as this “notice and takedown” process can be abused in other areas, it can also be abused in relation to 3D printing. As is the case in situations unrelated to 3D printing, this abuse often occurs when someone objects to something happening online and simply assumes that they can use copyright to stop it.

The story of the first 3D printing-related copyright takedown request is a case in point. A designer named Ulrich Schwanitz created a 3D model for an optical illusion called a “Penrose triangle.” He uploaded his design to a website, Shapeways, that allows designers to sell 3D printed objects and invited the public to purchase a copy in the material of their choice. He also, for better or worse, both claimed that creating this design was a massive design achievement and refused to tell anyone else how he made the object.

As is often the case on the internet, shortly thereafter another designer, Thingiverse user artur83, uploaded a Penrose triangle with the comment:

Inspired by Ulrich Schwanitz's 'challenge' about the "Impossible Penrose Triangle" I thought I'd give it a try.
Looks pretty neat.¹⁵

Unlike Shapeways, the website Thingiverse is built around sharing design files. As a result, because it was now up on Thingiverse anyone could download the design, understand how it worked, and print out their own version at home.

Schwanitz did not appreciate artur83's behavior and sent a request to Thingiverse that the model be removed.¹⁶ Thingiverse complied, but eventually public outcry convinced Schwanitz to dedicate his design to the public domain and retract the takedown request.

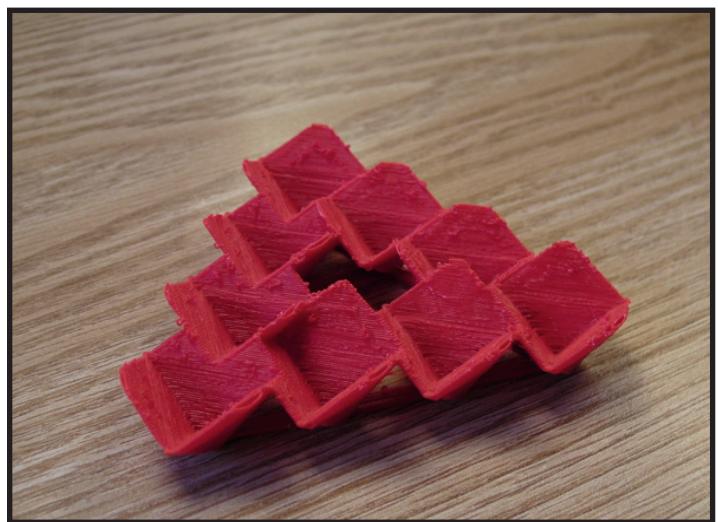


Figure 5: You too can download and print your own Penrose triangle

¹³ A great example of this process in action was Paramount's request that designer Todd Blatt remove his copy of the cube that plays a central role in the movie *Super 8*. The cube, which is essentially a sculpture, fits well within the scope of copyright and Paramount had already licensed its reproduction to another company. As such, Paramount was probably well within its rights to request that Blatt take the model down. Interestingly, if the cube worked in real life the same way it did in the movie, it might be a useful article that falls outside the scope of copyright. See Michael Weinberg, *3D Printing Expands How You Should Think About Copyright: The Super 8 Cube Edition*, Public Knowledge Policy Blog, June 28, 2011, <http://www.publicknowledge.org/blog/3d-printing-expands-how-you-should-think-abou>.

¹⁴ Thingiverse user Sublime's version of a Settlers of Catan board is a good example of this. Sublime created a new interpretation of the board and pieces for the board game Settlers of Catan. Sublime's board contained all of the elements necessary to play Settlers of Catan, but they look nothing like the ones sold by the company behind Settlers of Catan. The “idea” of a game and its utilitarian aspects have long been outside of the scope of copyright law. See, e.g. *Durham Indus., Inc. v. Tomy Corp.*, 630 F.2d 905, 914-15 (2nd Cir. 1980); *Mulligan v. Worldwide Tupperware, Inc.* 972 F. Supp. 158, 162 (W.D.N.Y. 1997). Sublime copied what he needed to copy in order to make his pieces work within the rules of the game, but not the appearance of those pieces themselves. Commendably, as of this writing the company behind Settlers of Catan has not requested that Thingiverse take down the board. See Michael Weinberg, *3D Printing Settlers of Catan is Probably Not Illegal: Is This a Problem*, Public Knowledge Policy Blog, Jan. 28, 2011, <http://www.publicknowledge.org/blog/3d-printing-settlers-catan-probably-not-illeg>.

¹⁵ artur83, *Penrose Triangle*, Thingiverse, Feb. 21, 2011, <http://www.thingiverse.com/thing:6456>. N.B. While Thingiverse currently displays this triangle's creation date at Feb. 21, 2011, it was mostly likely created at least as early as Feb. 16 – the day it was featured on the Thingiverse homepage and the day that artur83 first registered on Thingiverse.

¹⁶ See, Bre Pettis, *Copyright Policy*, Thingiverse Blog, February 18, 2011, <http://blog.thingiverse.com/2011/02/18/copyright-and-intellectual-property-policy/>

Although the story ends well, there is a gaping hole at the center of it: the entire narrative assumes that Schwanitz has a copyright in his design that was copied in the first place. This assumption overlooks a few critical things. First, the Penrose triangle itself predates Schwanitz's design by decades. That raises questions about how much of Schwanitz's work is actually original. Second, and perhaps more importantly, the Penrose triangle is a version of an optical illusion.

Optical illusions are arguably beyond the scope of copyright.¹⁷

If Schwanitz did not own a copyright in his design, he had no right to demand that it be taken down in the first place.¹⁸

It is unlikely that Schwanitz engaged in a detailed analysis of the copyrightability of his original design before issuing his takedown notice. Instead, trained by over a decade of takedowns related to music, movies, and other digital works protected by copyright, he may have simply assumed that he had a right that was being infringed upon by artur83.

As 3D printing and modeling grow in popularity, it is likely that we will see more companies and individuals assuming they have a copyright for a design or object and demanding removal of unauthorized versions. While most modern songs, movies, and pictures are protected by copyright, the same cannot be said for physical objects. For that reason, when a site receives a takedown request it may be wise to at least consider if the object is protected by copyright in the first place.

¹⁷ There are at least two theories that would place optical illusions outside of the scope of copyright. The first is that mechanisms that convey optical illusions are, as a category, useful objects. That would make them eligible for patent protection but not eligible for copyright protection. The second is that the entirety of the design is encompassed by its use as an optical illusion. Therefore, granting someone a copyright in the design would also grant them a copyright in the idea of the illusion – a merger of idea and expression that copyright law seeks to avoid. See footnote 46 below.

¹⁸ There is also the question about whether artur83 copied Schwanitz's design file, the printed object, or a picture of the printed object. The relevance of this question is discussed in the *Copyright on an Object, Copyright on a File* section below.

Questions on Copyrightability and 3D Printing

Sometimes the intersection of 3D printing and copyright is a clean one. Purely artistic physical objects will be protected by copyright as sculptural works. This category would include things like 3D models of characters from movies, video games, and comics. That does not mean that every reproduction of those objects will be infringement,¹⁹ but it does mean that many will.

However, as the Penrose triangle story suggests, the intersection of 3D printing and copyright is often not a clean one, and the situation tends to get complicated quickly. There are at least three major areas where bright line rules are still developing. The following sections attempt to outline them.

Kind of Creative, Kind of Useful: Severability

The ends of the copyright/patent spectrum are fairly easy to describe. Abstract sculpture? Protected by copyright. Breakthrough new hinge? Protected by patent. But what about things in the middle? What about things that are kind of artistic and kind of useful? More specifically, what about things that have some artistic features and some useful features? Can they be protected by copyright?



*Figure 6: A pig sculpture is copyrightable subject matter
(Steven Weinberg)*



*Figure 7: A hinge is patentable subject matter
(Topfscharnier By Pavel Krok, via Wikimedia Commons)*

¹⁹ If it is protected by a limitation and exception to copyright, such as fair use, even literal copying is not an infringement.

The law addresses these questions with a seemingly straightforward process called severability. If an object has both artistic and useful features, the copyright does not extend to protect the entire thing. Instead, copyright protection is limited to the artistic features that can stand alone – assuming there are copyrightable features that can stand alone. It protects those features by “severing” them from the rest of the object. If the artistic and functional features cannot be separated, the law errs on the side of keeping useful objects available to everyone and excludes the object from copyright protection altogether.

This process reflects a conscious decision by Congress. In a report accompanying the Copyright Act, Congress explained that it did not intend copyright to protect industrial products that happen to have “aesthetically satisfying and valuable” shapes.²⁰ Instead, only “physically or conceptually” severable elements could be protected by copyright.²¹ For example, if a chair has a carving on the back, the carving can be protected but the chair itself remains outside of the scope of copyright.²² This is because the carving can stand alone as a viable artistic creation even without the rest of the chair.

Actually applying this idea has proven something of a challenge. Only a few cases contain examples of elements that can actually be physically separated from each other in any meaningful way. More often than not, courts find themselves trying to identify “conceptually” separable elements. This is almost never easy.

To further complicate things, courts have not agreed on a uniform way to think about conceptual severability.²³ Different circuits have different tests to apply, and those tests evolve over time. While all of the tests seem to be trying to achieve the same thing, the same case could result in different outcomes in different circuits.

Although it is frustrating that these various tests and examples do not point to a single identifiable answer, reviewing them can provide some insight into how courts try to think about this issue. The remainder of this section attempts to describe the most important cases and the rules that have come out of them.

Hopefully, understanding these cases will make it easier to anticipate how courts may handle these questions in the future. The fact pattern for all of these cases is essentially the same. One person (or company) creates and successfully markets an object. Another company makes an exact copy of that object and starts to sell it as well. There is no question that the second object is a literal copy of the first object. The first company sues the second company for copyright infringement. The second company claims that there is no copyright to infringe. At that point it is up to the court to sort it all out.



Figure 8: This chair is a useful object not protected by copyright. However, the image can be severed from the rest of the chair and protected by copyright. (Flickr user Paul74)

²⁰ See, H.R. Rep. No. 1476, 94th Cong., 2d Sess. 55 (1976).

²¹ *Id.*

²² *Id.*

²³ The absence of a single rule does not mean that there are no rules. Each circuit has its own rule that is enforced within that circuit. But those rules can change depending on the circuit.

A Pair of Fancy Belt Buckles

This case dealt with a pair of fancy belt buckles.²⁴ On one hand, a belt buckle is a useful object – it holds the ends of your belt together and prevents your pants from falling down. On the other hand, these were artistically designed belt buckles that went well beyond what was needed to hold a belt together and pants up. Could those fancy elements be severed from the utilitarian ones?

The court did not want to give the original manufacturer a copyright on belt buckles, which could result in a monopoly on the useful object. However, there was at least an argument to be made that there were severable artistic elements of the buckles worth protecting under copyright.

Ultimately, the court found that the belt buckles had “conceptually separable sculptural elements” and granted those elements – and those elements alone – copyright protection.²⁵

The court came to this conclusion by looking at which elements were primary and which elements were secondary to the object. In the case of the belt buckles, it found that the sculptural/ornamental elements were primary and the utilitarian functions were secondary.²⁶ To do so it relied on the testimony of expert witnesses that the buckles rose to the level of creative art, as well as the fact that people had used the buckles as nonfunctional decoration on other parts of their bodies.²⁷ That meant that the buckles were used in ways unrelated to their utilitarian function, presumably because of their independent aesthetic value.

Rule to find severability: Determine if artistic elements play a primary or secondary role in the object.

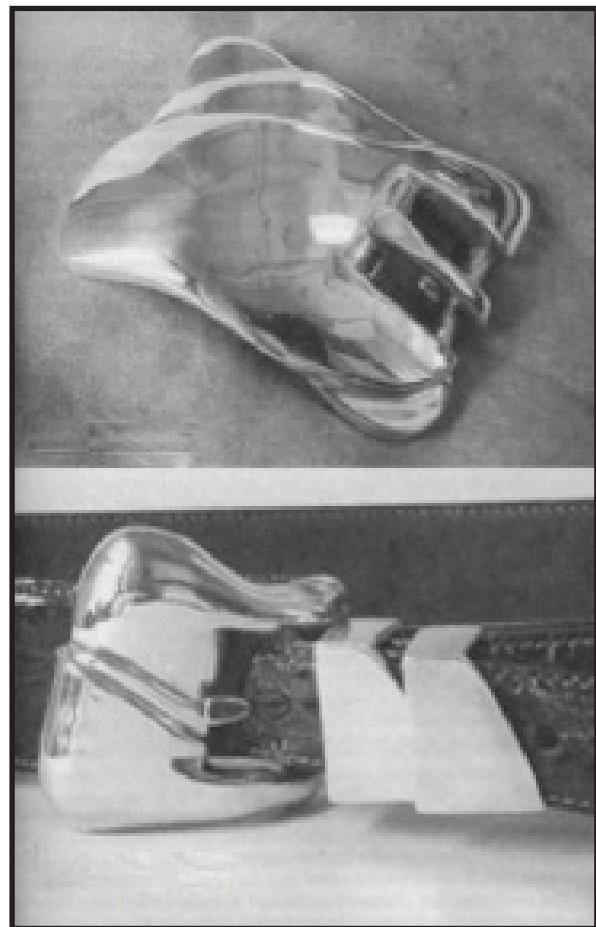


Figure 9: The original buckles in question

²⁴ *Kieselstein-Cord v. Accessories by Pearl, Inc.*, 632 F.2d 989 (2d Cir. 1980).

²⁵ See *id.* at 993.

²⁶ *Id.*

²⁷ See *id.* at 993-994.

A Sculpted Mannequin

This case dealt with four department store mannequins: two male and two female torsos without necks, arms, or backs.²⁸ One pair was shaped with bare torsos and one pair was shaped with torsos wearing a shirt. They were designed this way in order to display various shirts and jackets to customers. When a competitor copied the mannequins, the original creators sued.



Figure 1



Figure 2



Figure 3



Figure 4

Figure 10: The shaped mannequins

The court pointed out that “works of applied art or industrial design which have aesthetic or artistic features” are not protectable by copyright merely because they are “aesthetically satisfying and valuable.”²⁹ Instead, objects need to have elements that are separable from the underlying industrial purpose in order to receive copyright protection.

The fact that the mannequins were originally sculpted out of clay – a technique associated with sculptural art – also did not bring the mannequins within the scope of copyright. Just because the mannequins could be classified as sculpture did not mean that they were *protected* as sculpture.³⁰

In the end, the court did not find that there were any conceptually separable elements of the mannequins. This was because any ornamentation on the mannequin was largely driven by the utilitarian need to display clothing. There was no way to imagine artistic features that were added to the complete utilitarian object. Without copyright protection anyone, including the defendant in this case, was free to copy the mannequin.

Rule to find severability: Look to see if any potentially severable elements were driven by utilitarian needs.

²⁸ Carol Barnhart Inc. v. Econ. Cover Corp., 773 F.2d 411 (2d Cir. 1985).

²⁹ *Id.* at 418.

³⁰ See *id.*



Figure 11: A ribbon style bike rack (Flickr user orijinal)

A Bike Rack

This case involved a bike rack that you may see every day.³¹ The RIBBON rack is a bike rack made of tube bent into a wavy line. It was actually based on a wire sculpture that was unquestionably protected by copyright. However, the conversion from wire sculpture to tube bike rack required significant alterations.

Although the design is aesthetically pleasing, the court ultimately found that it was the product of an industrial design process and was not protectable under copyright. Even well-executed industrial design remained industrial design, and therefore beyond the scope of copyright.³²

Helpfully, the court actually attempted to spell out a test for finding conceptual separability.³³ The test was explained as follows:

If design elements reflect a merger of aesthetic and functional considerations, the artistic aspects of a work cannot be said to be conceptually separable from the utilitarian elements. Conversely, where design elements can be identified as reflecting the designer's artistic judgment exercised independently of functional influences, conceptual separability exists.³⁴

What does this mean? Simply being a creative designer of a useful object is not enough to grant the object copyright protection. As long as you are worried primarily about the functionality of the object, the object will be considered a useful object. If, however, there are elements that are designed largely without regard for functionality, those may be independently protected by copyright. While not every circuit has adopted this test, at the very least it provides some guidance on how to think about the elusive concept of severability.

Rule to find severability: Determine if there are creative elements that were designed without regard for functional requirements.

³¹ *Brandir Int'l, Inc. v. Cascade Pac. Lumber Co.*, 834 F.2d 1142 (2d Cir. 1987).

³² See *id.* at 1147.

³³ Actually, the court borrowed a test first proposed by Professor Robert Denicola. See *id.* at 1147-48.

³⁴ *Id.* at 1145.

A Beauty School Head

The final case involves a mannequin head sold to beauty schools and used to teach hair styling.³⁵ The head in question was designed to imitate what the court described as “the ‘hungry look’ of high-fashion, runway models.”³⁶ The head was designed once and then sold under various names with various types of hair and skin color combinations.

The court assumed that the head was a useful article because it was a teaching aid. The real question was if there were parts of the head that could be severed and protected by copyright.³⁷

In this case, the court largely adopted the test from the bike rack case.³⁸ As a bonus, it restated the test in somewhat easier to understand language:

If the elements do reflect the independent, artistic judgment of the designer, conceptual separability exists. Conversely, when the design of a useful article is as much the result of utilitarian pressures as aesthetic choices the useful and aesthetic elements are not conceptually separable.³⁹

How was the rule applied? The court granted copyright protection for the face of the head. First, it found that there were many ways to create a face for a mannequin, which reduces concern about granting the owner any sort of critical monopoly.⁴⁰ Second, it looked back to the original design process of the face. The company had hired an independent artist to develop the face, but had not given the artist any specific dimensions or any other technical requirements. That suggested that the design of the face was not particularly constrained by industrial design requirements.

Rule to find severability: Determine if independent, artistic judgment drove the creation of the non-functional elements.

Where Are We Now?

As of this writing, there is no single, straightforward test for severability. One court identified at least six versions of the test, although it did call the beauty school head test the most persuasive analysis that existed.⁴¹

As a result, severability remains a fact-specific inquiry. While some cases are straightforward, the outcome of others will depend on the circuit, judge, and even individual lawyering.

Frustrating as that may be, some important things can be learned from thinking about severability. First, severability acts as a reminder that useful objects – even those that are the product of industrial design – are largely outside of the scope of copyright. Without copyright protection, many industrial design products will not benefit from any type of intellectual property protection at all.

Second, severability reduces the pressure to make a binary decision about classifying an object as useful or artistic, and by extension protected by copyright or not protected by copyright. With severability, an object need not be all-useful or all-artistic. Parts may be protected by copyright, while others may be free to be copied.

Third, severability is an area to watch as 3D printing has more contact with the legal system. Decisions by courts in relatively obscure cases can fundamentally change what is and is not protected by copyright. That means that when you see an article about a new copyright severability case, it may be worth stopping to take a look. Even small changes to the line between severable and not severable, and therefore copyrightable and not copyrightable, may have massive ripple effects.

Although the courts have yet to settle on a clear, universal, and easy to apply rule regarding severability, today the best rule of thumb is probably the one expressed in the beauty school head case. If the elements of the design are non-functional and were developed without regard to utilitarian pressures, they may be protected by copyright. However, if the design of elements was largely influenced by the practicalities of making and using the object, they are unlikely to be protected by copyright.

³⁵ Pivot Point Int'l, Inc. v. Charlene Prods., 372 F.3d 913 (7th Cir. 2004).

³⁶ *Id.* at 915.

³⁷ See *id.* at 920.

³⁸ See *id.* at 927.

³⁹ *Id.* at 931 (internal citations and quotations omitted).

⁴⁰ *Id.*

⁴¹ After which, of course, the court declined to apply that test. See *Galiano v. Harrah's Operating Co.*, 416 F.3d 411, 417-18 (5th Cir. 2005).

Copyright on a File, Copyright on an Object⁴²

Physical objects can live in a digital form. For 3D printing, this digital form is often that of an .stl file.⁴³ These files can be thought of as the object equivalent of a .pdf file – they are more or less universally printable by 3D printers and allow objects to be transferred digitally around the world.⁴⁴ But are they protected by copyright? And if they are protected by copyright, what does that mean?

.Stl files are certainly *protectable* by copyright. Copyright law specifically mentions “maps, globes, charts, diagrams, models, and technical drawings, including architectural plans” as included within the scope of works eligible for protection.⁴⁵ However, that does not automatically mean that every design file for a physical object is actually protected by copyright.

After all, if a given diagram is the only practical way to virtually represent a physical object, a copyright on that diagram would prevent anyone from making any virtual versions of the object.⁴⁶ This would give the holder of that copyright a great deal of control over the distribution and manufacture of the object itself.

In order to avoid this outcome, copyright law limits the copyrightability of these types of works:

The design of a useful article...shall be considered [a work eligible for copyright protection] **only if, and only to the extent that, such design incorporates pictorial, graphic, or sculptural features that can be identified separately from, and are capable of existing independently of, the utilitarian aspects of the article.**⁴⁷

Put more simply, designs are only protected by copyright to the extent that they go beyond the utilitarian requirements of designing a useful article. Not surprisingly, in practice drawing this line can become extremely complicated. This is especially true in situations, like those described earlier, where an object combines useful and artistic elements.

However, these types of objects further complicate an already complicated analysis. In the interest of simplicity, the rest of this section will walk through four different scenarios designed to highlight what these lines mean in real life. While the details can become complex, the analysis is guided by a simple principle: courts must find a way to provide copyright protection to qualifying works without inadvertently using 3D printing and digital designs to expand copyright’s scope.

⁴² A warning: this may be the most speculative section of this whitepaper. 3D design files tend to compress prior distinctions between diagrams and physical objects, and the law is struggling to catch up. It would not be a surprise if future court decisions and/or Congressional action change the conclusions in this section considerably.

⁴³ The .stl file is usually the final version of an object, but oftentimes the object is first created in another program with another file extension. For example, the free program SketchUp saves files as a .skp. Free online 3D design programs such as Tinkercad allow you to send designs directly to third party 3D printing services or download the file as a .stl or .vrml (or two-dimensional .svg). These other types of files can be converted into .stl.

⁴⁴ Although, like .pdf files, they can be hard to modify once they have been created.

⁴⁵ 17 U.S.C. § 101.

⁴⁶ This problem is known as the “merger doctrine” or the “idea/expression dichotomy.” Copyright does not protect ideas; it only protects expressions of ideas. If there are many ways to express an idea, each expression of that idea will have strong copyright protection. For example, there are many ways to express a story about a boy and a girl falling in love, so each version of that story will have strong copyright protection (but no author will be able to stop someone else from writing another story about a boy and a girl falling in love). Alternatively, if there are a very limited number of ways to express an idea, then each expression will have very little copyright protection – or no protection at all. If the idea that a baffle should be attached to a rectangular surface exactly 15 mm from the edge can only be expressed one way (or an extremely limited number of ways), that idea and expression of that idea are said to have “merged.” The result is that the one and only way of expressing the idea is not protected by copyright. See, e.g., *Baker v. Selden*, 101 U.S. 99 (1880); *Kay Berry Inc., v. Taylor Gifts, Inc.*, 421 F.3d 199 (3rd Cir. 2005); *Yankee Candle Co., Inc. v. Bridgewater Candle Co., LLC*, 259 F.3d 25 (1st Cir. 2001); *Franklin Mint Corp. v. Nat'l Wildlife Art Exch., Inc.* 575 F.2d 62 (3rd Cir. 1978); *Crume v. Pacific Mut. Life Ins. Co.* 140 F. 2d 182 (7th Cir. 1944).

⁴⁷ 17 U.S.C. § 101 (emphasis added).

Useful Objects



Figure 12: No one can stop you from making a copy of this screw

Purely useful objects, like a screw, are not protected by copyright. While they may be protected by patent, as discussed above, many of them will simply not be protected by any intellectual property right at all. Generally speaking, the existence of a digital file should not be used to claw useful objects out of the public domain.

There are at least two ways to create digital design files for useful objects. One is to scan an existing object. The other is to design the useful object in a virtual universe with a computer aided design (CAD) program. Strangely enough, how the file was created may very well impact its copyright status.

Scanning a Useful Object

Incredibly precise laser scanners can create highly accurate virtual models of physical objects.⁴⁸ Among other things, they allow people to turn existing physical objects into portable, and alterable, digital files. Although there is a limited amount of case law on the question at this point, it also appears that such scans are not independently protected by copyright.

The justification for this is that the scans are not sufficiently “original” to qualify for copyright protection.⁴⁹ There is no question that 3D scanning is labor intensive and complicated. However, just because it is labor intensive and complicated to create something does not guarantee copyright protection.⁵⁰ Good 3D scans create exact replicas of the physical objects being scanned, and at least at this point in time are not recognized as creatively interpreting the object in any way.



Figure 13: A high resolution 3D scanner

⁴⁸ While scanning capability has traditionally been limited to purpose-built scanners, that is beginning to change. Microsoft’s Kinect accessory has been used for 3D scanning. Other services, such as Autodesk’s 123D Catch, can take photos taken by any digital camera and turn them into 3D digital representations suitable for 3D printing.

⁴⁹ See *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258 (10th Cir. 2008) (considering a 3D scan of a truck for use in commercials); *Bridgeman Art Library, Ltd., v. Corel Corporation*, 25 F.Supp. 2d 421 (S.D.N.Y. 1987), modified 36 F.Supp.2d 191 (S.D.N.Y. 1999) (high quality photographs of public domain works are not independently copyrightable). It is worth noting that this lack of originality was originally used to justify excluding photographs from copyright protection. The theory was that photographs merely captured the world as it existed, and therefore were not sufficiently original for protection. In time, courts recognized that most photographs are the result of a number of creative decisions made by the photographer with regard to framing, lighting and arrangement. See *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53 (1884). It is impossible to say if the law will grow to recognize similar artistry in 3D scanning. However, the purely functional application of 3D scanning to capture physical objects for production or replication purposes may reduce the likelihood of this happening. The fact that many 3D scanners explicitly try to reproduce the scanned object as faithfully as possible further undermines claims of originality.

⁵⁰ This “sweat of the brow” justification for copyright protection was famously rejected in a case where the Supreme Court denied copyright protection for a phone book. See, *Feist Publications, Inc. v. Rural Telephone Service Co., Inc.*, 499 U.S. 340 (1991). Phone books are hard to put together, but their appearance and arrangement are dictated by the requirements of users (that they include everyone with a phone number listed alphabetically) and therefore do not require any creativity to arrange.



Figure 14: Objects can be scanned and turned into digital files

As a result, there does not appear to be an independent copyright in the file containing a 3D scan of a useful object.⁵¹ Since the scanned object is a useful object, the object is not protected by copyright either. This means that anyone, without having to ask permission, is free to reproduce, change, or use a digital file of a physical object that was created by scanning that object.

Purely artistic elements of the design file, like photographs in the background or shading and coloring could potentially be severed from the more utilitarian elements that describe shapes, sizes, and relationships. This analysis would help to establish if any independent artistic elements exist to be protected.⁵³

Creating a Useful Object in CAD

Instead of being transferred from the physical world to the digital world via a scanner, useful objects created in CAD software exist first in a digital world. Once again, as a useful object the object itself (as it would exist physically) is not protected by copyright. Furthermore, even if the design file is protected by copyright, creating a physical version will not infringe on any copyright that exists in the file. No copyright on the design of a useful object extends copyright protection to the object itself.⁵² The legal question arises when someone tries to copy the file.

As mentioned earlier, diagrams and technical drawings are protectable by copyright, but only to the extent that the creative elements exist independently of the utility of the diagram. In order to determine the copyrightability of any given design file, a court may do a severability analysis. The analysis would not focus on the object itself, but rather the contents of the file.

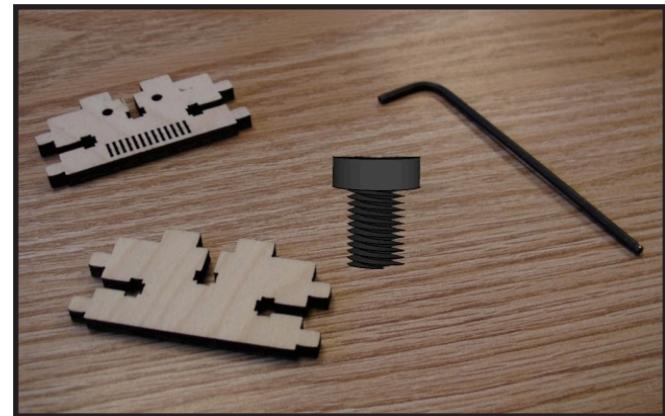


Figure 15: This image combines a digital representation of a screw with a photograph to give the design some context. If a digital file included both the technical information needed to describe the screw and the photograph that gave it context, the technical information would not be protected by copyright but the photograph would be. A court may try to sever the technical information and the photograph to determine copyrightability.

⁵¹ It bears repeating that this conclusion is open to reexamination and revision as courts are confronted with more cases centering on the copyrightability of such scans. While current case law supports this conclusion and the reasoning behind the conclusion is sound, attitudes towards 3D scanning may evolve over time.

⁵² See, e.g. *Robert R. Jones Assoc. v. Nino Homes*, 858 F.2d 274 (6th Cir. 1988) (copying a house is permitted even if plans are protected by copyright); *Imperial Homes Corp. v. Lamont*, 458 F.2d 895 (5th Cir. 1972) (copying a house is permitted even if plans are protected by copyright); *Victor Stanley, Inc. v. Creative Pipe, Inc.* Case No. MJG-06-2662, 2011 U.S. Dist. LEXIS 112846 (D. Md. 2011) (copying of copyright protected plans is infringement, using authorized plans to create unauthorized articles is not); *Morgan v. Hawthorne Homes, Inc.*, Civil Action No. 04-1809, 2009 U.S. Dist. LEXIS 31456 (W.D. Pa. Apr. 14, 2009) (copyright in design protects design, does not prevent creation of building based on design); *Gusler v. Fischer* 580 F. Supp. 2d 309 (S.D.N.Y. 2008) (using copies of technical drawings to create article not infringement, creating copies of technical drawings can be infringement); *Niemi v. Am. Axle Mfg. & Holding Co.*, No. 05-74210, 2006 U.S. Dist. LEXIS 50153 (E.D. Mich. 2006) (no copyright violation when defendant made multiple objects after obtaining plans and permission to make only one); *Eliya, Inc. v. Kohl's Dept. Stores*, No. 06 Civ 195 (GEL), 2006 U.S. Dist. LEXIS 66637 (S.D.N.Y. 2006) (copyright in pictorial representation of useful article does not grant rights in article); *National Medical Care Inc., v. Espiritu*, 284 F. Supp. 2d 424 (S.D.W.Va. 2003) (copying structure without copying plans is not infringement).

⁵³ See, e.g. *Kern River Gas Transmission Co. v. Coastal Corp.*, 899 F.2d 1458 (5th Cir. 1990) (map in dispute was the only way to represent . . .

It can be hard to predict the outcome of any individual severability analysis, but many 3D design files that simply represent an object without additional context may lack severable creative elements (and therefore copyright protection). CAD environments give designers a standard way to show sizes, shapes, and relationships. If there is only one way to represent a given useful object in a CAD program, it is unlikely that a court would grant the designer of the object copyright protection in the design file. Doing so would prevent anyone else from representing that useful object digitally.

If a court determines that parts of the file are protected by copyright, then copying that file without permission will be copyright infringement. If there are no copyrightable elements of the file, then, as with the file generated by a scanner, anyone would be free to copy the file.

No matter how a court decides to treat the file, the copyright on the file by itself would not restrict production of the purely useful object represented by the file.⁵⁴ Furthermore, there is some indication that copying a file of a useful object protected by copyright for the purposes of creating the useful object is not copyright infringement.⁵⁵

... a pipeline's location); *Tensor Group Inc. v. Global Web Sys., Inc.*, No. 96 Civ. 4606, 1998 U.S. Dist. LEXIS 19596 (N.D. Ill. 1998) (defendants must show that there is only one way to express the part to be free of copyright liability); *Guillot-Vogt Assoc., Inc. v. Holly & Smith*, 848 F.Supp. 682 (E.D. La. 1994) (defendant must show that plans are the only meaningful way to depict an article to avoid infringement liability). However, at least one court has held that blueprints themselves are not useful articles and therefore a severability test would be improper. See *Gemel Precision Tool Co. v. Pharma Tool Co.*, 1995 U.S. Dist. LEXIS 2093 (E.D.Pa. 1995).

⁵⁴ See note 52, *supra*.

⁵⁵ Prior to a law passed to specifically protect buildings, blueprints were protected by copyright but buildings were not. In cases where defendants were accused of copying the blueprints and a building, courts generally found infringement for the blueprint copying but not for the building copying. However, defendants who could show that they did not need to copy the blueprint (if, for example, they had an authorized copy already) in order to copy the building were not held liable. . . .

Creative Objects

The issues surrounding creative objects are much more straightforward. There is no concern that granting copyright protection to a design file will somehow expand the scope of copyright because the object itself is already protected by copyright. However, it is worth considering who owns which parts of this puzzle.

Scanning a Creative Object

As with scans of useful objects, scans of creative objects do not create a new copyright.⁵⁶ Unlike scans of useful objects, scans of creative objects are copies of existing works protected by copyright. That has two ramifications. The first is that anyone scanning a creative object needs the permission of the rightsholder of that object. Scanning makes a copy, and copies are exactly what copyright regulates. Even though the scanner is not creating a work eligible for copyright protection, she is still copying the creative object.



Figure 16: Michelle Obama owns a copyright in the pig sculpture. Barack Obama does not own a copyright in the scan file

... This balancing allowed the copyright for the blueprint to coexist with the lack of copyright protection for the building. Unfortunately, the nature of digital technology – where everything is copied countless times – could make this distinction harder to maintain. Hopefully future courts recognize the underlying wisdom of preventing a copyright in a design from granting protection for the object depicted in the design, and find a way to advance it even as technology changes. See, e.g. *Forest River, Inc. v. Heartland Rec. Vehicles, LLC*, 753 F. Supp. 2d 753 (N.D.Ind. 2010) (expressing disinclination to recognize a distinction between creating an article with original or duplicated plans); *Gusler v. Fischer* 580 F. Supp. 2d 309 (S.D.N.Y. 2008) (using copies of technical drawings to create article not infringement, creating copies of technical drawings can be infringement); *Niemi v. Am. Axle Mfg. & Holding Co.*, No. 05-74210, 2006 U.S. Dist. LEXIS 50153 (E.D. Mich. 2006) (no copyright violation when defendant made multiple objects after obtaining plans and permission to make only one); *National Medical Care Inc., v. Espiritu*, 284 F. Supp. 2d 424 (S.D.W.Va. 2003) (copying structure without copying plans is not infringement). But see *Robert R. Jones Assoc. v. Nino Homes*, 858 F.2d 274 (6th Cir. 1988); *Imperial Homes Corp. v. Lamont*, 458 F.2d 895 (5th Cir. 1972) (although both cases are pre-Architectural Works Copyright Protection Act and therefore may have limited instructional utility today).

⁵⁶ See *Bridgeman Art Library, Ltd., v. Corel Corporation*, 25 F.Supp. 2d 421 (S.D.N.Y. 1987), modified 36 F.Supp.2d 191 (S.D.N.Y. 1999).

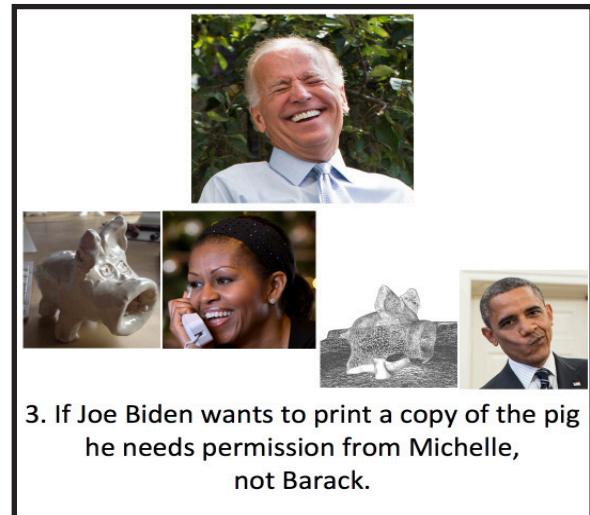


Figure 17: If Joe Biden wants to distribute the digital file he needs permission from Michelle Obama, but not from Barack Obama

The second has to do with who needs to grant permission before the file is copied. Remember, the file created by the scan is not protected by its own independent copyright. That means that the scanner has no copyright interest in the file, and therefore the scanner's permission is not needed to copy the file. (See Figure 16.)

That does not mean that the file can be copied and distributed freely. The file is still a copy of a creative work protected by copyright. Copying and/or distributing the file requires permission from the person who controls the copyright over the original object. (See Figure 17.)

Creating a Creative Object in CAD

This is perhaps the most straightforward scenario. When a creative object is created in a CAD program, that file is protected by copyright. Copying and/or distributing the object requires permission from the rightsholder. Creating the creative object in physical form also requires permission, because that physical object is a copy or derivative work of the CAD design. Unlike the case of useful objects, copying the physical version of the creative object designed in a CAD program also infringes on the copyright in the CAD design.

	Useful Object	Creative Object
File Created by Scan	Not copyrightable - lacks required originality and can't be derivative work because underlying object is not protected by copyright.	No independent copyright, but will still be a copy/derivate work of the object itself. Need permission from object creator, but not scanner in order to copy.
File Created in CAD	At least copyrightable in theory. However, actual copyrightability will turn on merger analysis. Creating object from the file will not violate any copyright that exists in the file. Copying the file to create object may or may not be copyright infringement (cases differ) but will probably be influenced by merger analysis. If you need to copy the file to create the object, unauthorized copying may be easier to justify.	Independent copyright in file. Object is probably derivative work of the file. Independent copyrightability of object as derivative work also possible.

Figure 18: Copyright on digital files

Does Licensing Matter?

One way to avoid some of these thorny copyright questions is by distributing objects and designs with permissive licenses such as those provided by Creative Commons. Unfortunately this solution can break down when applied to physical objects beyond the scope of copyright.

To put it simply, you cannot license what you do not have. A license is a conditional permission to use: I grant you the right to make copies of my work as long as you comply with these conditions. If you do not comply with the conditions, then your copies are in violation of my copyright.

However, if there is no copyright, there is no need for permission, and no way to enforce the terms. A license without an underlying right is legally meaningless.

For example, adding a Creative Commons license to a door hinge (a useful object) grants you no legally binding control over anyone who uses that hinge. If someone copies the hinge without complying with the license, there is nothing you can do because the copies do not infringe on any rights.



Figure 19: I can offer you a license to paint the Brooklyn Bridge pink, but since I do not own the Brooklyn Bridge the license will not be of much help when you are arrested for vandalism.

Licensing Non-Copyrightable Objects

All of that being said, licensing of noncopyrightable files can serve at least two useful purposes – one legal and one cultural.

The legal purpose is something of a hedge against future legal change. As detailed in this paper, there are many open questions surrounding just what types (and parts) of objects are and are not protectable by copyright. Granting a license today means that the usage conditions of the object are clear no matter how copyright law evolves in the future. As long as the creator does not believe that merely granting the license gives them the right to control non-copyrightable parts of the work, there is little downside to futureproofing the status of the object.

The second, cultural, purpose is probably the more important one. Licensing can be an important signaling device even when it is not legally enforceable. Attaching a Creative Commons license is a signal that the creator wants to include her work in an ever-expanding and evolving network of creativity. It gives the rest of the community confidence that they can build on the object.

There are already strong examples of this type of community understanding bearing fruit in the world of 3D printing. Thingiverse, a website dedicated to sharing 3D design files, is centered on the notion of sharing one's own work and building on the work of others. Every object on Thingiverse lists information about what it is derived from and what has been derived from it. This has created a rich ecosystem of creation, design, and innovation. (See Figure 20.)

There are, however, potential downsides to licensing objects not protected by copyright. These are especially clear when you move away from permissive licenses towards more restrictive licenses. Objects that are not protected by copyright, but have restrictive licenses attached to them, could discourage completely lawful uses. They could also allow creators to intimidate others.

When used responsibly and realistically, licensing non-copyrightable objects can be worthwhile. However, their actual legal enforceability must always be greeted with a degree of skepticism.

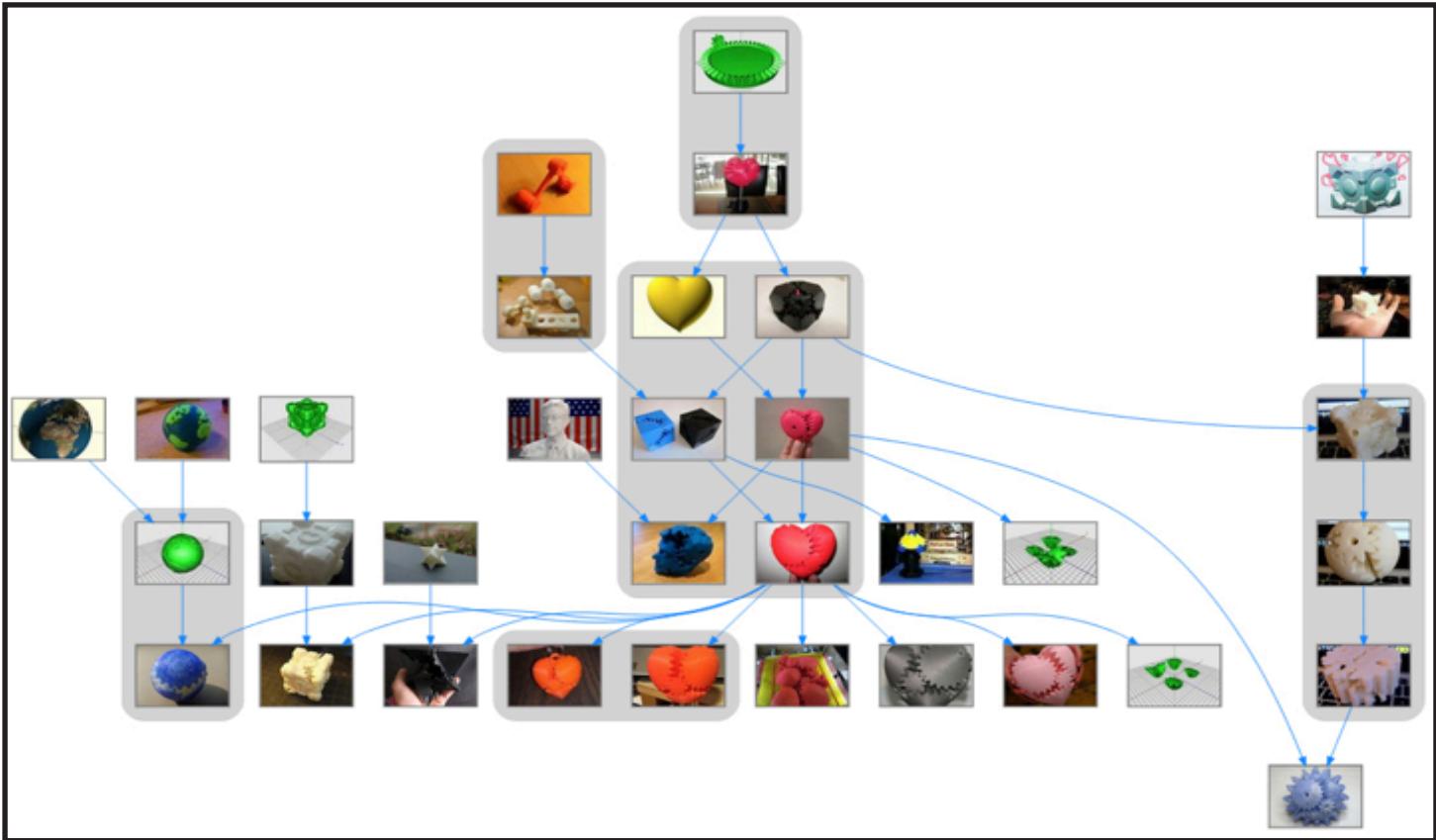


Figure 20: On Thingiverse, a single design can spawn an entire family of remixes, improvements, and changes. (Sean Michael Ragan - <http://www.smragan.com/2012/06/11/the-heart-gears-phenomenon-a-physisble-family-tree/>)

Licensing Design Files

By and large, licensing design files raises the same questions and concerns as licensing the objects themselves. As detailed earlier, not all design files are protected by copyright. For those that are protected by copyright, the owner is free to license them as they see fit. For those not protected by copyright, licensing can serve as a useful social signal to others who might want to use the file.

This signal can be socially productive if a Creative Commons-type license is involved, because it is inviting people to use what they are already allowed to use. It can also be socially counter-productive if a restrictive license is used, because it might prevent people from making use of an object that they are, in fact, free to make use of.

Finally, it is unlikely that any license of a copyrighted design file could be used to assert copyright-style control over an object that is beyond the scope of copyright. In cases where a maker of a physical object does not need permission from the creator of the design file, even Creative Commons-style restrictions on a design file could not force a maker of the object to share and share alike.

Conclusion

By now, an attentive reader will have noticed that many of the questions raised in the paper do not have simple, easy-to-apply answers. That is in large part a function of the way the legal system tackles new questions. At this point in the history of 3D printing and consumer access to digital manufacturing, many of the most interesting questions are only beginning to assert themselves. Although it is possible to draw guidance and principles by analogy from cases not involving 3D printing, it is too early to confidently state how future courts will view them in light of 3D printing.

This shifts the opportunity and responsibility for creating reasonable, workable rules to three places. The first two are the legislature and the courts. As detailed in *It Will Be Awesome*, there are many ways that 3D printing and digital manufacturing can be handled poorly by both. Legislatures may take steps to legislate against an imagined dystopic future that would probably never come, cutting off unanticipated positive developments in the process. Courts may react to the unknown by expanding the scope of intellectual property rights and infringement liability in counterproductive ways.

But both the legislature and the courts can take steps to protect innovation. Legislatures can say no when incumbents try to push laws designed to criminalize a new technology. Courts can protect legally defensible, but culturally novel, ways of doing business. After all, it was the Supreme Court's refusal to hold the creator of the Betamax liable for copyright infringement that gave us VCRs, DVRs, MP3 players, and more.

The third – and perhaps most important – place to develop rules is the community itself. Community norms matter. This is especially true when it is unclear exactly how traditional intellectual property laws apply – if at all. Developing a way to recognize and reward true innovators without relying on costly, drawn-out legal battles is the most effective way to stave off the creep of copyright expansion. If there is a system that already works, most people will not need to grasp for novel copyright theories.

Ultimately then, the burden is on the community and the organizations that host the community not to blindly assume that copyright covers everything. This is not to say that copyright should be rejected, or that legal orders should be ignored. Instead, it is a reminder of the value of healthy skepticism. If someone is asserting copyright over an object, take a moment to consider if copyright can even apply in that case. Make assertions of infringement public so that the wider community can understand who is claiming what kinds of rights.

For better or worse, this last burden will fall heaviest on the sites that host design files and provide a forum for 3D designers to gather, share, and sell their wares. The way they react to takedown notices will heavily influence the willingness of rightsholders to attempt to exercise questionable control. While these sites would be prudent to comply with all properly formed DMCA takedown requests, what they do after taking something down (and how they handle marginal cases) will have a disproportionate impact on how the community, and ultimately the wider world, thinks about copyright and 3D printing. Until there is better legal clarity, cultural clarity is the best way to protect the development of 3D printing.