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3 STEPS FOR LICENSING YOUR 3D PRINTED STUFF

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Introduction

For the past few years, 3D printing has been booming. The expiration of patents, as well as a worldwide effort to engineer open, low-cost desktop 3D printers, has begun to fundamentally alter an industry that had been flying under the radar for decades. However, as 3D printers become more accessible to more people, questions of ownership and control of 3D printed objects begin to arise more often.

It should come as no surprise that many people turn to copyright law to answer these ownership and control questions. Indeed, one of the unexpected side effects of the past generation's growth of software and the internet has been a collective, informal public education in copyright and copyright licensing. In light of this history, it is only natural that 3D creators' instincts lead them to the General Public License (GPL), Creative Commons (CC) licenses, and other similar licenses to determine how others can—and cannot—use their creations.

Unfortunately, this instinct is not always the right one. From an intellectual property law standpoint, physical objects are quite different from code or words or photographs. Code (and words and photographs) is categorically eligible for copyright protection, and that protection attaches automatically. The GPL, CC licenses, and other licenses geared towards code all function under the assumption that the underlying work exists well within the scope of copyright protection and is therefore protected by copyright.

This assumption is not as easily applied to the world of physical objects. Some physical objects are protected by copyright, but many others are not. Additionally, the copyright in the digital files that represent those physical objects can require an entirely different copyright analysis than the one for the objects themselves.

In light of that, this paper is not actually about choosing the right license for your 3D printable stuff (sorry about that). Instead, this paper aims to flesh out a copyright analysis for both physical objects and for the digital files that represent them, allowing you to really understand what parts of your 3D object you are—and are not—licensing. Understanding what you are licensing is key to choosing the right license. Simply put, this is because you cannot license what you do not legally control in the first place. There is no point in considering licenses that ultimately do not have the power to address whatever behavior you're aiming to control. However, once you understand what it is you want to license, choosing the license itself is fairly straightforward.

Finally, in discussing licenses, this paper mostly focuses on open licenses, such as the GPL or Creative Commons licenses. This is in part because many 3D object creators gravitate towards these types of licenses. It is also because supporting open culture is important to both Public Knowledge and me. However, the fundamental analysis of what is and is not protectable by copyright applies to any license regime and can be used in support of any type of copyright license.

A Three-Step Process

In order to understand what it is you are licensing, this paper proposes a three-step process:

> **Figure out which elements of your object or object file are eligible for copyright protection**

This can be much harder in the world of physical objects than it is with exclusively digital works. Unlike with code or photographs, with physical objects you may actually have to search out what parts are and are not protected by copyright. You may also need to make a distinction between the object and the file that represents the object—something that rarely occurs in the more traditional copyright world. While this can be complicated, this paper will try to make it as intuitive and straightforward as possible.

> **Understand what copyright does—and does not—allow you to control**

Although it sometimes can feel otherwise, a copyright that protects a work does not control every use of that work.[1] Understanding what your copyright allows you to control—and what remains out of your control—is critical to thinking about how to license things. For example, you may have a copyright on a file that represents an object, but not on the object itself. In that case, you should be clear-eyed about the fact that even the most restrictive license on the file will not stop people from reproducing the object without your permission.

> **Choose your license**

After you understand what parts of your work are protected by copyright, and what that copyright protections actually mean, it is time to think about licensing. Once you understand what you have the legal right to control, you can start deciding how you want to exercise that control.

This Paper is Only About Copyright

Your 3D object might be protected by more than copyright. It could be protected by patent, or by trademark. So why is this paper only about copyright? Mostly because copyright protection is free. If you create something that is eligible for copyright protection, it automatically gets copyright protection free of charge. There are good reasons to register your copyright, but registration is not required for protection. This means that you get a copyright without ever filling out paperwork, consulting a lawyer, or even wanting it in the first place.

1 Copyright can feel all-encompassing, but it has real limitations. A copyright owner cannot stop you, for example, from thinking about their work, or memorizing it, or summarizing it for a friend.

In contrast, patents are not free. In order to get a patent, you will need to fill out paperwork and pay fees. You will also likely pay a lawyer to walk you through the process. At that point it probably makes sense to talk to that lawyer about how to go about licensing your patented object.

That is why this paper is geared towards creators without lawyers who want a general approach to thinking about copyright. It should not be read as legal advice, and it is always good to consult lawyers when you are making important licensing decisions about specific objects. But this paper should give you a general framework to use in order to approach the problem, and a sense of the types of questions you should be asking.[2]

Step 1: Figure out which elements of your object or object file are eligible for copyright protection[3]

Just about every piece of code, photograph, article, and movie created today is automatically and entirely protected by copyright. That automatic, long-term protection is a large part of what motivated the creation of open and copyleft[4] licenses in the first place.

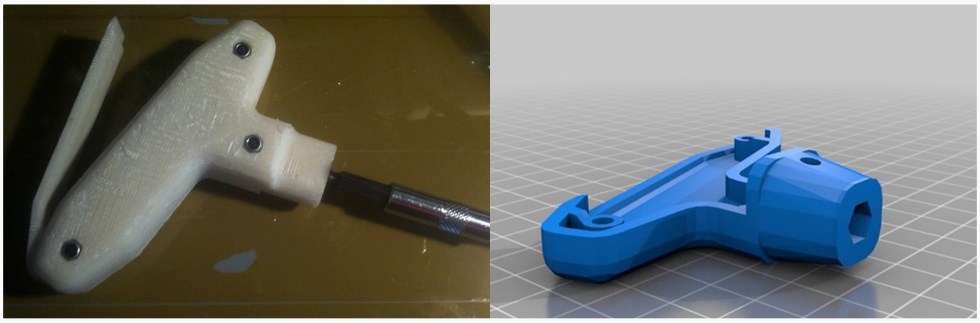
The same cannot be said for all of the physical objects that come out of a 3D printer. Some objects are completely protected by copyright. Some objects are not protected by copyright at all. And some objects have parts that are protected by copyright and parts that are not protected by copyright. Before choosing a license for an object, it is critical to understand which parts of the object are actually protected by copyright. In large part, this is because you can't license a copyright that does not exist.

2 If you would like a deeper dive into how various types of intellectual property law intersect with 3D printing, or how copyright does (and does not) interact with 3D printing, you might consider taking a look at the previous whitepapers *It Will Be Awesome If They Don't Screw it Up: 3D Printing, Intellectual Property, and the Fight Over the Next Great Disruptive Technology* (available for free at http://bit.ly/awesome3D) and *What's the Deal With Copyright and 3D Printing?* (available for free at http://bit.ly/3Dcopyright).

3 *What's the Deal With Copyright and 3D Printing?* examines this process in greater detail.

4 Copyleft is generally considered to be the use of copyright to increase the sharing and accessibility of works.

Understanding the contours of copyright with regard to a specific object is further complicated by the need to make a distinction between an object and a file that represents an object. For more traditional copyright-protected digital objects—again, these are code, articles, photographs, and whatnot—drawing this distinction has not been particularly important. For most purposes, a digital photograph and the file that contains a digital photograph are the same thing.



While this screwdriver is not protectable by copyright, the file that represents this screwdriver digitally may be. Credit: Screwdriver by Thingiverse user steeve_becker.

But in the world of 3D printing and copyright, an object and a digital file that represents that object may be very different things. For example, it is possible that a given object is not protected by copyright, but that a file that represents that physical object is protected by copyright. In such a case, it is important to recognize the distinctions between the two. These distinctions may feel pedantic—why split hairs over which parts of a physical object are copyrightable, or distinguish between an object and a digital file representing that object?—and in some ways they are. But they are distinctions created by current copyright law, and are therefore important to understand because they define the boundaries of copyright's reach.

Copyright is a powerful right—in most cases it lasts for the lifetime of the author plus seventy years after her death, and it restricts all manner of uses. However, copyright is also a limited right. It is only designed to protect a limited universe of types of expression and does not protect "useful objects." You cannot get a copyright on a new type of rotary engine. It would be irresponsible (and ill-advised) to allow copyright to bleed into new areas of protection simply because drawing its boundaries is complicated.

Finally, and again, just because an object is not protected by copyright does not mean that it cannot be protected under a different type of intellectual property, or that it cannot be licensed. It may very well be that an object is excluded from copyright protection because it falls within the scope of patent protection. However, these other types of protections are outside of the scope of this paper, and if you are involved with patents you are probably already consulting with a lawyer.

Copyright in Physical Objects

When it comes to physical objects and copyright, there are essentially three categories: entirely copyrightable, entirely uncopyrightable, and mixed. The categorization of any individual object largely turns on how much non-aesthetic functionality it includes.

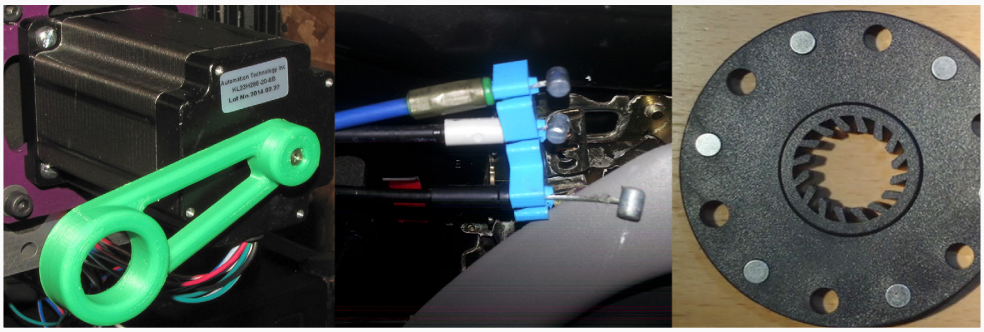
Entirely Copyrightable

Purely decorative items such as these fall well within the scope of copyright protection. Credits: The Cube by YouMagine user Clevin, Gargoyle by YouMagine user ultibrain, and drooloop flowers—customizable by YouMagine user Peetersm.

Entirely copyrightable objects are classic “creative works” that exist to look nice and/or inspire an emotional reaction, but do not perform any sort of non-artistic function. Sculptures fit into this category, as does most jewelry and other decorative items. These works are entirely and automatically protected by copyright from the minute they are created, and the creators will need to decide how (and whether) they would like to license the objects to others.

Entirely Uncopyrightable

Entirely uncopyrightable objects lie on the other end of the spectrum. These are going to be purely functional objects that exist to perform non-artistic tasks. They are not eligible for copyright protection. A screw would fall into this category, as would extruders and other functional parts of 3D printers.



Purely functional items such as these are not eligible for copyright protection. Credits: NEMA-23 Motor Finger Crank by YouMagine user Mark_Rehorst, Toyota Sienna Cold Door Fix by YouMagine user carlson3368, and E-Bike Pedal Magnet Plate by YouMagine user COMsulting.

As a category, functional (and therefore entirely uncopyrightable) objects are eligible for patent protection. However, in order to obtain a patent an object must meet additional criteria beyond simply existing, and its creator must formally apply for protection. Attempting to use a copyright license to restrict the use of an entirely uncopyrightable object would be improper, because the attempted licensor would have no right to restrict the object's use. Furthermore, it would be a legal nullity because there would be no penalty for violating the license.

Mixed

As you might expect, mixed objects are not as straightforward. The key to analyzing their copyrightability is to try to separate out parts of the object that do qualify for copyright protection from the parts that do not. Doing so avoids extending copyright protection to non-copyrightable objects (or parts of objects). Since copyright is such a powerful right, the law traditionally takes steps to avoid sweeping functional objects under its protection.

These items combine functional elements with purely decorative elements. Credits: T-Rex Shower Head by Thingiverse user JMSchwartz11, Iphone 6 (plus) 2 parts stand by Thingiverse user davidmus, and Pen Holder by Thingiverse user damm301. While it may be technically true that the decorative T-Rex part of the shower head is in the public domain and therefore not protected by copyright, ignore that tiny detail for now and appreciate it both because it is fantastic and because it illustrates an object with both functional and decorative elements vividly.

In order to achieve this, the primary analysis for mixed objects involves separating the artistic elements from the functional elements. If the artistic elements can stand on their own then those elements—and those elements alone – get copyright protection.

Figuring this out can be fairly easy when the artistic and functional elements can be physically separated. A classic example of this type of separation is a chair with decorative embroidery attached to the back. The chair itself is functional (it gives you somewhere to sit). The decorative embroidery is artistic (the chair would work just fine without it). You could physically separate the embroidery from the chair and protect the embroidery with copyright while leaving the rest of the chair out if it. Anyone could come along and copy the chair without getting permission, but if they also copy the embroidery they are violating copyright.

The (decorative, copyrightable) inlaid ornamentation in these chairs could be physically separated from the (functional, non-copyrightable) chairs themselves. Credit: Antique table and chairs, flickr user Thomas Quine.

Unlike the chairs, it is a bit harder to tell where the artistic part of this bike rack ends and the functional part begins.

This process is less straightforward when artistic and functional elements cannot be physically separated from each other. In this case, copyright law attempts to use what is referred to as "conceptual separation." Some important cases dealing with "conceptual separation" have involved artistic belt buckles (how can you separate the artistic elements of the buckle from the fact that it functions to hold your belt together?),[5] a decorative bike rack (how can you separate the aesthetically-pleasing design of a bike rack from its utilitarian function of securing your bike?),[6] and a mannequin head used in beauty school classes (how can you separate the functional teaching aid elements of the head from the purely aesthetic ones?).[7]

Unfortunately, none of these cases has produced a single, easy-to-apply rule. Some of them attempted to determine if independent artistic judgments—as opposed to utilitarian

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

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

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

or functional concerns—drove the creation of certain elements of the objects, but that approach is far from a consensus standard.

Fortunately, for the purposes of this paper, we do not need to settle on a hard and fast test for conceptual severability. The most important thing to remember is simply that mixed artistic/functional objects do not get copyright protection for the entire object. Instead, only the artistic elements are eligible for protection. As with the chair mentioned earlier, this may mean that copying the functional elements of an object would not violate copyright while copying the entire object (artistic parts and all) would violate copyright.

When thinking about licensing a specific mixed object it is important to have a realistic understanding of what is, and is not, protected by copyright. But when thinking about licensing mixed objects in general, the most important thing it is to simply be aware that the mixed category exists.

Copyright in Files

Copyright as it relates to a printed object's digital files is where 3D printing really starts to feel different from a more traditional copyright analysis. Normally, we do not spend very much time trying to make distinctions between a digital photograph and a file that contains a digital photograph; in that case copyright can be thought of as protecting the entire bundle, which means that the distinction is not particularly meaningful. In large part, this is because the photograph itself is well within the scope of copyright protection.

However, the distinction between a digital file and the work that it represents can become meaningful if the work in question is a non-copyrightable object. In at least some cases, a digital file that represents a non-copyrightable object (such as, say, a screw) will be protected by copyright even if the screw printed from that file cannot be. Notably, a copyright for a digital file does not automatically give you the right to control the use and reproduction of the printed object itself—something that will be discussed later in "Files" on page 14.

Before diving into the details of how these various rights relate to one another, it is worth first spending some time understanding copyrights for digital files. For the sake of simplicity, the next two sections assume that the file was created in some sort of virtual CAD environment. The third section will discuss files created by scanning an existing object.

The Easy Case: Files for Copyrightable Objects

In most situations, files for copyrightable objects—those are the non-functional objects discussed earlier—can be thought of the same way as files that contain digital photographs. The file and the object are both parts of the same bundle, and the person who owns a copyright in the object will probably also own the copyright in the file—and

vice versa. Since the object is already protected by copyright, there is no risk that the copyright in the file will be used to incorrectly bring the object itself under the umbrella of copyright protection. A single license can be—although does not have to be—used to control both the file and the object itself.

The Harder Case: Files for Non-Copyrightable Objects (or Objects with Non-Copyrightable Elements)

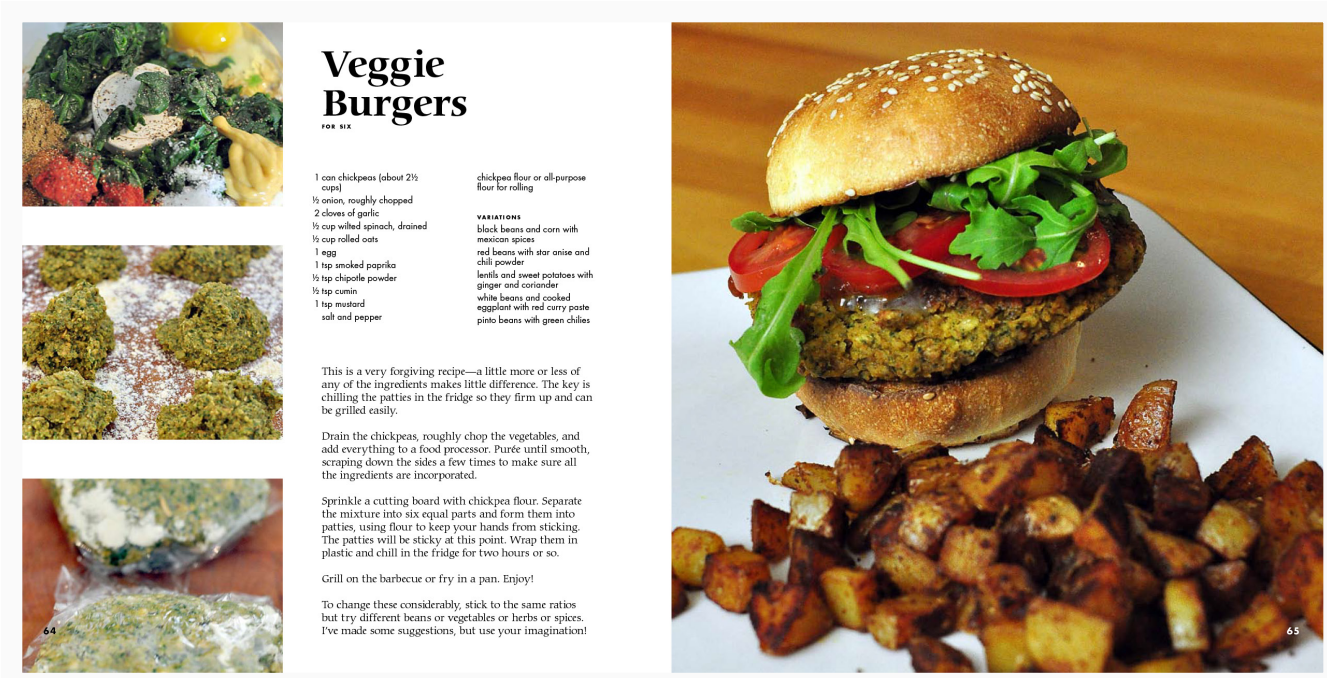
In situations where the object is not protected by copyright, there is a threat that a copyright on the file representing the object could be used to claw the object into the world of copyright protection. For example, a file representing a screw (an object not protectable by copyright) should not give the file's creator copyright-like protection over the screw. In light of that threat, it is important to sharply define the boundaries of copyright protections on digital files.

In order to draw these lines, it may be helpful to think of the files as having two elements. First, there are the parts of the file that are absolutely required to accurately reproduce the object. These are things like measurements and physical relationships. Second, there are parts of the file that may make it easier or more attractive to view, but are not critical to reproducing the object. These are things like shadows, background images, and non-functional coloring.

Why are these different? The first category is just a set of instructions for making the object. Controlling it would mean controlling someone else's ability to accurately reproduce the object. The second category is an artistic embellishment on top of those instructions. Controlling it would simply mean forcing someone else to come up with their own artistic representation of the object—a much less invasive restriction. If copyright protected the first category, it could be used to control the reproduction of non-copyrightable objects. Since copyright only protects the second category, everyone is still free to reproduce the non-copyrightable object (although they might have to come up with their own way to picture it). Admittedly, in practice these categories may not be as distinct (or as sensible) as one might like. However, for better or worse, they do represent the ways in which copyright law might analyze protection of the file.[8]

One way to think about this distinction is to consider a recipe in a cookbook. Like the first category, a recipe itself is just a set of instructions for making food and is not protectable by copyright. That's why, if I wanted to, I could take a list of ingredients and instructions for making veggie burgers out of a cookbook and reprint it here without infringing on the copyright in the cookbook held by the cookbook's author.

8 For those of you looking for a more in-depth legal analysis of this distinction, consider *What's the Deal with Copyright and 3D Printing?*, at 14-19. Essentially, the distinction is an attempt to capture the merger doctrine and bits of what is known as the "abstraction-filtration-comparison test" developed in *Computer Associates Int'l, Inc. v. Altai*, 982 F.2d 693 (2d Cir. 1992).



Veggie Burgers

FOR SIX

1 can chickpeas (about 2½ cups)
½ onion, roughly chopped
2 cloves of garlic
½ cup wilted spinach, drained
½ cup rolled oats
1 egg
1 tsp smoked paprika
½ tsp chipotle powder
½ tsp cumin
1 tsp mustard
salt and pepper
chickpea flour or all-purpose flour for rolling

VARIATIONS
black beans and corn with mexican spices
red beans with star anise and chili powder
lentils and sweet potatoes with ginger and coriander
white beans and cooked eggplant with red curry paste
pinto beans with green chilies

This is a very forgiving recipe—a little more or less of any of the ingredients makes little difference. The key is chilling the patties in the fridge so they firm up and can be grilled easily.

Drain the chickpeas, roughly chop the vegetables, and add everything to a food processor. Purée until smooth, scraping down the sides a few times to make sure all the ingredients are incorporated.

Sprinkle a cutting board with chickpea flour. Separate the mixture into six equal parts and form them into patties, using flour to keep your hands from sticking. The patties will be sticky at this point. Wrap them in plastic and chill in the fridge for two hours or so.

Grill on the barbecue or fry in a pan. Enjoy!

To change these considerably, stick to the same ratios but try different beans or vegetables or herbs or spices. I've made some suggestions, but use your imagination!

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Credit: Leanne Brown

However, if I wanted to reproduce the recipe as it is artistically arranged on the page of the cookbook—the pictures, the text layout, and perhaps the more ornate language of the instructions—I would be infringing on the author's copyright.

For example, I could list the ingredients and steps for the veggie burgers in Leanne Brown's cookbook *From Scratch* without her permission. But if I want to show the page from the book that contains those ingredients and steps as it exists in Leanne Brown's cookbook *From Scratch*, I would need her permission. Fortunately, *From Scratch* is licensed under a Creative Commons Attribution NonCommerical Share Alike license, which means that I do have Ms. Brown's permission to reproduce the recipe as it exists in the book as long as I attribute it to Ms. Brown, do not sell the reproduction commercially, and share my copy under the same share alike condition.[9]

Somewhere between a list of ingredients with bare bones instructions and a beautifully illustrated and laid-out page of a cookbook, copyright attaches. Similarly, copyright attaches somewhere between the core code that describes a functional object and a lovingly rendered digital representation of that same object. Annoyingly, that "somewhere" is not easy to describe with a generally applicable rule. On some level it could be thought of as the difference between gcode and a more elaborate CAD file, but

9 Importantly, the license does not mean that the cookbook is not protected by copyright. In fact, it means just the opposite. From Scratch is protected by copyright, but uses that fall within the license are not infringement because they are done with permission.

the distinction is not as simple as that. To the extent that it exists, a rule of thumb might be something like this: the further the file is from what is absolutely necessary to reproduce the object, the more likely it is to be protected by copyright. Anything more than that will probably require a few more infringement cases in order to clarify the rule.

What About Scans?

The previous two sections assumed that the digital files in question were created in a CAD environment and therefore predated the physical objects they represented. But that process can also be reversed by 3D scanning existing physical objects and turning them into digital files. From a copyright standpoint, these two different creation mechanisms lead to very different protections.

While not necessarily intuitive, the copyright rules for scans are fairly straightforward: there is no new copyright for the scan file. Unlike a person who takes a photograph, a person who scans an existing object does not get a copyright just for the scan.[10] Briefly, this is because courts do not consider the act of scanning to be sufficiently original to receive copyright protection. The goal of a scan is to crate as faithful a copy as possible, thus leaving no room for artistic interpretation by the scanner. While accurate scanning may require a great deal of skill and effort, it does not have sufficient originality to be eligible for copyright protection.[11]

The result is that a scan of an existing object gives the creator of the scan no ability to control the object itself, nor does it give her the ability to control the scan file with copyright. If the scan was of an object protected by copyright, the creator of the object may be able to control the reproduction of the scan file, but the scanner herself is without legal rights.[12] The end result is that no copyright license can be attached to a scan file by the person who created the scan.

10 See *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc*., 528 F.3d 1258 (10th Cir. 2008). For a further discussion of this, see *What's the Deal with Copyright and 3D Printing?* at 15-16.

11 Of course, if you scanned an object and then creatively altered the scan—not in a way to make the scan more accurate, but rather in a way to embellish, distort, or change the object's appearance—in a CAD program, that new file could very well be eligible for copyright protection.

12 A scan of an artistic object is a reproduction of that artistic object. The scan creator would need permission from the copyright holder for the object to make the scan, and anyone wanting to make a copy of the scan file would also need permission from the object's rightsholder.

Step 2: Understand What the Copyright Controls

Once you have identified what parts of an object and/or file are protected by copyright, it is worth taking a moment to consider what that protection actually means.

Objects

For objects protected by copyright, copyright protection primarily means protection from unauthorized reproductions or copies without permission of the rightsholder. If you are the creator of an object protected by copyright[13] (let's say you designed a sculptural interpretation of the dream you had last night), in most cases someone else will need your permission to copy your sculpture.[14] If they copy the sculpture without your permission, they are infringing on your copyright.

Licenses

Permission to copy is often given in the form of a license. A license can be a single agreement between two people or entities: "I, Michael, grant you [reader, insert your name here] permission to make copies of the dream sculpture that I made." This type of license is common, especially between commercially sophisticated players. For example, I could license my dream sculpture to a single company, giving them permission to manufacture, distribute, and sell it on my behalf in return for a percentage of the profits (which, it almost goes without saying, would be massive for such an in-demand work of art).

A license can also be an agreement held out to anyone interested in taking the creator up on the offer. That is how Creative Commons licenses work. This paper is licensed under a Creative Commons Attribution, Share-Alike license. Instead of trying to identify individuals

13 When you create a copyrightable object, you automatically get a copyright that protects that object. However, sometimes you decide to transfer that copyright to someone else (like a publisher, record label, or movie studio). Because of this, in order to avoid confusion lawyers and copyright experts often refer to the person who actually controls the copyright as the "rightsholder." The rightsholder does not have to be the creator, although the rightsholder can be the creator. In the interest of avoiding over-complicating the already complicated topic of copyright for non-lawyers, this paper generally sticks with describing the rightsholder as the "creator." But to avoid any questions, it is legitimate to substitute "rightsholder" for "creator" for most of this paper.

14 The most obvious time that this general rule doesn't apply is when the "someone" is relying on fair use when she makes that copy. If the copy is protected by fair use the copier does not need permission of the rightsholder and the resulting copy does not infringe on any copyrights.

who might want to make copies of it and then negotiating individual licenses, the Creative Commons license essentially says to the world "Hey, anyone who wants to make a copy of this paper! The creator of the paper (who holds the copyright that controls such things) gives you permission to make a copy of it as long as you comply with two conditions: attribute the paper to the author and license any works built on this paper under similar conditions." Anyone can take the licensor up on the offer and make compliant copies without infringing on the creator's copyright.

Derivative Works

In addition to controlling the right of simply reproducing the object, copyright also gives the creator the right to create what are known as "derivative works." As the name implies, "derivative works" are works that are derived from the original work.

A good example of this is a comic book that is turned into a movie. Scanning a comic book without permission creates a literal copy of the comic book. Doing so without permission (or without the protection of fair use) infringes on the creator's copyright. But what about turning a comic book into a movie? A movie is not a "copy" of the comic book in the literal way that a scan is a copy of a comic book. Instead, the movie is considered a derivative work of the comic book. This type of copy—sometimes described as "non-literal" copying—still requires the creator's permission to make.

Limits

The right to control copies—both literal and non-literal—is an expansive one, but it is important to remember that it is limited. Copyright does not give the creator the ability to prevent other people from talking about her creation (even if they are saying nasty things about it), nor thinking about it, nor even making full reproductions that are protected by fair use. Additionally, copyright does not prevent an owner of a copyright-protected object (say a book or a sculpture) from cutting it up into little pieces or selling it to someone else.[15] When thinking about copyright, it can be helpful to step back and remember that copyright is not as all-consuming as it can sometimes appear.

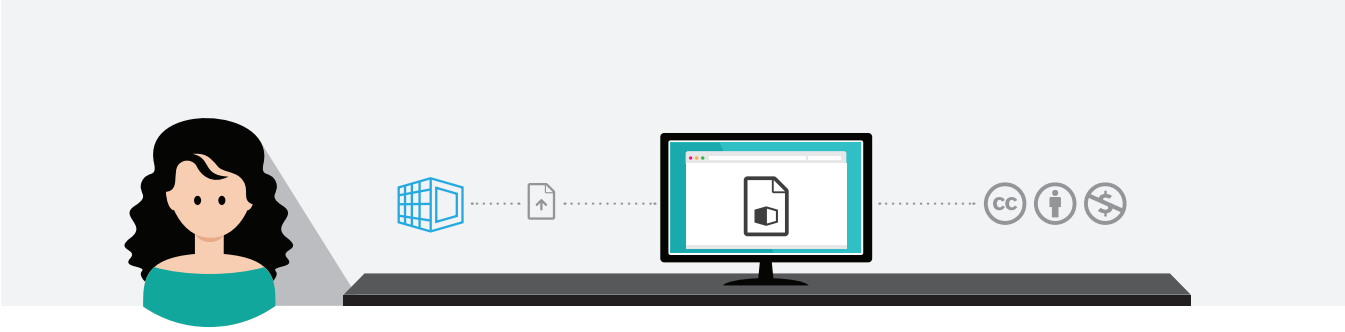
Files

As discussed in "The Harder Case: Files for Non-Copyrightable Objects" on page 10, it is possible to have a copyright for a file even if the creator does not have a copyright for the

15 The traditional ability of someone who owns a copy of a work to do whatever she wants with it gets a bit more complicated when those works become digital. For an interesting exploration of what this all means, check out Sherwin Siy's *Copies, Rights, and Copyrights: Really Owning Your Digital Stuff* (available for free at http://publicknowledge.org/copiesrightscopyrights).

object itself. It is even possible that only parts of the file are protected by copyright. In those cases, it is critical to be clear-eyed about what that copyright for the file actually controls. In order to do that, it is necessary to remember the distinction between the file and the object itself. No amount of control over the copyright of a file for an uncopyrightable object will give you the right to prevent people from copying the actual object. Once that object makes it into the world in physical form, any copies made from the physical object itself are beyond the scope of a copyright in the file. This is even true if someone uses the physical object to create a new digital file. If the file came from scanning or recreating the object itself (as opposed to simply duplicating the original file), it exists independently of the original file and is beyond the scope of that file's copyright.[16] This type of workaround makes a copyright in a digital file somewhat leaky.

That being said, it is not hard to imagine a situation where an infringer really did make an unauthorized copy of a copyright-protected file instead of reverse engineering it somehow. In those cases the copyright for the file becomes important. Let's look at several hypothetical scenarios to illustrate the utility and the limits of digital file copyrights.

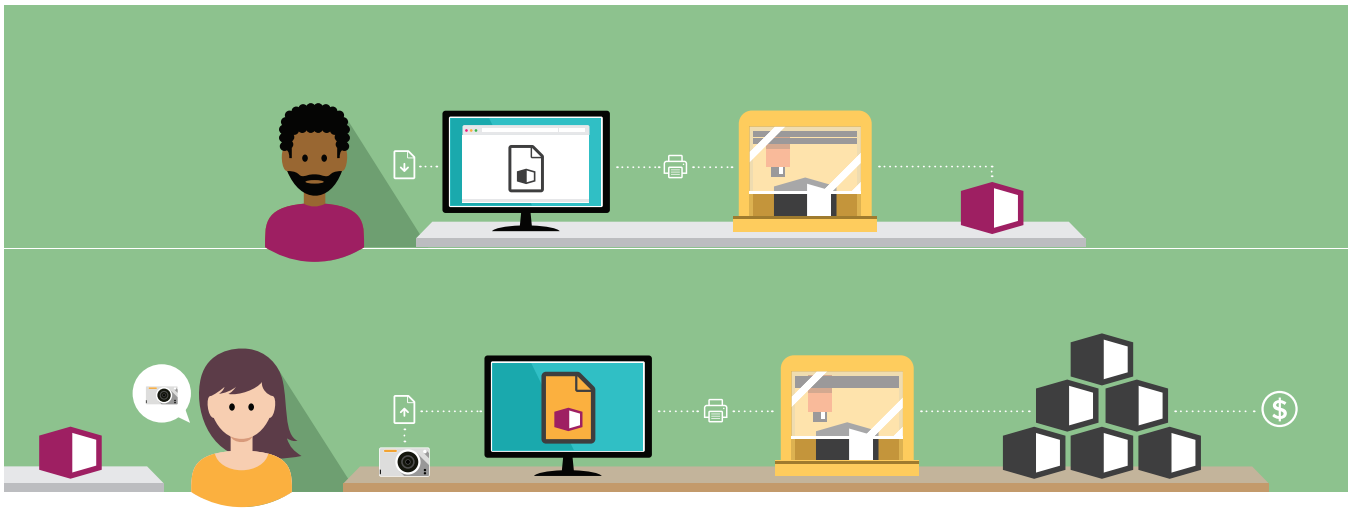


Imagine you design a widget and upload the digital file under a Creative Commons attribution-noncommercial license.

Imagine that you design a wholly functional object—say, a widget—in CAD. The widget itself is not protected by copyright. But at least parts of the widget's artistically-rendered digital file, which you upload under a Creative Commons attribution-noncommercial license,[17] are protected by copyright.

16 As you might imagine, this sort of scenario means that any actual infringement lawsuit is likely to be very fact-intensive. Did the alleged infringer have access to the original file? Can she show convincingly that her new file was created independently of the original? The answers to those questions will turn on the details of every individual case.

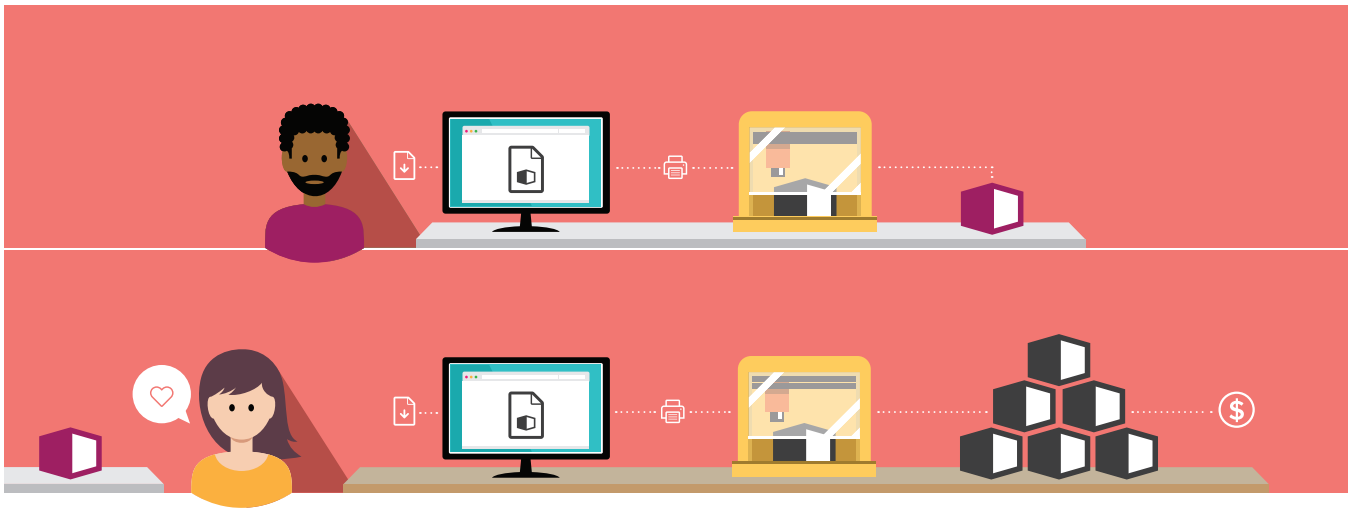
17 This type of license allows anyone to make a copy of your file as long as the copy is attributed to you and the copy is made for noncommercial purposes.



Alex downloads your file and prints the object for noncommercial purposes. Barbara scans the printed object to create her own file. Barbara then prints her own objects from her own file and starts selling them. Barbara has not infringed on your original file, even though the license restricts use to noncommercial purposes.

In one scenario, Alex sees your amazing widget online, downloads the file, and 3D prints one for his own noncommercial purposes. Barbara, who is also impressed by your well-designed widget, scans Alex's printed widget (thus creating her own file to represent the widget), uses her file to 3D print hundreds of widgets, and starts selling them online. Even though Barbara violated the noncommercial term of the original license, she is not infringing on your copyright. Why? Because Barbara never copied your original file in order to make her widgets.

Now imagine that this scene plays out a bit differently. Alex downloads a copy of your file and 3D prints a widget for noncommercial purposes. Barbara sees Alex's printed widget and asks him where he got the file. Barbara then downloads your original file, uses it to 3D



Alex downloads your file and prints the object for noncommercial purposes. Barbara likes the object and downloads her own copy of the file from the original source. Barbara then prints her own objects from the file she downloaded and starts selling them. Barbara has infringed on your original file by copying it for commercial purposes.

print her own widgets, and starts selling them online. In this case, Barbara is infringing on your copyright. Why? Because Barbara made a copy of your file for commercial purposes, thus violating your license.

Seeing these two scenarios, you might be thinking to yourself, "I guess this means that a copyright on a file is worthless, since infringers will just make their own file and ignore my license." While reasonable, this type of reaction overlooks the fact that creating new digital files from physical objects is hard (at least as of this writing). Perhaps more importantly, it overlooks the fundamental laziness of humanity. Do not discount the possibility of an infringer not bothering—or not knowing to bother—to create her own version of a file if your version already exists.

All of this means that it really is worth thinking about how you want to license your digital file. A license will not protect you from all infringement, but it could end up providing some relevant protections. Perhaps equally importantly, your license will serve as a signal to people who have no interest in infringing on your work and who want to comply with your wishes. Many people appreciate when designs are shared (especially when they are shared permissively) and are more than willing to adhere to the original creator's intention (even if that intention is not backed up by the threat of a lawsuit).

Step 3: Choose Your License

Now that you understand what you are actually protecting and understand what type of control protection grants you, it is finally time to consider the question that may have convinced you to read this in the first place: which license should you pick?

When thinking about your license, it is important to remember a few things:

> **A license only controls what you control. If you only have a copyright on an embellishment of a functional object, do not think that your license will prevent people from copying the underlying object.**

> **A copyright on a file is not blanket protection against people making unauthorized copies of your object. Controlling a file is different from controlling an object.**

Recognizing these limitations may impact your licensing decisions. For example, if your file license cannot stop a determined infringer (because they could reverse-engineer their own file), perhaps it is better to use a permissive license that forces them to give you credit. After all, someone who is faced with a strict copyright limitation may decide it is worth the trouble to reverse-engineer your file, but that same person might not bother if your

only request is that he gives you attribution. Along those same lines, it might be worth considering adding a statement of intention instead of a license. Explaining to people how you want them to use your files and designs—even if that explanation is not legally binding—will give good actors a way to follow your wishes.

The Licenses

As explained in the introduction, this paper is not really about choosing the right license for your object or file. This section does not contain a detailed analysis of possible licenses with explanations of their pros and cons. It also does not engage with closed licenses. While closed licenses are completely legitimate, and just about everything in this paper applies equally to closed and open licenses, this paper is written with an assumption that most of its readers are inclined towards some sort of permissive license. In that spirit, when considering how to license a new file or object, lean on any prior open licensing experience you have. If there is an existing open license that you already know, love, and understand, it is probably best to start there.

However, if you are not already enamored of a specific license, or if licenses you've used in the past don't feel like a good fit, it might be worth starting with the licenses offered by Creative Commons. Unlike many other open licenses that trace their history specifically to computer code, Creative Commons licenses were originally drafted with more than software in mind. In some cases, that may make them more applicable to 3D printed objects and their files than a purely software-focused license. Additionally, Creative Commons maintains an excellent set of resources designed to introduce and explain their licenses to non-copyright experts. They even have a helpful guided tool that helps you choose your license.[18] Another excellent starting point is the Free Software Foundation, which also offers helpful licensing explanations.[19]

When considering these options, however, be aware that many existing open licenses were first drafted with software in mind. This does not mean that they are limited to software, but rather that they may contain some provisions that are hard to apply outside of the software context.

18 http://creativecommons.org/choose

19 http://www.fsf.org/licensing

Conclusion

Choosing a license for 3D printed objects or for the digital files of 3D printed objects can be complicated. Unlike software code or photographs, you must first answer unintuitive questions about copyrightability before you can even think about which license makes the most sense. Hopefully this guide helps you begin to identify and answer these questions and gives you a realistic sense of what is—and is not—protected by copyright.

The answers to these questions will likely evolve over time. We may get clarity about how best to deal with objects that are both decorative and functional, how much (if any) copyright protection digital files of functional objects receive, or which provisions of which open licenses work best for 3D objects in the coming years. Until then, it is best to remember the importance of asking, "What can I protect?" before jumping right to "How can I protect it?".

Addendum: Images

This paper is focused on licensing 3D printed objects and the digital files that represent them, as these are the most directly relevant real-world applications at the intersection of copyright and 3D printed objects. However, there is one other copyright issue that may be important to you, especially if you plan on sharing your object online: images.

The good news is that copyright for images is easy: images are protectable by copyright. If you made them, you own the copyright.[20] Of course, that copyright comes with some responsibility—which means you need to give it some thought. Fortunately, there are just a few things to keep in mind:

A license for an image can be different from the license for the object.

A license for an image does not extend to the object itself.

The result is that you can choose a completely different license for your image than for your object. For example, imagine you want to license your object with a fairly restrictive (but still open) license like the Creative Commons Attribution-Noncommercial-No Derivatives license. (This license allows people make copies *of your object* as long as they

20 This does not mean that you own the subject of the photograph. If I take a picture of the Brooklyn Bridge I own the copyright in the photo but not in the bridge.

give you credit, do not make copies for commercial purposes, and do not change them in any way.) At the same time, however, you want to spread word about your object far across the internet. In order to do that, you choose a much more permissive license, like the Creative Commons Attribution license, for the image of your object. (This license lets people make copies *of your image* for any reason they want as long as they attribute it to you).

In this example, the different licenses for your object and for your image of the object play complementary roles. The fact that the image of the object is licensed highly permissively does not undermine your less permissive license of the object itself. Furthermore, the fact that you took the time to explicitly license the image gives people confidence in how they use the image and therefore encourages them to do so. This example reinforces the importance of thoughtfully choosing a license for each aspect of your object and its representations. It does not make a lot of sense to spend time carefully thinking about how to license your object and your file only to throw up some images without any clear license indication.