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**COMMENT: ALWAYS EAT THE FINE PRINT: WHY 3D
PRINTED FOOD WILL FINALLY WARRANT
INTELLECTUAL PROPERTY PROTECTION FOR RECIPES**

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I. INTRODUCTION

“Tea. Earl Grey. Hot.” – Captain Jean-Luc Picard¹

For Trekkies,² Earl Grey tea is not just a beverage; it is the signature drink of perhaps the most beloved character in all of Star Trek.³ Fans also instantly associate the tea with one of Star Trek’s most well-known inventions: the replicator.⁴ A replicator could create food and drink from any rematerialized matter, which “[m]ost people found . . . to taste exactly the same as ‘real’ food.”⁵ While creating food out of thin air is still relegated to science fiction, its concept is no longer a mere fantasy. Just as many concepts invented for Star Trek have now become a normal part of everyday life,⁶ it is only a matter of time before the replicator will become a household item as commonplace as the washing machine.⁷ However, in this universe we will not know it as a replicator; it will be known as the 3D printer.⁸

While not a particularly new technology, 3D printing is slowly entering the mainstream of society.⁹ If its full potential is realized, 3D printing has the potential to revolutionize nearly every industry, in both positive and negative ways.¹⁰ Adopting 3D printing technologies will reduce nearly all costs associated with manufacturing,¹¹ and storage and warehousing costs will all but cease to exist.¹² The accessibility of 3D

¹ *Star Trek: The Next Generation: Contagion* (Paramount Television Mar. 18, 1989).

² See Tom E. Pinkerton, *Trekkie*, URB. DICTIONARY (Nov. 18, 2002), <https://www.urbandictionary.com/define.php?term=Trekkie> (defining a “Trekkie” as “a devoted fan” of the Star Trek franchise and its derivative media). *But see*, TREKKIES (NEO Motion Pictures 1997) (analyzing an intracultural segregation amongst fans who take offense to “Trekkie” and prefer the term “Trekker”).

³ See *Picard Named Best Star Trek Captain*, STAR TREK (Feb. 27, 2012), <http://www.startrek.com/article/picard-named-best-star-trek-captain>.

⁴ See *Replicator*, MEMORY ALPHA, <http://memory-alpha.wikia.com/wiki/Replicator> (last visited Sept. 25, 2018).

⁵ *Id.*

⁶ See Matthew Loffhagen, *15 Star Trek Gadgets That Exist in Real Life*, SCREEN RANT (July 4, 2016), <https://screenrant.com/star-trek-real-life-gadgets/> (highlighting that cell phones, Siri, Bluetooth, and the iPad all have their roots in Star Trek).

⁷ *See id.*

⁸ See David Gewirtz, *I’ve Seen the Future of 3D Printing (Think Star Trek Replicator)*, ZDNET (July 7, 2017, 11:34 AM), <http://www.zdnet.com/article/ive-seen-the-future-of-3d-printing-think-star-trek-replicator/>.

⁹ See Avi Reichental, *The Future Of 3-D Printing*, FORBES (Jan. 23, 2018, 7:00 AM), <https://www.forbes.com/sites/forbestechcouncil/2018/01/23/the-future-of-3-d-printing/#2bf0797865f6>.

¹⁰ See JOHN HORNICK, 3D PRINTING WILL ROCK THE WORLD 4–5, 169 (2015).

¹¹ *Id.* at 4–5.

¹² *See id.* at 26 (discussing the positive effects 3D printing will have on the

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printing allows for customization of products at any scale,¹³ and its minimal carbon footprint will even aid with climate change.¹⁴ Domestic use is around the corner, and a 3D printer will be in every home, “enabl[ing] everyone to become [a] creator of things.”¹⁵

However, this great potential also comes with incredible risk, and intellectual property could experience the most drastic losses. Research and consulting firm, Gartner, predicts that while 3D printing will reach \$13.4 billion in global revenue in 2018, it will simultaneously create \$100 billion of losses in intellectual property.¹⁶ Furthermore, this figure inherently only includes losses actually protected by intellectual property.¹⁷ For 3D printed items unprotected by current intellectual property law, any losses will only add to Gartner’s number.¹⁸ 3D printing creates virtually unlimited opportunity, but once there is a 3D printer in every home, connected to the internet, and waiting to download and print any item, 3D printing piracy will be inevitable.¹⁹ This will hurt one industry perhaps more than any other: 3D-printed food.²⁰

As Hod Lipson²¹ envisions via the website for his Creative Machines Lab group at Columbia University:

You want to bake a special cake for your mom, so you boot up the 3-D printer in your kitchen. Loaded with a dozen cartridges filled with pastes of chocolate, marzipan, and other ingredients, the machine downloads

carbon footprint).

¹³ See *id.* at 41 (“Each design for each product was destined to remain essentially unchanged in thousands or millions of exact copies.”)

¹⁴ See *id.* at 25–26.

¹⁵ Paula-Mai Sepp et. al., *Intellectual Property Protection of 3D Printing Using Secured Streaming*, in *THE FUTURE OF LAW AND TECHNOLOGIES* 81, 82 (Tanel Kerikmäe & Addi Rull eds., 2016).

¹⁶ See Sarah Craig, Note, *Protection for Printing: An Analysis of Copyright Protection for 3D Printing*, 2017 U. ILL. L. REV. 307, 309 (2017).

¹⁷ *Id.* at 310.

¹⁸ John Hornick, *IP Licensing in a 3D Printed World*, FINNEGAN (Feb. 27, 2015), <https://www.finnegan.com/en/insights/ip-licensing-in-a-3d-printed-world.html>.

¹⁹ See *id.*

²⁰ This article will broadly refer to this concept as either printed food, food printing, or food printers.

²¹ Lipson is generally seen as the foremost expert on printed food and is leading the way in advancing the technology. See Tyler Koslow, *Columbia Professor Hod Lipson Leads the Food 3D Printing Revolution with New Printer Prototype*, 3DPRINT (Aug. 1, 2016), <https://3dprint.com/144449/lipson-food-3d-printing/>. See generally *Hod Lipson*, COLUM., <http://me.columbia.edu/hod-lipson> (last visited Sept. 24, 2018) (providing a brief biography on Lipson).

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instructions from the Internet. You key in a specific texture, size, and flavor, and then you insert a 3-D message in the center—Happy Birthday, Mom!—to be revealed only after she takes a bite. The machine does the rest, assembling and baking a pastry so scrumptious it rivals a virtuoso chef’s in richness and complexity. Your mother loves it so much that she insists you send a slice of the same cake—in the form of a digital recipe—to your Uncle Norman’s printer as well. Your 3-D cake recipe gets so many raves, in fact, that you decide to sell the recipe online for 99 cents a download.²²

This vision foresees vast potential for the printed food industry, with both small and large businesses able to upend traditional means of production and monetize their food via download, not unlike iTunes or any other pay-per-view streaming service.²³ But with the sweet comes the sour. As we learned from the various legal controversies surrounding Napster nearly twenty years ago, anything that can be downloaded can be pirated.²⁴ Internet piracy sites like ThePirateBay.org and 1337x.to are already sharing pirated 3D printing files.²⁵ Just as pirates have easily distributed music and movies across the internet, a single aspiring “food pirate” could easily copy Lipson’s hypothetical cake recipe and share it across the internet.²⁶ Just as music and film piracy destroyed any pirate’s desire to pay for media, food piracy would destroy any desire to pay for food, and any business built around the ninety-nine cent cake recipe would fail before it could even begin.²⁷ Yet while the various record labels used copyright law to pursue claims against Napster,²⁸ no member of the printed food industry

²² *Digital Food*, CREATIVE MACHINES LAB, <https://www.creativemachineslab.com/digital-food.html> (last visited Sept. 24, 2018).

²³ See generally *Choosing a Business Model*, APP STORE, <https://developer.apple.com/app-store/business-models/> (last visited Sept. 24, 2018).

²⁴ See Craig, *supra* note 16, at 335 (“The decentralized piracy faced by 3D printing is not unique. The music industry faced a similar situation upon the advent of Napster and the rise of digital distribution.”)

²⁵ The Pirate Bay even has a specific section of its site for 3D printing files, or “physibles.” See Sepp et al., *supra* note 15, at 83 n.8.

²⁶ See *id.* at 82 (“New digital technologies have made copying a lot easier than it has been before, and we have already witnessed the collateral damage in relation to copying of music and movies.”)

²⁷ See, e.g., Brian Stelter & Brad Stone, *Digital Pirates Winning Battle with Studios*, N.Y. TIMES (Feb. 4, 2009), <https://www.nytimes.com/2009/02/05/business/media/05piracy.html>.

²⁸ See *A & M Records, Inc. v. Napster, Inc.*, 114 F. Supp. 2d 896, 900 (N.D. Cal. 2000). Due to the litigation, Napster was forced to shut down in July 2001 and ultimately filed for bankruptcy in June 2002. *UMG Recording, Inc. v. Bertelsmann*

would be able to pursue civil or criminal claims against food pirates or file-sharing websites because recipes are not protected under traditional intellectual property laws.²⁹

Because recipes are not protected by traditional intellectual property such as patents, trademarks, or copyrights, corporations are forced to rely on trade secret laws.³⁰ As awareness of food printing increases, and the benefits of downloading printed food become more appealing to the public, corporations will want to exploit that interest and offer their foods for download.³¹ But without protection from food piracy, any recipes offered for download could be easily hacked, and long-held secret recipes would be revealed to the world.³² Essentially, trade secret protection for food will become toothless, and the technology will flounder because no food producer will enter the printed food industry and risk their most valuable information.³³

This note will analyze why printed food will require some form of intellectual property protection, and why current laws are insufficient to address the eventual needs of the industry. Part II will explain the technology and functionality of 3D printers and printed food. Part III will examine current trade secret law, its current application within the various sectors of the food industry, and why it will be futile in any fight against internet food piracy. Part IV will analyze printed food under each of the major intellectual property frameworks—patent law, trademark law, and copyright law—and why none of them can be effectively used as a tool against internet food piracy any more than trade secret law can. Finally, part V will analyze the key requirements any protection would need, as well as the difficult issues a lawmaking body would need to consider when deciding just how much protection to afford printed food.

AG (*In re Napster Copyright Litig.*), 479 F.3d 1078, 1082 (9th Cir. 2007).

²⁹ See, e.g., Richard E. Kaye, Annotation, *Application of Copyright Law to Cookbooks, Recipes, Cooking Shows, and the Like*, 61 A.L.R. Fed. 2d 81 (2012).

³⁰ See generally Joseph Brees, Note, *Trade Secrets Go Federal – Parade to Follow*, 12 J. BUS & TECH. L. 277, 280 (2017) (providing background information on corporations' heavy reliance on trade secrets).

³¹ See, e.g., Lydia Mahon, *3D Printed Food – A Growing Market*, 3D PRINTING INDUSTRY, (June 30, 2017, 3:00 PM), <https://3dprintingindustry.com/news/3d-printed-food-growing-market-83916/> (providing a list of corporations exploring the use of 3D printing in its food production and distribution).

³² See generally *Digital Food*, *supra* note 22 (demonstrating how recipes would be downloaded from the internet and easily shared).

³³ Kyle Wiggers, *From Pixels to Plate, Food Has Become 3D Printing's Delicious New Frontier*, DIGITAL TRENDS, (Apr. 19, 2017, 2:44 AM), <https://www.digitaltrends.com/cool-tech/3d-food-printers-how-they-could-change-what-you-eat> (asserting that commercial producers of food use 3D printing to reduce time and resource costs).

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II. THE TECHNOLOGY BEHIND 3D PRINTED FOOD

Much of manufacturing today (and since the Industrial Revolution) has been what is now classified as “subtractive manufacturing”—starting with a large product and sculpting it down (or “subtracting”) to fit the desired shape.³⁴ This inherently creates loss and waste, as the subtracted materials are usually not reusable and must be disposed of.³⁵ 3D printing, on the other hand, is referred to as “additive manufacturing”—starting with a literal blank slate and creating the desired object from the ground up.³⁶ Much like a traditional printer prints a single layer of ink onto paper, a 3D printer prints a single layer of a specific material (usually plastic, but potentially anything) at a time onto the slate, building up from the previous layer.³⁷ This continues layer by layer, building up until the object is fully formed.³⁸

A 3D printer knows what to print by receiving a Computer Aided Design, or CAD file.³⁹ An object is either designed or scanned on a computer, and the final “blueprint” CAD file is converted into a universal file format, typically using an .stl file extension.⁴⁰ Once finalized, the .stl file is ready to be sent to the 3D printer, which uses the file to print out whatever design is contained within the file.⁴¹ Even though the .stl format creates a finalized file for printing, the design can still be edited or adjusted, and there are many free programs available online that will edit any .stl file.⁴² While this accessibility aligns with the social norms encouraged by the online 3D printing community,⁴³ it also acts as a virtual invitation to online pirates looking to freely distribute 3D printing designs, thereby infringing the rights of

³⁴ See HORNICK, *supra* note 10, at 3.

³⁵ See *id.* at 4.

³⁶ *Id.* at 3–4.

³⁷ See *id.*

³⁸ *Id.* at 4.

³⁹ See Michael Weinberg, *It Will Be Awesome If They Don't Screw It Up*, PUB. KNOWLEDGE 2 (Nov. 2010), <https://www.publicknowledge.org/files/docs/3DPrintingPaperPublicKnowledge.pdf>.

⁴⁰ See Michael Weinberg, *What's the Deal with Copyright and 3D Printing?*, PUB. KNOWLEDGE 14–15 (Jan. 2013), https://www.publicknowledge.org/files/What's%20the%20Deal%20with%20Copyright_%20Final%20version2.pdf.

⁴¹ See *id.* at 14.

⁴² See, e.g., Frederik Bedrich, *7 Free STL Editors + How to Edit and Repair STL Files*, ALL3DP (Oct. 11, 2017), <https://all3dp.com/1/7-free-stl-editors-edit-repair-stl-files/>.

⁴³ Online 3D printing communities fervently support a free and open of environment of sharing and collaboration, and users are encouraged to use each other's designs. See Weinberg, *supra* note 40, at 5.

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intellectual property owners.⁴⁴

While printed food is still relatively unheard of by many outside of the industry, the technology has been around since 2005, when Hod Lipson and his group at Cornell University developed what is generally believed to be the first food printer.⁴⁵ The number of food options available in 3D printing has since exploded. *Mélisse*,⁴⁶ a two-star Michelin restaurant in Santa Monica, California, uses 3D printed croutons for their French onion soup.⁴⁷ Dylan's Candy Bar is a store that helps customers design and print their own gummy candies based on photographs, allowing them to even eat a gummy of their own face based on a "selfie" picture.⁴⁸ Food printers are advanced enough to print pasta, fruit, burgers, cookies, lollipops, chewing gum, or absinthe.⁴⁹ Developers have even invented brand new foods with "edible growth"—food injected with live organisms that "cook" the food in its package.⁵⁰

Today, the technology can even combine multiple ingredients and print full meals and prepared dishes, leading to a future where any meal can be ordered online and printed at home.⁵¹ Beehex's Chef 3D already prints fully customizable pizzas, allowing customers to choose their own crust, sauce, and cheese.⁵² The technology will only get better; as

⁴⁴ See HORNICK, *supra* note 10, at 175 ("In fact, 3D printing could lead to counterfeiting on steroids.")

⁴⁵ While food printing was invented around the same time that 3D printing in general became affordable at the consumer level, it did not have much success until the developments by Hodson's group at Cornell. See, e.g., *3D Food Printing*, EDUTECH WIKI, https://edutechwiki.unige.ch/en/3D_food_printing (last modified Apr. 20, 2017); Tyler Pincombe, *Who Invented 3D Printable Food?*, PREZI (June 3, 2016), https://prezi.com/ikwbvbyu_f_b/who-invented-3d-printable-food/?webgl=0.

⁴⁶ *Mélisse*, <https://www.melisse.com/> (last visited Mar. 8, 2018).

⁴⁷ See Tess, *Santa Monica Restaurant Mélisse Reinvents Classic French Onion Soup with 3D Printed Twist*, 3DERS.ORG (Apr. 3, 2017), <https://www.3ders.org/articles/20170403-santa-monica-restaurant-melisse-reinvents-classic-french-onion-soup-with-3d-printed-twist.html>.

⁴⁸ See *3D Gummy Candy Printing*, DYLAN'S CANDY BAR, <https://www.dylancandybar.com/personalized-candy/3d-candy-printing.html> (last visited Feb. 2, 2018). See generally Megan Giller, *Eat My Face: I Made a 3D-Printed Candy Selfie at Dylan's Candy Bar*, THE SPOON (Oct. 10, 2016), <https://thespoon.tech/eat-my-face-i-made-a-3d-printed-candy-selfie-at-dylans-candy-bar/> (describing a customer's personal experience with Dylan's Candy Bar).

⁴⁹ See Symposium, *3D-Printed Food*, 17 MINN. J.L. SCI. & TECH. 855, 858-59 (2016).

⁵⁰ *Id.* at 859.

⁵¹ *Id.* at 860.

⁵² Leanna Garfield, *This Robot Can 3D-Print and Bake a Pizza in Six Minutes*, BUS. INSIDER (Mar. 4, 2017 12:16 AM), <http://www.businessinsider.com/bee-hex-pizza-3d-printer-2017-3>. The Chef 3D also allows for fully customized shapes and designs, even President Donald Trump's face. *Id.*

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Lipson envisioned, food printers will inevitably be able to combine a myriad of ingredients, with the ability to create virtually any recipe.⁵³ Such potential would create a massively exploitable market by allowing food manufacturers to allow customers to “download” the food into their home food printers.⁵⁴ This would strongly appeal to businesses and food manufacturing companies because it reallocates virtually all production costs onto the customers.⁵⁵ A company could distribute the CAD files for food from its website (or a similar server or application) to the customer, and it could either be a one-time purchase of the file or a single-use “rental” of the CAD file streamed directly to the customer’s printer.⁵⁶

In addition to food printers, and 3D printing in general, there are also 3D scanners that can scan an object and convert its shape and design into a software blueprint.⁵⁷ Beyond the exterior of an object, they “can be used to scan the *interior* of objects, resulting in digital files that, when 3D printed, exactly reproduce the original object, inside and out.”⁵⁸ 3D scanners can already scan common household objects and will only improve, until eventually a person will be able to scan an object with her phone and send the scan to her printer at home so that it will be waiting for her when she returns.⁵⁹ It is only a matter of time before a person can use that same scanner to scan any piece of food, determine its recipe, and print that same food in her home at any time for no additional cost beyond the ingredients.

III. PRINTED FOOD UNDER THE TRADE SECRET RUBRIC

Food, recipes, and culinary creations currently exist within the “negative spaces” of intellectual property,⁶⁰ which are areas and industries of genuine creativity that are nonetheless afforded little to no

⁵³ See *Koslow, supra* note 21 and accompanying text.

⁵⁴ See *id.* (stating that edible 3D creations will become part of daily life and some food manufacturers have already started to capitalize on this market).

⁵⁵ Should a business shut down its traditional food manufacturing line of business and distribute its food exclusively via downloads and food printers, a food manufacturer could potentially gain income solely from its intellectual property and potentially be seen as a software company. See *id.* (acknowledging that unique software programs are a main component of the food printing business).

⁵⁶ See Weinberg, *supra* note 39, at 6 (discussing how a CAD file can be distributed).

⁵⁷ See HORNICK, *supra* note 10, at 45 (“Using 3D design software, the designer can create a design from scratch, modify an existing digital blueprint, or reverse engineer an existing product.”)

⁵⁸ *Id.*

⁵⁹ See *id.* at 46, 109.

⁶⁰ See Kal Raustiala & Christopher Sprigman, *The Piracy Paradox: Innovation and Intellectual Property in Fashion Design*, 92 VA. L. REV. 1687, 1768 (2006).

formal intellectual property protection.⁶¹ Without formal legal protection, these negative spaces are free to be copied and appropriated without penalty, regardless of the amount of effort put into developing, selling, or marketing a product or idea.⁶²

Instead, a recipe holder's only option is to guard his or her creation under trade secret law, which protects commercially valuable information that is kept confidential and provides a competitive advantage for the holder of the information.⁶³ Trade secret protection is integral to the global economy and is critical to many businesses engaging in international commerce.⁶⁴ "U.S. publicly traded companies own five trillion dollars in trade secret information," and yet trade secret misappropriation is so rampant that it is believed to cost the United States upwards of three percent of its entire Gross Domestic Product.⁶⁵ While most intellectual property owners can pursue both civil and criminal claims should their works be pirated, trade secret holders have little to no legal options against pirates once their confidential information is released onto the internet.⁶⁶ But any argument will require an understanding of what current trade secret law is, how the food industry protects its recipes today, and why the current law will not provide any relief to recipe holders in the face of decentralized internet piracy.

A. Current Trade Secret Law

At its core, "trade secret law protects competitively significant secret information."⁶⁷ A trade secret is information⁶⁸ that "derives

⁶¹ *Id.* at 1764.

⁶² Providing such protection as a reward for a party's efforts is known as the "sweat of the brow" doctrine, which was explicitly rejected in *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 354–56 (1991).

⁶³ See Brees, *supra* note 30, at 280.

⁶⁴ See *id.* ("In fact, multiple U.S. International Trade Commission surveys indicate that internationally engaged businesses have . . . trade secrets making up a majority of [their] intellectual property portfolios.").

⁶⁵ *Id.* at 280–81.

⁶⁶ *Cf.* HORNICK, *supra* note 10, at 176 ("Once-thriving companies may find it impossible to stay in business because they lose control of their products and blueprints.").

⁶⁷ 1 ROGER M. MILGRIM & ERIC E. BENSON, MILGRIM ON TRADE SECRETS § 1.01 (2017).

⁶⁸ "Information" includes "all forms and types of financial, business, scientific, technical, economic, or engineering information, including patterns, plans, compilations, program devices, formulas, designs, prototypes, methods, techniques, processes, procedures, programs or codes, whether tangible or intangible." 18 U.S.C. § 1839(3) (2012).

independent economic value . . . from not being generally known to . . . another person who can obtain economic value from the disclosure or use of the information,” in which its owner “has taken reasonable measures to keep [a] secret.”⁶⁹ Misappropriation of a trade secret generally occurs when it is acquired, used, or disclosed without authorization from its owner.⁷⁰ Trade secrets could potentially remain protected for an infinite duration as long as the secret’s owner continues to successfully protect its secrecy; however, once information is revealed to the world, it is no longer a secret and any protection ceases to exist.⁷¹ Even if a misappropriated trade secret is published online, a secret holder is only able to recover its losses from the publishing party; the information’s secrecy is destroyed, and anyone else who uses the published information is not liable for misappropriation because the information is no longer a secret.⁷² This encourages owners to do whatever is necessary to prevent any exposure of their secrets.⁷³

While misappropriation has generally been policed by trade secret owners via civil claims,⁷⁴ there has also been federal criminal liability for theft of trade secrets since Congress passed the Economic Espionage

⁶⁹ *Id.*

⁷⁰ See MILGRIM, *supra* note 67, § 1.01.

⁷¹ Michael Goldman, Comment, *Cooking and Copyright: When Chefs and Restaurateurs Should Receive Copyright Protection for Recipes and Aspects of Their Professional Repertoires*, 23 SETON HALL J. SPORTS & ENT. L. 153, 184 (2013).

⁷² See *id.*

⁷³ See *id.*

⁷⁴ In the civil arena, trade secret law has largely been a creature of state law, with forty-seven states adopting legislation based heavily on the Uniform Trade Secrets Act (the “UTSA”), a uniform statute proposed by the American Law Institute in the late 1970s. See MILGRIM, *supra* note 67. However, the civil remedies for trade secret violation received a major expansion in 2016 when President Obama signed the Defend Trade Secrets Act (the “DTSA”) into law, which created a federal civil remedy for misappropriation of trade secrets related to a product or service in interstate commerce while explicitly avoiding preemption of any preexisting state trade secret law. 18 U.S.C. § 1838 (2012); Thomas Muccifori & Daniel DeFiglio, *Jam Recipe Yields 1st DTSA Verdict*, LAW360 (Mar. 28, 2017, 1:09 PM), <https://www.law360.com/articles/906046/jam-recipe-yields-1st-dtsa-verdict> (delivering, ironically, the first verdict under the DTSA for misappropriation of a food recipe). The DTSA also amended the existing federal trade secret law to match the definitions of the UTSA, thus essentially federalizing the UTSA. See MILGRIM, *supra* note 67. While the DTSA is still very young, and there is much that needs to be clarified, because of its inherent uniformity nationwide, this note will analyze food piracy’s impact on trade secrets under the DTSA. See generally Conor Tucker, *The DTSA’s Federalism Problem: Federal Court Jurisdiction over Trade Secrets*, 28 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1, 4–7 (2017) (analyzing what does and does not qualify for trade secret protection under the DTSA, as well as the potential for “trade secret trolls”).

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Act (EEA) in 1996.⁷⁵ A person can be guilty of criminal misappropriation by, *inter alia*, taking, copying, downloading, uploading, transmitting, or delivering a trade secret.⁷⁶ Misappropriation can occur even by merely possessing the secret if she knows it has been stolen or misappropriated, although any finding of liability for possession of a trade secret inherently requires that the information is still a trade secret at the time of possession.⁷⁷ Punishment of a person can be up to five million dollars or fifteen years imprisonment, or both.⁷⁸

B. Trade Secret Protection Within the Food Industry

Cuisine and the food industry exist in a vacuum where recipes can freely flow between parties without legal repercussion because they receive so little protection from intellectual property law.⁷⁹ Despite the potential chilling effects on culinary innovation, sharing recipes is generally socially accepted and the industry has flourished. The rise of Instagram and proliferation of cooking shows have created a massive demand for, as well as a constant supply of, fresh and original foods presented in unique fashions.⁸⁰

But these social norms are not followed by all chefs, and certainly not by large-scale industrial and retail food manufacturers, who instead choose to rely on trade secret law to protect their recipes.⁸¹ A nondisclosure agreement is considered a reasonable measure sufficient to maintain trade secret protection for smaller-scale establishments such as restaurants and food truck chefs, but corporations usually take much

⁷⁵ Economic Espionage Act of 1996, Pub. L. No. 104-294, 110 Stat. 3488 (1996) (codified at 18 U.S.C. §§ 1831-39 (2012)).

⁷⁶ 18 U.S.C. § 1831(a)(1)-(3) (2012).

⁷⁷ *See id.*

⁷⁸ 18 U.S.C. § 1831(a)(5).

⁷⁹ *See* Caroline M. Reeb, *Sweet or Sour: Extending Copyright Protection to Food Art*, 22 DEPAUL J. ART TECH. & INTELL. PROP. L. 41, 44 (2011) (“If food art possesses sufficiently underlying traits, then by analogy identical legal protections may be warranted.”)

⁸⁰ *See* Mary Grace Hyland, *A Taste of the Current Protection Offered by Intellectual Property Law to Molecular Gastronomy*, 8 CYBARIS INTELL. PROP. L. REV. 155, 161–62 (2017) (discussing the effects of social media on the culinary industry). While chefs and restaurants occasionally steal the signature recipes of others (known in the Orange County culinary community as “swagger jacking”), legal options such as litigation are rarely employed due to the lack of intellectual property protection for recipes, instead focusing on reputational harm and publicly shaming those who would “jack” a chef’s “swagger”. *The Ketchup #22: Food Industry Swagger Jackers*, FOODBEAST (Sept. 8, 2017), <https://soundcloud.com/foodbeast/ketchup-22-food-industry-copycats> [hereinafter *Swagger Jackers*].

⁸¹ *See* Brees, *supra* note 30, at 280.

continued . . .

stronger measures to protect their recipes.⁸² The Coca-Cola “Secret Formula,” arguably the most valuable trade secret in history, is kept in a vault at all times to maintain its secrecy.⁸³ McDonald’s protected their “special sauce” recipe so vigorously they actually lost the original formula, and were forced to change the recipe for a number of years.⁸⁴

Kentucky Fried Chicken undertakes particularly extraordinary efforts to protect its Original Recipe.⁸⁵ Although the recipe was originally developed by its founder, the real Colonel Harlan Sanders, KFC outsources production of the seasoning to two separate suppliers, Sexton and Stange.⁸⁶ In addition to nondisclosure agreements, each supplier is only supplied with half of the recipe, with neither producer knowing the ingredients of the other half.⁸⁷ Once produced, the two halves are then combined together to create the true Original Recipe blend, which is then distributed to KFC franchisees.⁸⁸ By doing this, not only does KFC satisfy reasonable efforts to maintain the recipe’s secrecy, “KFC [does] not disclose[] its trade secrets to anyone.”⁸⁹

C. Advances in 3D Printing Will Destroy the Power of Trade Secret Protection

As mentioned in Part II, if food manufacturers (especially those relying on trade secret laws to protect their recipes) choose to enter the printed food market and sell their food online, consumers will essentially be able to purchase and “download” a CAD file for food. Much like Star Trek’s replicator, should Krispy Kreme enter this market, one will be able to order a donut from KrispyKreme.com (or from wherever Krispy Kreme chooses to offer their donuts) on one’s home computer, purchase the donut, and have a fully edible Krispy Kreme donut sitting in one’s home food printer within moments.⁹⁰ This

⁸² See R. Mark Halligan & David A. Haas, *The Secret of Trade Secret Success*, FORBES (Feb. 19, 2010, 8:30 PM), <https://www.forbes.com/2010/02/19/protecting-trade-secrets-leadership-managing-halligan-haas.html#51f97f641372>.

⁸³ Emily Ely, *The Most Valuable Trade Secret Ever—and How it Stayed That Way*, TRACKLIGHT (June 22, 2014), <https://blog.traklight.com/the-most-valuable-trade-secret-ever>.

⁸⁴ David Greising & Jim Kirk, *McDonald’s Finds Missing Ingredient*, CHI. TRIB. (June 27, 2004), <http://www.chicagotribune.com/chi-0406270263jun27-story.html>.

⁸⁵ See *KFC Corp. v. Marion-Kay Co.*, 620 F. Supp. 1160, 1172 (S.D. Ind. 1985) (explaining that KFC’s Original Recipe is protected as a trade secret).

⁸⁶ *Id.* at 1170.

⁸⁷ *Id.* at 1172.

⁸⁸ See *id.*

⁸⁹ *Id.*

⁹⁰ See Jacopo Prisco, ‘Foodini’ Machine Lets You Print Edible Burgers, Pizza, *continued . . .*

business model inherently requires the Krispy Kreme recipe to be included inside the CAD file so the food printer knows what ingredients to combine.⁹¹

Decoding the recipes nestled inside CAD files will be relatively easy for hackers and pirates, and nothing will prevent them from posting unlocked and unprotected copies of recipes aggressively protected for decades.⁹² And while it is true that posting the recipe to a torrent website like The Pirate Bay would most likely qualify for civil and criminal trade secret misappropriation, the anonymous nature of online piracy makes discovering the identity of the pirate extremely difficult, if not impossible.⁹³ Even if companies create a special recipe unique to food printing (so as to protect the original “true” recipe), they will still be powerless to pursue any action if the pirate’s identity cannot be uncovered.⁹⁴

Furthermore, any attempts to prosecute those who download and further proliferate pirated CAD files for printed food will be fruitless because the recipe inside a pirated CAD file will no longer have trade secret protection.⁹⁵ While copying or downloading a trade secret does constitute “acquiring” under civil misappropriation, and is explicitly a crime under the EEA, those definitions only apply if the copied or

Chocolate, CNN (Dec. 31, 2014, 1:06 AM),
<https://www.cnn.com/2014/11/06/tech/innovation/foodini-machine-print-food/index.html>.

⁹¹ See Rebecca Matulka & Matty Greene, *How 3D Printers Work*, ENERGY.GOV (June 19, 2014), <https://www.energy.gov/articles/how-3d-printers-work>.

⁹² While parties and businesses could easily place Digital Rights Management (DRM) and other security measures on their files, history has shown that virtually any digital encryption can be overcome. See, e.g., *CD Crack: Magic Marker Indeed*, WIRED (May 20, 2002, 11:35 AM), <https://www.wired.com/2002/05/cd-crack-magic-marker-indeed/> (circumventing Sony’s “copy-proof” DRM technology for music CDs by simply using a marker on the outside of the disc); Jamie Condliffe, *You Can Hack Keurig’s DRM With Scotch Tape to Use Knock-Off Coffee Pods*, GIZMODO (Dec. 11, 2014, 7:00 AM), <https://gizmodo.com/you-can-hack-keurigs-drm-with-scotch-tape-to-use-knock-1669713772> (“The result: cheap pods merrily burst . . . forth into your mug while Keurig looks on wondering why it even bothered investing in DRM in the first place.” (emphasis added)); Sarah Perez, *Android DRM Cracked! Pirating Apps is “Easy,”* READWRITE (Aug. 24, 2010), https://readwrite.com/2010/08/24/android_drm_cracked_pirating_apps_is_easy/.

⁹³ See HORNICK, *supra* note 10, at 197–98.

⁹⁴ See Nick Bilton, *Internet Pirates Will Always Win*, N.Y. TIMES (Aug. 4, 2012), <https://www.nytimes.com/2012/08/05/sunday-review/internet-pirates-will-always-win.html>.

⁹⁵ See Lorna Caddy, *Challenging CAD File Sharing*, TAYLOR WESSING (Apr. 2013), https://www.taylorwessing.com/download/article_cad_file_sharing.html#.W65VhHtKi4Q.

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downloaded information *is* a trade secret.⁹⁶ Once the pirated CAD file is posted to a site like The Pirate Bay, it will be in a public forum for everyone to view and the recipe's secrecy is destroyed.⁹⁷ The recipe loses all trade secret protection and it can be freely downloaded without fear of criminal prosecution or civil action.⁹⁸ The only legally liable party will be the original hacker, assuming her identity can even be determined.⁹⁹

In essence, if a thing can be hacked, it will be hacked, and without greater protection for 3D printed food, piracy will run rampant without fear of civil action or criminal prosecution.¹⁰⁰ The potential for loss will create such a chilling effect that the printed food industry will never be able to reach its full potential because no business will want to assume the risks associated with entering the market.¹⁰¹ Greater protection will be needed, even if it is a minimum amount that gives food the same protection as other printed designs and objects, but current intellectual property laws are inadequate for printed food.¹⁰² With every advance in 3D printing, "trade secret protection" edges closer to becoming an oxymoron.

IV. PRINTED FOOD CANNOT FIT WITHIN THE SCOPE OF EXISTING IP LAW

Any technology-related legislation is inherently not forward-looking, simply because (at best) it is based on an understanding of current technology at the time the law is written.¹⁰³ If a bill involving

⁹⁶ See Peter J. Torren, *Misappropriation of a Trade Secret Under the DTSA*, IPWATCHDOG (Jun. 10, 2016), <https://www.ipwatchdog.com/2016/06/10/misappropriation-trade-secret-dtsa/id=69826/> (discussing how courts use circumstantial evidence to establish a violation in these cases).

⁹⁷ See HORNICK, *supra* note 10, at 197 ("The immense power of 3D printing away from control will be wielded by consumers, industrial customers, and governments who become makers, making or repairing the things they need for their own use rather than buying them.")

⁹⁸ *Id.* at 198.

⁹⁹ See *id.* at 199 (acknowledging that, in the context of music, the "likelihood is low that [an] industry will sue individuals for sharing a few music files").

¹⁰⁰ *Cf. id.* at 200 ("Pirates bent on IP infringement will likely remain one step ahead of any technological solution.")

¹⁰¹ See *id.* at 199–200.

¹⁰² See *id.* at 198–99.

¹⁰³ Such issues are further compounded when our lawmaking bodies do not understand technology from the previous decade. See, e.g., Victor Tangermann, *Hearings Show Congress Doesn't Understand Facebook Well Enough to Regulate It*, FUTURISM (Apr. 11, 2018), <https://futurism.com/hearings-congress-doesnt-understand-facebook-regulation/> (analyzing Facebook creator Mark Zuckerberg's testimony before Congress regarding Cambridge Analytica).

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technology is passed, it may very well be obsolete the day after it is signed into law.¹⁰⁴ Food companies will undoubtedly demand some new or alternative form of intellectual property protection to supplement the inevitable holes of trade secret law before entering the printed food industry.¹⁰⁵ The easy solution may be to squeeze the technology to fit within the confines of existing law, but a technology as disruptive as printed food probably requires new legislation. This section analyzes the various possible “easy” solutions, including officially extending the other forms of intellectual property to printed food, and why they will not be successful.

A. Printed Food vs. the Patent

The origins of patent law lie within the Constitution, which grants Congress power to “promote the Progress of Science.”¹⁰⁶ Congress does this via the United States Patent and Trademark Office (PTO),¹⁰⁷ which grants a patent for any discovery that is new, useful,¹⁰⁸ and nonobvious.¹⁰⁹ If granted, a patent holder has the exclusive right to make, use, sell, offer to sell, or import her discovery for twenty years.¹¹⁰ However, in exchange for this monopoly, any patent application must also include a written description “in such full, clear, concise, and exact

¹⁰⁴ See Christopher Wolf & Jules Polonetsky, *Privacy Concerns and Technological Change: The Legislative Option*, THE HILL (Jan. 31, 2012, 2:57 PM), <https://thehill.com/blogs/congress-blog/technology/207613-christopher-wolf-and-jules-polonetsky-co-chairs-future-of-privacy-forum> (explaining how “technology-specific laws may be outmoded as soon as they come into force”).

¹⁰⁵ See generally Jia Li, *Inside Views: To Print or Not to Print: Innovation and IP Issues in 3D Printing*, INTELL. PROP. WATCH (July 19, 2017), www.ip-watch.org/2017/07/19/print-not-print-innovation-ip-issues-3d-printing/ (giving an overview of how to protect intellectual property assets as 3D printing becomes more prominent).

¹⁰⁶ U.S. CONST. art. I, § 8, cl. 8.

¹⁰⁷ See *About Us*, USPTO, <https://www.uspto.gov/about-us> (last visited Oct. 22, 2018).

¹⁰⁸ See 35 U.S.C. § 101 (2012) (“Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.”) Such inventions and discoveries are known as “utility” patents, while the patent system also protects what are known as “design” and “plant” patents. 1-1 DONALD S. CHISUM, CHISUM ON PATENTS § 1.01 (2018). However, since “utility is the relevant option for the culinary industry,” this note will only analyze the applicability of utility patents. Emily Cunningham, Note, *Protecting Cuisine Under the Rubric of Intellectual Property Law: Should the Law Play a Bigger Role in the Kitchen?*, 9 J. HIGH TECH. L. 21, 33 (2009).

¹⁰⁹ See 35 U.S.C. § 103 (2017).

¹¹⁰ See 35 U.S.C. § 154(a)(2) (2017).

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terms as to enable any person skilled in the [pertinent] art” to reproduce the discovery that is published by the PTO.¹¹¹

Historically, patent law has been rarely used by the food industry for recipes, not only because of the “high standard of originality” required for patent protection but also because the protection afforded is often counterintuitive to a company’s needs.¹¹² Even though recipes are considered to be “compositions of matter” under 35 U.S.C. § 101,¹¹³ any patent applications for recipes are usually rejected because the PTO sees them as neither new nor nonobvious.¹¹⁴ Instead of protecting culinary recipes, patent law is seen to protect culinary *techniques*; no matter how new or inventive a recipe is, it will not receive patent protection if it uses traditional cooking methods.¹¹⁵ Even if traditional recipes could be patented, members of the food industry otherwise relying on trade secret law would most likely elect not to patent their foods because of the disclosure requirement. Patent applications are a matter of public record, which would require recipe holders (particularly those previously relying on trade secret protection) to reveal their recipe to the world, even if the application is denied.¹¹⁶ Furthermore, with protection only lasting for twenty years, any recipe used in mass commerce would inherently have no economic value two decades after its patent application because it would be in the public domain and known to the world.¹¹⁷ In this way, patent are almost opposite to trade secrets because public disclosure is required for patent protection, and yet strictly forbidden for trade secret protection.¹¹⁸ Nevertheless, some companies have opted to pursue patents on their recipes—and even succeeded—but only to see those patents later invalidated in court.¹¹⁹

¹¹¹ 35 U.S.C. § 112(a) (2017).

¹¹² Naomi Straus, Comment, *Trade Dress Protection for Cuisine: Monetizing Creativity in a Low-IP Industry*, 60 UCLA L. REV. 182, 198 (2012).

¹¹³ See Cunningham, *supra* note 108, at 33 n.109.

¹¹⁴ See *id.*

¹¹⁵ See Straus, *supra* note 112, at 198 (“[P]atent laws cannot be used to protect restaurant dishes that are created using classic cooking techniques or fail to meet the high standards of originality that the patent system requires because these dishes do not fulfill the requirement that an invention be novel and nonobvious.”)

¹¹⁶ See Cunningham, *supra* note 108, at 34–35.

¹¹⁷ See *id.* at 35.

¹¹⁸ See *Kewanee v. Bicron*, 416 U.S. 470, 474, 489 (1974) (holding that state trade secret law is not preempted by federal patent law because a patent’s disclosure requirement can inherently never conflict with protections afforded a properly maintained trade secret).

¹¹⁹ See *Procter & Gamble Co. v. Nabisco Brands*, 711 F. Supp. 759, 760–61 (D. Del. 1989) (invalidating P&G’s patent on a “crispy on the outside and chewy on the inside” cookie because the same idea was published in a 1968 cookbook, thereby no

Within the 3D printing industry as a whole, it is not clear just how far patent law can or will extend.¹²⁰ A CAD file itself would probably meet the newness requirement, but any design based on a previously existing object or item created via subtractive manufacturing may be per se ineligible for patent protection due to lack of novelty.¹²¹ Computer software and files are ineligible for patent protection without an “inventive concept” that takes the software beyond a mere computer implementation of an already existing idea, but within the 3D printing context it is difficult to determine whether a CAD file used to additively manufacture a previously known item is sufficient enough to qualify as an inventive concept.¹²² However, any uncertainty has not stopped the industry from vigorously applying for patents.¹²³ In this decade alone (through 2016), over 4400 3D printing related applications were filed, and the PTO registered nearly 2600 of them, but it is not clear how many have been for CAD files, if any at all.¹²⁴

However, even if Congress explicitly extended patent protection to printed food, piracy would still go unchecked because file sharing would not infringe the patent, and any actual infringement would be virtually unprovable.¹²⁵ Patent infringement occurs when one “makes, uses, offers to sell, or sells any patented invention” without

longer being a “new” recipe). Similarly, the J.M. Smucker Company attempted to enforce its patent on a crustless peanut butter and jelly sandwich in *Albie’s Foods v. Menusaver Inc.*, 170 F. Supp. 2d 736, 738 (E.D. Mich. 2001), but this backfired; their patent was declared invalid because pinching the edges of the crustless sandwich to form a seal was found to be obvious. *Ex parte Kretchman*, No. 2003-1775, 2003 WL 23507731, at *2 (B.P.A.I. Dec. 10, 2003).

¹²⁰ See Symposium, *Intellectual Property and Additive Manufacturing/3D Printing: Strategies and Challenges of Applying Traditional IP Laws to a Transformative Technology*, 17 MINN. J.L. SCI. & TECH. 881, 894 (2016) [hereinafter *Transformative Technology*] (“[T]he ability to claim patent rights in a 3D digital model itself remains unclear.”)

¹²¹ See HORNICK, *supra* note 10, at 194 (“Why print a trademarked product when you can print a generic substitute”)

¹²² See *Transformative Technology*, *supra* note 120, at 887 (citing *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2348, 2350, 2357 (2014)).

¹²³ *Id.* at 904.

¹²⁴ See John Hornick, *3D Printing Patent Landscape*, 3DPRINT.COM (July 17, 2017) <https://3dprint.com/181207/3d-printing-patent-landscape/> (charting the number of applications and registrations related to 3D printing from 1996-2016). Hornick’s figures may actually be understated. Cf. Lyndsey Gilpin, *3D Printing: 10 Factors Still Holding It Back*, TECHREPUBLIC (Feb. 19, 2014, 11:33 A.M.), <https://www.techrepublic.com/article/3d-printing-10-factors-still-holding-it-back/> (claiming the PTO received over 6800 3D printing patent applications in the previous decade).

¹²⁵ See Peter Twomey, *A New Dimension to Intellectual Property Infringement: An Evaluation of the Intellectual Property Issues Associated with 3D Printing*, 17 TRINITY C. L. REV. 14, 25 (2014).

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permission.¹²⁶ Internet piracy does not fit within that definition, and so pirating a CAD file and sharing it via torrents or any other file sharing method can never constitute patent infringement, even if a pirate sells the file online.¹²⁷ Sharing a blueprint or schematic for a patented invention merely circulates what is already public record,¹²⁸ and so downloading from sites like The Pirate Bay would be completely legal because “the mere possession or downloading of a file is not enough to create infringement liability.”¹²⁹ Instead, patent infringement would not occur until a person physically prints the food from a pirated CAD file.¹³⁰ The food is the infringing product, and would serve as the proof of infringement, except food is intended to be eaten. Once consumed, any evidence of patent infringement is essentially destroyed.¹³¹ Furthermore, since Congress has been oddly reluctant to criminalize patent infringement, food piracy can never be a crime under current law.¹³² Therefore, while patent law may not be able to effectively protect 3D-printed objects in general, it absolutely cannot protect 3D printed food.

¹²⁶ 35 U.S.C. § 271(a) (2012). *But see* 35 U.S.C. § 154(a) (1) (giving a patent owner a monopoly over the same activity that constitutes infringement).

¹²⁷ *See* Twomey, *supra* note 125, at 25.

¹²⁸ *See id.*

¹²⁹ *See* Weinberg, *supra* note 39, at 12. While patent law does provide liability for contributory infringement under 35 U.S.C. § 271, the level of proof required may not be feasible with internet piracy. *See supra* note 93 and accompanying text. Contributory infringement requires not only the taking of affirmative steps with intent to infringe (an element probably fairly easy to establish), but it also requires knowledge that the specific infringing activity occurred. 35 U.S.C. § 271(c) (2017). Neither the hosting website nor any pirates sharing the file could be found liable unless they had specific knowledge that a CAD file was used to print a patented food or item; this is unlikely. *See* Global-Tech Appliances, Inc. v. SEB S.A., 563 U.S. 754, 761, 770 (2011); Twomey, *supra* note 125, at 24–25; *Transformative Technology*, *supra* note 120, at 892–93.

¹³⁰ *See* Weinberg, *supra* note 39, at 12.

¹³¹ There are conceivable situations where evidence could remain, like if printed food was part of a piece of art or if the actual printing process was filmed, but these scenarios would be rare. *See id.*

¹³² Irina D. Manta, *The Puzzle of Criminal Sanctions for Intellectual Property Infringement*, 24 HARV. J.L. & TECH. 469, 488 (2011) (citing *Dowling v. United States*, 473 U.S. 207, 227 (1985)). Despite the Supreme Court confirming Congress has the “undoubted power to do so,” Congress has made no moves to criminalize patent infringement since the 1985 decision. *Dowling*, 473 U.S. at 227.

B. Printed Food vs. the Trademark

At its core, trademark is anything that can be used to identify the source of goods or services.¹³³ While trademarks were initially defined by the Lanham Act as “any word, name, symbol, or device, or any combination thereof,”¹³⁴ the definitions of symbols and devices has expanded over time to include shapes, sounds, scents, and “almost anything at all that is capable of carrying meaning,”¹³⁵ but a mark cannot qualify for trademark protection if it has any functional aspects.¹³⁶ Whether a mark qualifies for registration with the PTO depends on whether it is distinctive enough to identify the good or service to which it is attached.¹³⁷ Any mark considered to be inherently distinctive will be accepted for publication and registration by the PTO.¹³⁸ Any marks found not to be inherently distinctive must acquire distinctiveness—also referred to as secondary meaning—via “proof of substantially exclusive and continuous use” before the PTO will allow registration.¹³⁹ While anything can potentially acquire enough distinctiveness to identify another good or service, it can never serve as a trademark for itself.¹⁴⁰

Unlike patents and copyrights, which Congress has direct authority to legislate under the Constitution,¹⁴¹ Congress’ power to legislate trademarks comes from the commerce clause.¹⁴² Because of this, a

¹³³ *Qualitex Co. v. Jacobson Prods. Co.*, 514 U.S. 159, 162 (1995).

¹³⁴ 15 U.S.C. § 1127 (2012).

¹³⁵ *Qualitex Co.*, 514 U.S. at 162.

¹³⁶ *Traffix Devices v. Mktg. Displays*, 532 U.S. 23, 35 (2001) (barring trade dress protection for a spring device on the back of a highway sign because it served a functional purpose and functional items are preempted by patent law).

¹³⁷ See 15 U.S.C. § 1052(a) (2017).

¹³⁸ See 15 U.S.C. § 1052(e) (“No trademark by which the goods of the applicant may be distinguished from the goods of others shall be refused registration on the principal register on account of its nature unless . . . [it] is merely descriptive.”).

¹³⁹ 15 U.S.C. § 1052(f).

¹⁴⁰ See *Oliveira v. Frito-Lay, Inc.*, 251 F.3d 56, 62 (2d Cir. 2001). The plaintiff in *Oliveira*, famous for singing “The Girl from Ipanema”, sought trademark protection for her performance on that song. The Court refused to extend protection because granting her performance “the status of trademark *for itself* would stretch the definition of trademark too far” *Id.*

¹⁴¹ U.S. CONST. art. I, § 8, cl. 8 (giving Congress the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries”).

¹⁴² See *In re Trade-Mark Cases*, 100 U.S. 82, 97 (1879) (stating that Congress could only regulate “the kind of commerce which Congress is authorized to regulate [under the Commerce Clause],” not *intrastate* commerce); see also U.S. CONST. art. I, § 8, cl. 3, (granting Congress power “[t]o regulate commerce . . . among the several states”).

continued . . .

trademark cannot acquire federal protection until it is “use[d] in commerce,” and loses any protection once the mark’s use in commerce ends.¹⁴³ At the same time, merely copying or displaying a mark outside of commerce is not enough to violate a trademark, so a use in commerce is also required for any unauthorized use to rise to the level of trademark infringement.¹⁴⁴ The Lanham Act defines a “use” as when a mark “is placed in any manner on [] goods or their containers or the displays associated therewith” and those goods “are sold or transported in commerce.”¹⁴⁵ Therefore, “a trademark violation occurs only when an offending trademark is applied to *commercial* goods and services.”¹⁴⁶

Protection via trademark law may be ideal for the printed food industry, but extending the Lanham Act to encompass food is problematic. Since federal protection lasts for as long as a trademark is used in commerce, a mark continuously used in commerce has the potential to last forever.¹⁴⁷ This provides the industry a greater advantage than patents and copyrights because those protections are only “secur[ed] for limited times.”¹⁴⁸ Since the ultimate goal in extending intellectual property protection to printed food is to protect what can no longer be protected by trade secret (the recipe), any trademark protection would need to apply to the recipe within a CAD file.¹⁴⁹ This is difficult for multiple reasons: not only must any trademark represent another good or service, meaning the recipe could never serve as a source identifier for itself,¹⁵⁰ a mark is ineligible for protection if it possesses any functional aspects.¹⁵¹ While a court could rule that the recipe in a printed food CAD file is a nonfunctional aspect, it is more likely that the recipe would be considered functional because it serves the functional purpose of telling the food printer what to create.¹⁵²

Not only is a recipe ineligible for direct trademark protection

¹⁴³ See Cunningham, *supra* note 108, at 29 (stating that “trademark laws protect . . . only the way in which the product or service is presented to consumers”).

¹⁴⁴ See Weinberg, *supra* note 39, at 8.

¹⁴⁵ 15 U.S.C. § 1127 (2012).

¹⁴⁶ *San Francisco Arts & Athletics, Inc. v. U.S. Olympic Comm.*, 483 U.S. 522, 566 (1987) (O’Connor, J., concurring and dissenting) (alteration in original).

¹⁴⁷ See Cunningham, *supra* note 108, at 29.

¹⁴⁸ U.S. CONST. art. I, § 8, cl. 8.

¹⁴⁹ See generally Aaron Wright, *Copyright and Trademark in 3D*, CARDOZO LAW, <https://cardozo.yu.edu/copyright-and-trademark-3d> (last visited Sept. 28, 2018) (analyzing potential copyright and trademark issues arising from 3D printing).

¹⁵⁰ Cunningham, *supra* note 108, at 29.

¹⁵¹ See *Traffix Devices v. Mktg. Displays*, 532 U.S. 23, 35 (2001).

¹⁵² See *Qualitex Co. v. Jacobson Prods. Co.*, 514 U.S. 159, 165 (1995) (stating that a product feature is functional when it is essential to the use or purpose of the article).

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because of its functionality, but extending trademark to the flavor of printed food would also be a difficult bar to overcome because flavors are probably not distinctive enough to qualify for trademark protection.¹⁵³ While courts have been hesitant to rule that flavors and tastes are per se ineligible for trademark protection,¹⁵⁴ a flavor unique enough to serve as a source identifier is difficult to accomplish because flavors probably are not inherently distinctive.¹⁵⁵ As a sense, taste is significantly more subjective than sight or sound, which by its very nature makes flavors less distinguishable.¹⁵⁶ Because trademark protection turns on distinctiveness, and given the subjectiveness of taste, any flavor would probably have to gain secondary meaning before qualifying for any trademark protection.¹⁵⁷ This makes it difficult for any two people (let alone Twelve Angry Men¹⁵⁸) to agree on whether a food's flavor is unique enough to acquire distinctiveness. After all, how often does a new food taste like chicken?¹⁵⁹

Another option recipe holders may try is to push for trade dress protection in the actual printed food, but they will also probably find the protection insufficient for their needs. Trade dress protection applies to the overall image of a product, which can include a variety of features such as size, shape, color, and more.¹⁶⁰ When it comes to trade dress of goods, infringement usually involves the packaging or labeling of a good, but protection can also extend to the good itself if its design is distinctive enough.¹⁶¹ Recipe holders entering the printed food industry could potentially design their foods with a distinctive shape and thus attempt to claim trade dress protection in how the food is presented once printed,¹⁶² which would be appealing to the industry because trade dress can potentially be inherently distinctive and therefore not require five

¹⁵³ See *In re N.V. Organon*, 79 U.S.P.Q.2d 1639, 1650 (T.T.A.B. 2006) (holding that consumers generally do not regard flavors as trademarks, but adding that a flavor is most likely not inherently distinctive, meaning it would have to acquire distinctiveness in the marketplace in order to qualify for trademark protection).

¹⁵⁴ See *id.*

¹⁵⁵ See *id.*

¹⁵⁶ Krishnendu Ray, *Domesticating Cuisine: Food and Aesthetics on American Television*, 7 *GASTRONOMICA J. FOOD & CULTURE* 50, 57 (2007) (“Literal taste is unconscious, subjective, and too intimate to allow for any discursive elaboration.”)

¹⁵⁷ See *In re N.V. Organon*, 79 U.S.P.Q.2d at 1640–41.

¹⁵⁸ *TWELVE ANGRY MEN* (MGM Studios 1957).

¹⁵⁹ *Cf. THE MATRIX* (Warner Bros. 1999) (suggesting that multiple foods tasting like chicken is a result of a computer simulated reality failing to generate a sufficient number of distinctive flavors).

¹⁶⁰ *John H. Harland Co. v. Clark Checks, Inc.*, 711 F.2d 966, 980 (1983).

¹⁶¹ See *id.* (providing examples of cases focusing on distinctive attributes).

¹⁶² See generally 74 AM. JUR. 2D *Trademarks and Tradenames* § 1 (2011) (defining the nature and purpose of trademarks).

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years of continuous use to acquire secondary meaning.¹⁶³ However, trade dress protection probably would not be available to foods with amorphous qualities (such as spaghetti or any liquid recipes like Coca-Cola).¹⁶⁴ Furthermore, with the ability to easily edit .stl files, any trade dress protection would be useless when pirates can simply access the file and alter the design of the food so it no longer bears its distinctive shape.¹⁶⁵

On the other hand, devising a way to tie 3D printed food to trademarks would be desirable for manufacturers because the protection provided would be roughly similar to the protection provided by trade secret law.¹⁶⁶ Trademarks are, in a way, intrinsically linked to destruction of trade secrets, particularly with uninventive and unprotectable information such as recipes.¹⁶⁷ If a pirate were to hack a printed food file and post a CAD file on a site like The Pirate Bay that contains the KFC Original Recipe, the destroyed secret is not the recipe itself; after all, someone somewhere has undoubtedly combined the same eleven herbs and spices via independent creation.¹⁶⁸ Instead, the destroyed secret is that *KFC uses this specific recipe*. The power of sharing a CAD file containing KFC's Original Recipe lies in associating the file with KFC, so any pirate would inherently need to use a KFC mark to identify KFC's recipe.¹⁶⁹ Without including the KFC trademark in the file name or as some other form or label, no one would know the file contains their Original Recipe and its status as a trade secret is maintained. However, using a trademark in this manner would require trademark law to protect file names and metadata, and current law is unclear as to whether a file name could constitute a commercial

¹⁶³ See *Two Pesos, Inc. v. Taco Cabana, Inc.*, 505 U.S. 763, 767 (1992) (ruling that trade dress does not require secondary meaning to be eligible for trademark protection).

¹⁶⁴ *Harland*, 711 F.2d at 980.

¹⁶⁵ See *id.*

¹⁶⁶ See 18 U.S.C. § 1839(3) (2012).

¹⁶⁷ See RESTATEMENT (FIRST) OF TORTS § 757 cmt. b (AM. LAW INST. 1939).

¹⁶⁸ See Joe Gray, *KFC Recipe Challenge Puts Secret 11 Herbs and Spices to the Test*, SEATTLE TIMES (Aug. 29, 2016, 6:02 AM), <https://www.seattletimes.com/life/food-drink/kfc-recipe-challenge-puts-secret-11-herbs-and-spices-to-the-test/>.

¹⁶⁹ Kentucky Fried Chicken has a number of registered trademarks associated with their fried chicken services. See, e.g., KENTUCKY FRIED CHICKEN, Registration No. 0815167; KFC, Registration No. 1807753. Trademark registrations can be examined using the *Trademark Electronic Search System (TESS)*, UNITED STATES PATENT AND TRADEMARK OFFICE, <http://tess2.uspto.gov> (last updated Sept. 28, 2018), but when searching for older marks such as KENTUCKY FRIED CHICKEN the zero will need to be included when searching by registration number.

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use under the Lanham Act and Commerce Clause requirements.¹⁷⁰

However, just like with patent law, the most significant barrier to using trademark law to protect printed food from internet piracy is that file sharing by itself probably cannot infringe a trademark.¹⁷¹ Because trademark infringement requires that the mark be used in commerce, any noncommercial use of a mark cannot violate trademark law.¹⁷² This is a problem. Internet piracy seeks to *avoid* commerce, not participate in it.¹⁷³ Just as the goal of online piracy in music and movies was to consume entertainment free of charge, the goal of domestic printed food piracy would be to consume any food free of charge (or for merely the cost of the food “ink”). Since any pirated printed food would need to be resold to infringe any trademarks,¹⁷⁴ civil trademark law in its current form cannot protect printed food from domestic internet piracy any better than patent law.

Unlike patent law, there can be criminal liability for trademark infringement under 18 U.S.C. § 2320, which punishes anyone who intentionally traffics in counterfeit goods.¹⁷⁵ While there is no explicit language requiring a “use in commerce,” food piracy still may not meet the requirements for criminal trademark infringement based on the language of the statute.¹⁷⁶ Under the statute, “traffic” means “to transport or transfer . . . to another for purposes of . . . private financial

¹⁷⁰ Compare *Bally Total Fitness Holding Corp. v. Faber*, 29 F. Supp. 2d 1161, 1167 (C.D. Cal. 1998) (holding that the defendant’s posting of a “Bally sucks” web page did not identify any goods and was not a commercial use in any way, and therefore he could not be liable for trademark dilution), with *Sega Enters. v. MAPHIA*, 948 F.Supp. 923, 939 (N.D. Cal. 1996) (finding the defendant infringed Sega’s trademarks and copyrights by offering emulated versions of Sega’s video games for free download as an incentive to purchase his “Super Magic Drive” copying devices). Both cases are comparable to and distinguishable from food piracy; the defendant in *Bally* was not offering anything in commerce but also had a clear First Amendment defense in his use of Bally’s mark to criticize them, *Faber*, 29 F. Supp. 2d at 1167, while the defendant in *Sega* was providing pirated copies of software for free but also used the software in commerce by providing that software as an inducement to purchase his goods. *MAPHIA*, 948 F.Supp. at 935. The court in *Sega* makes no mention of whether trademark infringement still would have occurred if the games had no commercial nexus to the Super Magic Drives. See *id.* at 939.

¹⁷¹ See Twomey, *supra* note 125; see also Weinberg, *supra* note 39, at 8.

¹⁷² See Weinberg, *supra* note 39, at 8.

¹⁷³ See Ben Depoorter, *Intellectual Property Infringements & 3D Printing: Decentralized Piracy*, 65 HASTINGS L.J. 1483, 1495 (2014).

¹⁷⁴ See Weinberg, *supra* note 39, at 8.

¹⁷⁵ 18 U.S.C. § 2320(a)(1) (2018).

¹⁷⁶ *Id.*; see also Weinberg, *supra* note 39, at 8 (“Unlike patent or copyright, it is not copying a trademark that creates a trademark violation. Instead, it is using that trademark in commerce . . . that results in a violation.”)

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gain,” and “financial gain” is defined as “the receipt, or expected receipt, of anything of value.”¹⁷⁷ Assuming the pirated recipe has value after its secrecy is destroyed, this could theoretically apply to downloading a CAD file for printed food, but the statute explicitly does not allow the government “to bring a criminal cause of action . . . for the repackaging of genuine goods or services not intended to deceive or confuse.”¹⁷⁸ For food piracy, the CAD file is genuine, and by using an owner’s trademark the intent is not to deceive or confuse but to accurately identify the source of the goods. Internet piracy does little more than alter the channel through which the good is received, so criminal trademark infringement will most likely be just as ineffective as its civil counterpart.¹⁷⁹

C. Printed Food vs. the Copyright

Copyright protects “original works of authorship fixed in a tangible medium of expression.”¹⁸⁰ This essentially applies to only the creative expressions of an idea, but never the idea itself.¹⁸¹ Unlike patent or trademark law, which require registration of a work before granting it protection, copyright law extends protection to a creative work immediately upon fixation,¹⁸² which the Copyright Act defines as occurring when a work is embodied in a medium stable enough for it to be reproduced.¹⁸³

On the surface, copyright protection seems like the most appropriate form of intellectual property protection for printed food because a copyright has a comfortable history of handling infringement in different media.¹⁸⁴ Online piracy until now has chiefly involved

¹⁷⁷ 18 U.S.C. § 2320(f) (2012).

¹⁷⁸ 18 U.S.C. § 2320(g).

¹⁷⁹ See Rebecca Dunlevy, Note, *Internet Immunity: The Limits of Contributory Trademark Infringement Against Online Service Providers*, 22 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 927, 936–38 (2012) (discussing the ineffectiveness of criminal counterfeit and civil trademark infringement statutes).

¹⁸⁰ 17 U.S.C. § 102 (2012).

¹⁸¹ Bryan J. Vogel, Note, *Casting 3D Printing’s Coming IP Litigation: Usual Suspects and Dark Horses*, 86 PAT. TRADEMARK & COPYRIGHT J. 1209, 1211 (Oct. 11, 2013),

<https://www.robinskaplan.com/~media/pdfs/casting%203d%20printings%20coming%20ip%20litigation%20usual%20suspects%20and%20dark%20horses.pdf?la=en>.

¹⁸² *Id.*

¹⁸³ See 17 U.S.C. § 101 (2012).

¹⁸⁴ Lucas S. Osborn, *Doctrinal Quandaries with 3D Printing and Intellectual Property*, 27 INTELL. PROP. LITIG. 18, 22 (2016); see also Weinberg, *supra* note 39, at 12 n.36 (“When downloading a file, a user creates a copy of that file on her own hard drive, thus implicating copyright.”)

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copyrights, and the subject matter involves computer software, which Congress specifically granted copyright protection to in 1980.¹⁸⁵ Furthermore, since both sculptural designs and blueprints are also explicitly protected by copyright, either the objects inside CAD files could qualify as sculptural designs or the CAD file itself could be classified as a blueprint.¹⁸⁶ There are also many scholars who believe recipes already qualify for copyright protection under the language of the Copyright Act of 1976, arguing that generating a new or original food is an expression of creativity.¹⁸⁷ In this way, “[CAD] files are certainly protectable by copyright,” but it is not necessarily a guarantee.¹⁸⁸

Another advantage for printed food is that its functionality naturally resolves issues that previously barred food from copyrightability. *Kim Seng Co. v. J&A Importers Inc.*, a recent case related to copyright in food, illustrates these issues.¹⁸⁹ In *Kim Seng*, the copyright infringement claim involved a picture of a bowl of noodles that the plaintiff featured on its product’s packaging.¹⁹⁰ The plaintiff argued it owned a copyright not only in the photo of the bowl of noodles, but also in the underlying bowl of noodles itself, claiming the food was a sculptural work.¹⁹¹ The court held that the bowl of noodles in question was not copyrightable because the food “cannot be separated from [its] utilitarian function, which is to be eaten,” nor can it satisfy copyright’s fixation requirement because the food is perishable.¹⁹² While *Kim Seng* analyzed copyright in noodles, it also inadvertently highlighted the key differences between traditional food and printed food.¹⁹³ Any perishable food will be ineligible for copyright because its inevitable

¹⁸⁵ 17 U.S.C. §§ 101, 117 (2012); see Weinberg, *supra* note 40, at 3.

¹⁸⁶ Weinberg, *supra* note 40, at 8, 17 n.55.

¹⁸⁷ See, e.g., Reeb, *supra* note 79, at 42. But see *id.* at 46 (noting how some argue that recipes “are substantially derivative” and “do not warrant the full arsenal of intellectual property protection”). However, as Reeb states, the “norm of sharing” in the culinary industry is common to all art forms, and even relied upon to foster further creation or innovation. Compare POINT BREAK (Largo Entertainment & JVC Entertainment Inc. 1991) (featuring an undercover FBI agent who infiltrates the exotic Los Angeles surfing scene to catch a group of adrenaline-loving bank robbers), with THE FAST AND THE FURIOUS (Universal Pictures 2001) (featuring an undercover police officer who infiltrates the exotic Los Angeles street racing scene to catch a group of adrenaline-loving cargo thieves).

¹⁸⁸ Weinberg, *supra* note 40, at 14.

¹⁸⁹ 810 F. Supp. 2d 1046 (C.D. Cal. 2011).

¹⁹⁰ *Id.* at 1050.

¹⁹¹ *Id.*

¹⁹² *Id.* at 1053–54 (noting, however, that the *arrange* and *position* of the food in the bowl could meet the minimal levels of creativity required to gain copyright protection).

¹⁹³ See *id.* at 1054.

decomposition means it cannot meet the fixation requirement, and this does not change with printed food.¹⁹⁴ But printed food *is* fixed because the CAD file is a “tangible medium of expression” that is “sufficiently permanent or stable to permit [printed food] to be . . . reproduced” exactly the same way each time.¹⁹⁵ Extending copyright protection to 3D printed food would also create protection under the Digital Millennium Copyright Act, which has been an essential tool in copyright owners’ attempts to combat internet piracy in music and film,¹⁹⁶ as well as criminal liability of up to ten years per offense.¹⁹⁷

However, even if the CAD files for 3D-printed food were protected under copyright, there are still significant hurdles to overcome because it is unclear *how much* of the file is protected.¹⁹⁸ While useful articles are not protected by copyright, the creative aspects of those articles are copyrightable if they can be conceptually separated from the article itself.¹⁹⁹ The concept of separability was unclear for a long time, with significant circuit court splits, but the Supreme Court recently set down the rule for separability in *Star Athletica, LLC v. Varsity Brands, Inc.*²⁰⁰ *Star Athletica* was a landmark decision for copyright law, not only for clarifying the separability doctrine but also for extending the scope of copyrightability to clothing and fashion, an industry previously understood to occupy one of intellectual property’s negative spaces alongside food.²⁰¹ Under the *Star Athletica* separability test, the goal is to determine whether the potentially copyrightable aspects of a functional item can be conceptually separated from the item itself. If they can, and those separable aspects meet the minimum requirements for protection (authorship, minimal creativity, fixation, etc.), then those aspects are protected by copyright.²⁰² As *Kim Seng* shows, foods’ functional purpose to be eaten prevents any copyright protection.²⁰³ As long as courts consider food and recipes to be functional or utilitarian, then under *Star Athletica* any copyright protection in the CAD file for 3D printed food would extend only to the design of the food as a sculptural work, and not to the actual contents of the food.²⁰⁴ While this

¹⁹⁴ *See id.*

¹⁹⁵ 17 U.S.C. § 101 (2012).

¹⁹⁶ *See* HORNICK, *supra* note 10, at 193.

¹⁹⁷ 18 U.S.C. § 2319 (2012).

¹⁹⁸ *See* Craig, *supra* note 16, at 323.

¹⁹⁹ *See* 17 U.S.C. § 101 (2012).

²⁰⁰ *Star Athletica, LLC v. Varsity Brands, Inc.*, 137 S. Ct. 1002, 1007 (2017).

²⁰¹ *Id.* at 1009; Raustiala & Sprigman, *supra* note 60, at 1764.

²⁰² *Star Athletica*, 137 S. Ct. at 1007.

²⁰³ *Kim Seng Co. v. J & A Importers, Inc.*, 810 F. Supp. 2d 1046, 1053 (C.D. Cal. 2011).

²⁰⁴ *See Star Athletica*, 137 S. Ct. at 1002.

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would probably be sufficient to protect the CAD file itself, recipe holders could still potentially fall victim to piracy. The availability of free .stl editors makes it easy for any pirate familiar with an editing program to open the file and edit the sculptural design of the food itself until its shape is no longer substantially similar enough to the original CAD file to establish copyright infringement.²⁰⁵ Any copyrightable elements would be altered or removed, and the resulting CAD file would be free to circulate across the internet without recourse because it would not violate any intellectual property protection.²⁰⁶

Furthermore, a CAD file for 3D printed food may not even gain copyright protection as a structural work in the first place because it may not even meet the minimal threshold of creativity for copyright protection.²⁰⁷ Any work that attempts to merely recreate an already existing work in a different medium does not qualify for copyright protection because it adds no creative expression to the underlying work.²⁰⁸ Therefore, “many 3D designs that simply represent an object without additional context may lack severable creative elements (and therefore copyright protection).”²⁰⁹

In addition, there is also a policy argument that could be made against providing intellectual property protection of any kind to any 3D-printed food. The purpose of copyright law is to encourage and stimulate creativity,²¹⁰ but extending this protection to businesses already protecting their recipes via trade secret functions more as an incentive for businesses to embrace a new technology.²¹¹ Creating a printable version of food for home consumption does not stimulate creativity, it merely encourages transitioning already existing information to a new medium.

V. NO EASY SOLUTION FOR “TRADE RECIPES”

Since no form of intellectual property can give the industry the protection it needs to fight food piracy, a new form of intellectual property will most likely be needed. Developing this new framework would most likely be painful and tedious, which this author does not envy given it is such a difficult task. But any new law should seek to

²⁰⁵ See Weinberg, *supra* note 40, at 3.

²⁰⁶ See Oliver Smith, *CAD, Copyright and Creative Commons – Part 1, The Infringement Saga Continues*, STRATASYS (Feb. 26, 2016), <http://consulting.stratasys.com/2016/02/cad-copyright-and-creative-commons-the-infringement-saga-continues/>.

²⁰⁷ See HORNICK, *supra* note 10, at 192.

²⁰⁸ See *id.*

²⁰⁹ Weinberg, *supra* note 40, at 17.

²¹⁰ Reeb, *supra* note 79, at 48.

²¹¹ See Jeanne C. Fromer, *A Psychology of Intellectual Property*, 104 NW. U. L. REV. 1441, 1472 (2010).

provide a minimal level of protection necessary to incentivize businesses to enter the market, while still allowing enough freedom for culinary innovation to flourish. This section analyzes the risks and potential pitfalls that could be encountered on the road to developing what this note will deem “trade recipe” protection.

The first issue to consider is how Congress would have authority under the Constitution to protect trade recipes. Using the commerce clause is a nonstarter and should not even be considered because, as previously mentioned, the purpose of internet piracy in general is to avoid commerce. If a commerce requirement cannot be met with food piracy under trademark law, there is no reason it could be met for trade recipe protection.²¹² Instead, Congress will probably have to approach trade recipe protection under the intellectual property clause and classify trade recipes as either “writings” or “discoveries.”²¹³ This would force Congress to place a time limit on the duration of trade recipe protection, since Congress only has authority to “secure for limited times.”²¹⁴ Since “limited” essentially means “not unlimited,” it would probably be challenged in court, but theoretically even a thousand year term of protection would be constitutional.²¹⁵

As for defining infringement, the bar for what constitutes trade recipe infringement should probably be as high as reasonably possible. Copyright relies on a standard of substantial similarity, but for trade recipes the more appropriate standard would likely be something closer to *exact* similarity.²¹⁶ The slightest change in the amount of an ingredient can drastically alter a food’s flavor, and requiring exact similarity would help ensure businesses don’t get trade recipe protection for recipes of foods they do not actually make.²¹⁷ By limiting the scope of infringement to either exact similarity or at most extremely minute differences (for example, “extreme” similarity), the recipe will remain protected while other foods can be developed. This also aligns with the social norms of the culinary community, and would continue to encourage creativity and innovation.²¹⁸ Extreme similarity could be

²¹² See Weinberg, *supra* note 39, at 8.

²¹³ U.S. CONST. art. I, § 8, cl. 8.

²¹⁴ U.S. CONST. art. I, § 8, cl. 8.

²¹⁵ See Malla Pollack, *The Right to Know?: Delimiting Database Protection at the Juncture of the Commerce Clause, the Intellectual Property Clause, and the First Amendment*, 17 CARDOZO ARTS & ENT. L.J. 47, 60 (1999).

²¹⁶ See, e.g., Eric Rogers, Comment, *Substantially Unfair: An Empirical Examination of Copyright Substantial Similarity Analysis Among the Federal Circuits*, 2013 MICH. ST. L. REV. 893, 897 (2013).

²¹⁷ See generally *supra* text accompanying notes 111, 217.

²¹⁸ See FOODBEAST, *supra* note 80 (debating a form of IP for food that should allow for all but the smallest of differences, with “even a tablespoon different” being
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determined by the amount of each ingredient being within a certain percentage of each other. Conversely, instead of a complicated set of hardline percentages or measurements, it may be simpler to treat extreme similarity as a question of fact and leave it for a jury to decide.

Perhaps the key factor is control. For trade secret owners, legal protection is a reward for owners of information who place restrictions and controls that are necessary to prevent misappropriation or disclosure, but those owners must also show that the information is controlled.²¹⁹ If the amount of protection for printed food should be as close as possible to what trade secret law provides, then it only makes sense to require businesses to maintain similar controls on their CAD files in order to maintain legal protection for the files. But if a recipe is extracted from the CAD file and widely published online, why continue to protect it? Posting a recipe on torrent sites for free distribution destroys its secrecy, and its owner can no longer derive any economic value from preventing its disclosure.²²⁰ Requiring businesses to control and guard publicly disclosed information like a trade secret is economically inefficient and an illogical waste of resources.²²¹ At the same time, if controlling the recipe is not required, there would be no incentive not to freely and irresponsibly disclose the recipe to the public without the risk of losing any trade recipe protection.²²² Furthermore, similar to issues already cropping up with traditional 3D printing, a food service business could potentially disseminate the recipe then turn around and immediately pursue infringement claims against anyone using the recipe, even if it is used without the assistance of a food printer.²²³

Ultimately, the goal will most likely be to adhere as closely as possible to the protection provided by trade secret law. Trade recipes will need enough protection to convince businesses that the potential risks associated with entering the printed food industry are outweighed by the potential rewards; at the same time, the protection should not be so broad that it gives a business an inequitable monopoly over general food concepts and stifles culinary innovation. Much like Congress's

sufficient to avoid infringement).

²¹⁹ See *supra* text accompanying note 71.

²²⁰ See *supra* text accompanying notes 93–94.

²²¹ See *generally supra* text accompanying notes 82–89.

²²² See *generally* John R. Thomas, *The Role of Trade Secrets in Innovation Policy*, CONG. RES. SERV. 1 (Jan. 15, 2014), <https://fas.org/sgp/crs/secrecy/R41391.pdf> (providing an overview of the law and policy of trade secrets).

²²³ See Timothy Holbrook, *How 3D Printing Threatens Our Patent System*, THE CONVERSATION, (Jan. 6, 2016, 6:06 AM), <http://theconversation.com/how-3d-printing-threatens-our-patent-system-52665>.

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focus on other areas where patent trolling has become problematic, Congress needs to ensure the protection is not overly broad and owners cannot become “trade recipe trolls,” abuse their rights, and stifle creativity.²²⁴

VI. CONCLUSION

This note has largely focused on *how* to protect printed food, but there is also the question of whether any legal protection would even successfully punish or prevent food piracy. Even with such strong criminal punishments, the Economic Espionage Act has been largely ineffective since its adoption in 1996, with only ten total convictions in its first eighteen years.²²⁵ Even if copyright protection was explicitly extended to printed food, there is still a question of whether enforcement would be effective. Films and music have been protected by the DMCA since its inception, but copyright owners ultimately abandoned the hunt for downloaders and pirates simply because it was not effective, and instead opted to pursue more cooperative models.²²⁶ Today, research shows that internet piracy is more popular than it has ever been in online culture.²²⁷ Take this response to a DMCA takedown notice by The Pirate Bay, which is no more belligerent than their usual responses and only serves to encourage a culture of piracy:

Hello and thank you for contacting us. We have shut down the website in question. Oh wait, just kidding. We haven't You're free to demand anything you want. So are we. We demand that you cease and desist sending letters like this, since they're frivolous and meaningless. Where should I send the bill for the consumed disk space and bandwidth?²²⁸

²²⁴ Katie Johnson, *Congress Must Stand With Innovators Against Patent Trolls*, THE HILL, (Mar. 26, 2017), <https://thehill.com/blogs/pundits-blog/lawmaker-news/325673-congress-must-stand-with-innovators-against-patent-trolls>.

²²⁵ *Economic Espionage and Trade Secret Theft: Are Our Laws Adequate for Today's Threats?: Hearing before the Subcomm. On Crime and Terrorism of the Comm. On the Judiciary*, 113th Congress 2d Sess. (2014), <https://www.gpo.gov/fdsys/pkg/CHRG-113shrg96009/pdf/CHRG-113shrg96009.pdf> (testimony by Randall C. Coleman, Assistant Director in charge of the FBI's Counterintelligence Division).

²²⁶ Depoorter, *supra* note 174, at 1494.

²²⁷ Ernesto Van de Sar, *Online Piracy is More Popular Than Ever, Research Suggests*, TORRENT FREAK, (Mar. 21, 2018), <https://torrentfreak.com/online-piracy-is-more-popular-than-ever-research-suggests-180321/>.

²²⁸ Cathie Lomeli, *The Hilarious The Pirate Bay's Legal Responses Will Make Your ROFL!*, BEE BULLETIN (May 21, 2015), <https://beebulletin.com/hilarious-pirate-bay-legal-responses/>.

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The questions raised in this note are not simple, and they will not have simple answers, but there needs to be an attempt.²²⁹ “3D printing brings the ‘Napster’ revolution of [internet piracy] to the doorstep of manufacturers and retailers of physical articles,”²³⁰ and this will be no different for the printed food industry once it enters the mainstream. But as the technology advances, it will become more and more difficult to protect trade secrets.²³¹ The printed food industry will most likely need the participation of the large corporations to reach its full potential, but no business will enter the printed food market if a single hacker could easily devalue its most important assets.²³² 3D printing technology is already in the process of reshaping the world, and mostly for the better.²³³ The potential gains in drastically reducing production costs, world hunger, and climate change are an immense benefit to the entire world, and while those benefits should not be ignored, the potential for abuse creates too high a risk for the businesses with the most capital.²³⁴ The law needs to change for society to fully maximize the potentials of the technology. 3D printing, and printed food, can revolutionize nearly every aspect of our everyday lives, but it is going to need a push to get there.

Star Trek portrays a future where money no longer exists, supposedly because “acquisition of wealth [will] no longer [be] the driving force in our lives.”²³⁵ This implies that humankind chose to serve society instead of money, but perhaps it was not a choice. Perhaps disruptive technologies like the replicator made capitalism obsolete. Perhaps the replicator was the catalyst, and technology that can create food and drink at will, for free, simply eliminated the need for concepts such as money and commerce. Will 3D printing and printed food be that catalyst, and make capitalism obsolete? As with nearly all legal questions, the answer is “maybe”.

²²⁹ See Weinberg, *supra* note 40, at 22.

²³⁰ Depoorter, *supra* note 173, at 1495.

²³¹ *Cf. id.* (noting that “3D printing technologies will make it increasingly difficult to enforce IP rights on physical items”).

²³² *Cf. Craig, supra* note 16, at 317–18 (noting that the motivations behind Congress enacting the DMCA surrounded copyright owners and their hesitation to post their works online “without reasonable assurance that they will be protected against massive piracy”) (quoting 63 AM. JUR. PROOF OF FACTS 3D *Proof of Copyright Infringement by File Sharing* § 6 (2016)).

²³³ Jeff Desjardins, *INFOGRAPHIC: All the ways 3D printing is changing the world*, BUSINESS INSIDER (Sept. 28, 2017, 8:59 PM), <https://www.businessinsider.com/infographic-3d-printing-2017-9>.

²³⁴ *Preparing for the Risks of 3D Printing in Manufacturing*, TRAVELERS, <https://www.travelers.com/business-insights/industries/technology/preparing-for-risks-of-3d-printing-in-manufacturing> (last visited Sept. 28, 2018).

²³⁵ STAR TREK: FIRST CONTACT (Paramount Pictures 1996).