Unlocked and Loaded: Government Censorship of 3D-Printed Firearms and a Proposal for More Reasonable Regulation of 3D-Printed Goods

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INTRODUCTION

In August 2012, Defense Distributed launched the Wiki Weapon Project.[1] The stated mission of the group was to produce a working 3D-printed firearm and then publically release the corresponding data files.[2] The group sought to raise $20,000 on the crowdfunding website Indiegogo for the design and creation of the world's first 3D-printed firearm,[3] or a "Wiki Weapon" as the group referred to it.[4] Despite several setbacks with funding[5] and producing[6] the firearm, Defense Distributed announced the successful test firing of a working prototype—the Liberator pistol—less than a year later.[7] True to its word—and name—Defense Distributed released the prototype's data files for the Liberator shortly thereafter.[8]

Almost immediately after Defense Distributed's release, the U.S. Department of State contacted Defense Distributed and ordered that all technical data—namely, the computer-aided design (CAD) files—related to the Liberator, along with many other weapon and weapon accessory designs, be removed immediately from the Internet.[9] Despite believing that it was legal to make the blueprints available to the public, Defense Distributed immediately and "voluntarily" complied with the order while the Department

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1. Andy Greenberg, *'Wiki Weapon Project' Aims To Create a Gun Anyone Can 3D-Print at Home*, FORBES.COM (Aug. 23, 2012, 9:00 AM), http://www.forbes.com/sites/andygreenberg/2012/08/23/wiki-weapon-project-aims-to-create-a-gun-anyone-can-3d-print-at-home/.

2. *Id.*

3. *Id.*; *see also* Jessica Roy, *WikiWeapon Campaign to 3D-Print Your Own Gun Suspended by Indiegogo*, BETABEAT (Aug. 23, 2012, 1:21 PM), http://betabeat.com/2012/08/indiegogo-suspends-campaign-to-build-blueprints-for-3d-printed-gun/ (discussing suspension of crowdfunding account).

4. *Id.*; *see also* Roy, *supra* note 3.

5. *See* Roy, *supra* note 3.

6. *See* Robert Beckhusen, *3-D Printer Company Seizes Machine from Desktop Gunsmith*, WIRED.COM (Oct. 1, 2012, 2:06 PM), http://www.wired.com/2012/10/3d-gun-blocked/.

7. Andy Greenberg, *Meet the 'Liberator': Test-Firing the World's First Fully 3D-Printed Gun*, FORBES.COM (May 5, 2013, 5:30 PM), http://www.forbes.com/sites/andygreenberg/2013/05/05/meet-the-liberator-test-firing-the-worlds-first-fully-3d-printed-gun/print/.

8. *See id.*

9. Jessica Roy, *At the Command of the State Department, Defense Distributed Pulls Its 3D Printed Gun Blueprints*, BETABEAT (May 9, 2013, 4:29 PM), http://betabeat.com/2013/05/defense-distributed-state-department-cody-wilson-3d-guns/.

of State reviewed regulatory compliance of the files.[10] However, Pandora's Box was already open, and the files were easily accessible on the Internet.[11]

This Comment analyzes the regulations in place on 3D-printed firearms and proposes a new standard for regulating 3D-printed goods. Part I provides a brief primer on 3D printing and 3D-printed firearms. Part II turns to the events surrounding Defense Distributed's creation of the world's first 3D-printed firearm and the subsequent government censorship of the corresponding CAD files. Part III discusses the regulations affecting 3D-printed firearms and why these regulations are ill-suited for CAD files and 3D-printed goods. Part IV analyzes the implications of treating CAD files and 3D-printed goods as equivalents of traditional goods. Finally, Part V offers a proposal for a new standard of regulating 3D-printed goods inspired by *Sony Betamax*'s "substantial noninfringing uses"[12] standard. Ultimately, this Comment recommends treating CAD files as expressive free speech and suggests logically examining the potential uses of new technologies in order to allow for the organic development of emerging goods and technologies.

I. 3D PRINTER PRIMER

A. How a 3D Printer Works

One easy way to understand the operation of a 3D printer is to think of a real-life topographical map: the 3D printer lays down incremental layers—one on top of another—to build a 3D model.[13] A 3D printer works in a similar fashion to a typical 2D printer—for example, an inkjet printer—but instead of printing linearly on paper, the 3D printer extrudes, cures, or binds a variety of materials vertically on a base layer.[14] This iterative layering is called "additive manufacturing"[15] and can produce a wide variety of complete objects, separate parts combinable into a complete object, or single replacement parts.[16]

While 3D printers have historically been difficult to obtain and use for the average consumer, 3D printers have reduced in price dramatically and CAD software has

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10. *Id.*

11. Ian Steadman, *US Government Seizes 3D-Printed Gun Files, but Still Shared Elsewhere*, WIRED.CO.UK (May 10, 2013), http://www.wired.co.uk/news/archive/2013-05/10/defcad-gun-design-taken-down.

12. Sony Corp. of Am. v. Universal City Studios, Inc. (*Sony Betamax*), 464 U.S. 417, 440 (1984).

13. Peter Jensen-Haxel, Comment, *3D Printers, Obsolete Firearm Supply Controls, and the Right To Build Self-Defense Weapons Under* Heller, 42 GOLDEN GATE U. L. REV. 447, 449–50 (2012).

14. Kelsey B. Wilbanks, Comment, *The Challenges of 3D Printing to the Repair-Reconstruction Doctrine in Patent Law*, 20 GEO. MASON L. REV. 1147, 1152 (2013). Two examples are the MakerBot Replicator 2, which uses extrusion, and the Peachy Printer, which is a photolithographic printer. Makerbot, *The MakerBot Replicator 2—How It Works*, YOUTUBE (Sept. 19, 2012), https://www.youtube.com/watch?v=AKTSdW7-H3Q; Peachy Printer, *Peachy Printer—How It Works*, YOUTUBE (Sept. 18, 2013), https://www.youtube.com/watch?v=80HsW4HmUes.

15. *See* Wilbanks, *supra* note 14, at 1152.

16. *See id.*

become increasingly simplified.[17] What once cost tens of thousands of dollars can now be purchased by a curious shopper on Amazon[18] for around one thousand dollars.[19] Although that price might place a 3D printer above the level of an impulse buy, the reduction is still significant enough to bring the technology into the hands of serious consumers or hobbyists. Further, as the availability and use of 3D printers has increased, so too have repositories for 3D-printing designs and information.[20] Thus, what was once a relatively narrow and restricted market has expanded to hobbyists,[21] designers,[22] students,[23] and retail outlets.[24]

What a 3D printer produces is only limited by the user's imagination and the specific printer's capabilities. A user creates or imports a 3D object into a CAD program, and the CAD program then slices the 3D object into thin layers.[25] The printer then prints each of these layers using the additive manufacturing process.[26] In this fashion, users have printed medical devices,[27] furniture,[28] instruments,[29] and even edible sculptures;[30] however, designing a functional weapon—such as a firearm—poses unique challenges.[31]

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17. *See id.* at 1153–55.

18. John Biggs, *Amazon Creates a 3D Printing Store, Vaulting the Technology into the Mainstream*, TECHCRUNCH (June 13, 2013), http://techcrunch.com/2013/06/13/amazon-creates-a-3d-printing-store-vaulting-the-technology-into-the-mainstream/.

19. Richard Baguley, *Best 3D Printers 2014*, TOM'S GUIDE (Nov. 26, 2014, 11:00 PM), http://www.tomsguide.com/us/best-3d-printers,news-17552.html (listing several recommended, consumer-level 3D printers from $349–$2899).

20. *See, e.g.*, THINGIVERSE, http://www.thingiverse.com/.

21. *E.g.*, Knowledge Wharton, *Will 3D Printing Push Past the Hobbyist Market?*, FISCAL TIMES (Sept. 2, 2013), www.thefiscaltimes.com/Articles/2013/09/02/Will-3D-Printing-Push-Past-the-Hobbyist-Market.

22. *E.g.*, Lakshmi Sandhana, *The Room with 260 Million Surfaces: 3D Printed Architecture Is Here*, GIZMAG (Oct. 8, 2013), http://www.gizmag.com/swiss-architects-3dprint-a-room/29299/.

23. *E.g.*, Division of Engineering & Computing Services, *3D Printers*, MICH. ST. U. C. ENGINEERING, http://www.egr.msu.edu/decs/labs/printing/3d_printers; School of Engineering Education, *3D Printer Lab*, PURDUE U., https://engineering.purdue.edu/I2IApps/3d_printers/.

24. *See, e.g.*, Rakesh Sharma, *Staples, Office Depot and 3D Printing*, FORBES.COM (Oct. 4, 2013, 6:08 PM), http://www.forbes.com/sites/rakeshsharma/2013/10/04/staples-office-depot-and-3d-printing/.

25. *See* Jensen-Haxel, *supra* note 13.

26. *Id.*

27. *E.g.*, Nancy Owano, *British Project Uses 3D Printing for Prosthetic Eyes*, PHYS.ORG (Nov. 30, 2013), http://phys.org/news/2013-11-british-3d-prosthetic-eyes.html.

28. *E.g.*, Signe Brewster, *This Secretive Startup Plans to 3D Print Custom, Affordable Wood Furniture*, GIGAOM (Oct. 6, 2013, 8:00 AM), http://gigaom.com/2013/10/06/this-secretive-startup-plans-to-3d-print-custom-affordable-wood-furniture/.

29. *E.g.*, Arvid Jense, *Six 3D-Printed Musical Instruments, and What 3D Printing Could Do for Musicians*, CREATE DIGITAL MUSIC (Oct. 15, 2012), http://createdigitalmusic.com/2012/10/six-3d-printed-musical-instruments-and-what-3d-printing-could-do-for-musicians/.

30. *E.g.*, Steph, *Futuristic Food: Edible Wonders of the 3D-Printed Revolution*, WEBURBANIST (June 3, 2013), http://weburbanist.com/2013/06/03/futuristic-food-3d-printed/.

31. *See, e.g.*, Kelsey D. Atherton, *Australian Police Warn of 3-D Printed Gun Explosions*, POPULAR SCI. (May 28, 2013), http://www.popsci.com/technology/article/2013-05/australian

B. Printing, Priming, and Resilience of a 3D-Printed Firearm

The operation of a firearm is not overly difficult to understand,[32] but translating traditional firearm designs of metal and composites to a 3D printer presents novel issues.[33] For example, how well would the plastic barrel hold up against the heat and pressure as the bullet is fired?[34] Further, how resilient would the plastic structure be to the recoil of the firearm, and how much additional material would be needed to stop the plastic from snapping like a plastic twig?[35]

Branching from these questions, when Defense Distributed initially announced its plan to print a functioning firearm, it was met with skepticism.[36] Although Defense Distributed would eventually become the first to succeed in creating a 3D-printed firearm, the company was hardly the first to dream up the concept of a plastic firearm.[37] Previous iterations, however, appear to have amounted to little more than interesting ideas or rumors.[38] Thus, this initial skepticism was understandable—as the idea at the time effectively amounted to containing an explosion inside a Nerf gun—but Defense Distributed remained confident of its goal.[39] The company's vision to design a functional pistol became reality in May 2013—decidedly proving skeptics wrong—and the company subsequently released several more designs.[40]

Building upon Defense Distributed's proof of concept, other designers created a variety of new 3D-printed firearms. Some of these new varieties modified Defense Distributed's designs, attempting to fix design flaws in the originals or modify the

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-police-warn-3-d-printed-gun-failures; Alex Hern, *3D-Printed Guns: Inaccurate and Vulnerable to Catastrophic Failure*, GUARDIAN (Oct. 25, 2013, 9:59 AM), http://www.theguardian.com/uk-news/2013/oct/25/3d-printed-guns-risk-user; Kyle Maxey, *Defense Distributed Tests Their Mettle*, ENGINEERING.COM (Dec. 5, 2012), http://www.engineering.com/3DPrinting/3DPrintingArticles/ArticleID/5038/Defense-Distributed-Tests-Their-Mettle.aspx.

32. *See, e.g.*, Marshall Brain, *How Does a Pistol Work?*, HOWSTUFFWORKS (June 16, 2009, 2:00 PM), http://blogs.howstuffworks.com/2009/06/16/how-does-a-pistol-work/; *see also* Kelsey D. Atherton, *How the World's First 3-D Printed Gun Works*, POPULAR SCI. (May 6, 2013, 3:00 PM), http://www.popsci.com/technology/article/2013-05/worlds-first-fully-3-d-printed-gun-here (explaining how Defense Distributed's Liberator functions).

33. *See, e.g.*, Maxey, *supra* note 31.

34. *See, e.g.*, *id.*

35. *See, e.g.*, Cyrus Farivar, *"Download This Gun": 3D-Printed Semi-Automatic Fires over 600 Rounds*, ARS TECHNICA (Mar. 1, 2013, 9:00 AM), http://arstechnica.com/tech-policy/2013/03/download-this-gun-3d-printed-semi-automatic-fires-over-600-rounds/; Hern, *supra* note 31.

36. *See, e.g.*, Adam Clark Estes, *Despite Skepticism, Cody Wilson Successfully 3D-Printed an Entire Gun*, MOTHERBOARD (May 3, 2013, 5:30 PM), http://motherboard.vice.com/blog/despite-skepticism-cody-wilson-successfully-3d-printed-entire-gun; Greenberg, *supra* note 7.

37. *See* Steve Johnson, *What Happened to the Mythical Undetectable Plastic Gun?*, FIREARM BLOG (Oct. 5, 2011), http://www.thefirearmblog.com/blog/2011/10/05/what-happened-the-the-mythical-undetectable-plastic-gun/.

38. *Id.*

39. Sophie Aubrey, *Printable Firearms a 'Grave Threat' to Australians*, NEWS.COM.AU (Apr. 3, 2013, 1:10 PM), http://www.news.com.au/technology/science/printable-firearms-a-grave-threat-to-australians/story-fn5fsgyc-1226611704081.

40. *See infra* Part II.B.

original designs for use with lower-end 3D printers.[41] One company, Solid Concepts, decided to replicate the components to the classic M1911 semi-automatic pistol in a different medium: metal.[42] The company successfully created the world's first 3D-printed metal firearm, capable of firing at least fifty rounds, using direct metal laser sintering (DMLS).[43] This process works similarly to the more typical plastic-extruding 3D printers, but it substitutes the plastic and plastic-melting components for metal powder and a powerful, focused laser beam.[44] While Solid Concepts' announcement prompted some individuals to make apocalyptic predictions,[45] a company spokesperson was quick to point out that its DMLS printer is an industrial printer[46] and "costs more than my college tuition (and I went to a private university)."[47] Thus, while the concept of a 3D-printed metal firearm presents an intriguing—and perhaps ominous—hint at one avenue of 3D-printing technology, it is unlikely that we will be seeing metal, 3D-printed arsenals anytime in the near future; at any rate, Defense Distributed's origin is far humbler than Solid Concept's vast wealth of tools and knowledge.

II. DEFENSE DISTRIBUTED AND THE WORLD'S FIRST FUNCTIONAL 3D-PRINTED FIREARM

A. Founding and Mission

In August 2012, Cody Wilson—a twenty-four-year-old law student at the University of Texas—and a small group of his friends founded Defense Distributed.[48] Defense Distributed sought "to raise $20,000 to design and release blueprints for a plastic gun anyone can create with a[] . . . 3D printer . . . ."[49] As Wilson stated,

> We want to show this principle: That a handgun is printable. . . . You don't need to be able to put 200 rounds through it. . . . It only has to fire

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41. *See, e.g.*, Andy Greenberg, *$25 Gun Created with Cheap 3D Printer Fires Nine Shots (Video)*, FORBES.COM (May 20, 2013, 11:51 AM), http://www.forbes.com/sites/andygreenberg/2013/05/20/25-gun-created-with-cheap-3d-printer-fires-nine-shots-video/.

42. Samuel Gibbs, *First Metal 3D Printed Gun is Capable of Firing 50 Shots*, GUARDIAN (Nov. 8, 2013, 9:36 AM), http://www.theguardian.com/technology/2013/nov/08/metal-3d-printed-gun-50-shots; Victoria Turk, *You Don't Need To Worry About 3D-Printed Metal Guns*, MOTHERBOARD (Nov. 8, 2013, 9:45 AM), http://motherboard.vice.com/blog/you-dont-need-to-worry-about-the-worlds-first-3d-printed-metal-gun.

43. *See* Gibbs, *supra* note 42.

44. *Id.*

45. *See, e.g.*, Alexis Kleinman, *Now There's a 3D-Printed Gun Made Out of Metal, and We're Doomed*, HUFFINGTON POST (Nov. 8, 2013, 2:33 PM), http://www.huffingtonpost.com/2013/11/07/3d-printed-gun-metal_n_4234900.html.

46. *See* Gibbs, *supra* note 42.

47. *See* Turk, *supra* note 42. The DMLS machine costs approximately $850,000 and is probably out of most individuals' price ranges. *See* Kleinman, *supra* note 45.

48. *See* Greenberg, *supra* note 1.

49. *See id.*

> once. But even if the design is a little unworkable, it doesn't matter, as long as it has that guarantee of lethality.[50]

Wilson described himself as a "crypto-anarchist"—that is, a person seeking the free flow of data and an end to government surveillance and censorship.[51] Crypto-anarchism grew largely out of an online movement in the 1980s involving a group of cryptography activists known as the Cypherpunks.[52] Notable members of the Cypherpunks included WikiLeaks' Julian Assange, as well as technology and politics writer Tim May.[53] It is understandable then, based on this philosophy at least, why Wilson sought to release the firearm design to the public.

While Defense Distributed's mission might be read by some as the pursuit of an undetectable, lethal weapon,[54] others consider the company's mission to be one of "the greatest piece[s] of political performance art in this new century."[55] Although this might seem to be a strained interpretation of the project, others give further credence to the idea, comparing Defense Distributed's mission for 3D printers with the printing press and early printing restrictions.[56] Even if this may not be a pinnacle of performance art of our age, Defense Distributed's creations certainly pose intriguing First and Second Amendment questions. Whatever the perceived scope of Defense Distributed's mission might be, the potential ripple of influence created by Defense Distributed—directly or indirectly—is undeniable.

B. Concept and Creations

Despite Wilson's optimism, Defense Distributed experienced a number of setbacks as it worked to design its working prototypes. Starting from its rather ambitious goal of creating a functional 3D-printed firearm, Defense Distributed launched fundraising efforts on the crowdfunding website Indiegogo.[57] Defense

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50. *See id.*

51. Joshua Kopstein, *Guns Want To Be Free: What Happens When 3D Printing and Crypto-Anarchy Collide?*, VERGE (Apr. 12, 2013, 9:30 AM), http://www.theverge.com/2013/4/12/4209364/guns-want-to-be-free-what-happens-when-3d-printing-and-crypto-anarchy; *see also* Timothy C. May, *The Crypto Anarchist Manifesto*, ACTIVISM.NET (Nov. 22, 1992, 12:11 PM), http://www.activism.net/cypherpunk/crypto-anarchy.html (reciting the origin manifesto of Crypto-Anarchism).

52. DJ Pangburn, *Whistleblowers and the Crypto-Anarchist Underground: An Interview with Andy Greenberg*, MOTHERBOARD (Sept. 19, 2013, 3:05 PM), http://motherboard.vice.com/blog/whisteblowers-and-the-crypto-anarchist-underground-an-interview-with-andy-greenberg.

53. *Id.*

54. *See* Greenberg, *supra* note 7.

55. Aaron Timms, *The Future of 3D Printing Might Be Scarier Than You Thought*, BLOUIN NEWS (Mar. 29, 2013), http://blogs.blouinnews.com/blouinbeattechnology/2013/03/29/the-future-of-3d-printing-might-be-scarier-than-you-thought/.

56. Philip Bump, *How Defense Distributed Already Upended the World*, WIRE (May 10, 2013, 7:18 PM), http://www.thewire.com/technology/2013/05/how-defense-distributed-already-upended-world/65126/.

57. Erin Lee Car, *Click, Print, Gun: The Inside Story of the 3D-Printed Gun Movement*, MOTHERBOARD (Mar. 25, 2013, 11:19 AM), http://motherboard.vice.com/read/click-print-gun-the-inside-story-of-the-3d-printed-gun-movement-video.

Distributed wanted to raise $20,000 "to design and build the world's first entirely 3D-printed handgun."[58] Indiegogo, however, summarily removed the project from its website and refunded the pool of donations to the respective donors.[59] Indiegogo explained later that the project "violated Indiegogo's terms of service, which don't allow the sale of 'ammunition, firearms, or certain firearm parts or accessories.'"[60] Despite Indiegogo's rejection, Defense Distributed moved the fundraising efforts to its own website and, within a short period, managed to raise more than its previous $20,000 goal.[61] The group created the pistol—capable of firing a .380 caliber bullet—using an $8000 3D printer in a small workshop in Austin, Texas.[62] The design relies almost entirely on plastic for the pistol; "[t]he only non-printed piece is a common hardware store nail used as its firing pin."[63] The only other nonprinted, nonplastic part—which is effectively superfluous to the operation of the pistol—is a "six ounce cube of non-functional steel" that fits into the pistol body for compliance with the Undetectable Firearms Act.[64] And so, despite all the skepticism and setbacks, Defense Distributed achieved its goal of firing at least one shot,[65] and the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) later found the bullets fired from the Liberator were lethal.[66]

While Defense Distributed's vision looked to the future, the group looked to the past for inspiration in its design. Specifically, Defense Distributed invoked a rebellious tone for the Liberator by naming it after the FP-45 Liberator,[67] "a single-shot weapon produced by the Allies during World War 2 and airdropped to resistance fighters in France and China."[68] Although "there[is] no evidence that the FP-45 was ever used in combat,"[69] it would appear that Defense Distributed channeled the symbolism of its namesake: "[T]he *idea* that there were a million guns floating around behind enemy lines was enough to reduce the morale of Axis troops. . . . [I]t's clear that Wilson hopes that his Liberator will have the same effect on the US government."[70] Thus, while Defense Distributed created a functional firearm, it also imbued its creation with a historically and politically significant message.

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58. Andy Greenberg, *3D-Printable Gun Project Hits Its Fundraising Goal Despite Being Booted off Indiegogo*, FORBES.COM (Sept. 20, 2012, 9:49 AM), http://www.forbes.com/sites/andygreenberg/2012/09/20/3d-printed-gun-project-hits-its-fundraising-goal-despite-being-booted-off-indiegogo/.

59. *Id.*

60. *Id.*

61. *Id.*

62. *See* Greenberg, *supra* note 7.

63. *Id.*

64. *Id.*

65. *See* Greenberg, *supra* note 1; *see also supra* text accompanying note 50.

66. Ryan J. Reilly, *Feds Printed Their Own 3D Gun and It Literally Blew Up in Their Faces*, HUFFINGTON POST (Nov. 14, 2013, 10:40 AM), http://www.huffingtonpost.com/2013/11/13/3d-guns-atf_n_4269303.html.

67. *See* Sebastian Anthony, *The Liberator: The First Downloadable 3D-Printed Gun Gets Test Fired*, EXTREMETECH (May 6, 2013, 6:23 AM), http://www.extremetech.com/extreme/155084-the-liberator-the-first-downloadable-3d-printed-gun-gets-test-fired.

68. *Id.*

69. *Id.*

70. *Id.* (emphasis in original).

In addition to the Liberator, Defense Distributed also designed and created a functional lower receiver for an AR-15,[71] an extended AR-15 magazine,[72] and an extended magazine for the AK-47.[73] Versions of these designs proved capable as functional firearm components.[74] For example, a design for a 3D-printed AR-15 lower receiver—the part housing the trigger and gripped by the operator—improved from initially breaking after only six rounds to being capable of firing over six-hundred rounds.[75] Although a component life of six-hundred rounds is not comparable to traditional weapon performance, it represents a significant improvement in the design over time and suggests further refinement is possible. Defense Distributed's achievements, however, did not go unnoticed by the U.S. government.

C. "Voluntary" Censorship

On May 8, 2013—a mere three days after publishing the Liberator CAD files for the public to download—the U.S. Department of State requested that Defense Distributed remove its download links for the Liberator and a number of other accessories and weapons.[76] The State Department alleged that Defense Distributed's CAD files fell under the International Traffic in Arms Regulations (ITAR) as technical data, and therefore the company was required to remove the files from public access until the State Department could check for ITAR applicability and compliance.[77]

In response to the State Department's demands, Defense Distributed "voluntarily" removed the CAD files from its website—albeit not without public comment.[78] While the State Department's notice technically did not state that the CAD files violated the ITAR, it seems reasonable from the speed of the State Department's response that the Department considered the Liberator to be a threat. But, in an interview after the takedown, Defense Distributed's Cody Wilson made clear that the company's compliance was ultimately of little consequence:

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71. *See* Farivar, *supra* note 35. An AR-15 is effectively the civilian version of the M16 rifle used by the U.S. military. *See* Max R. Popenker, *Armalite / Colt AR-15 / M16 M16A1 M16A2 M16A3 M16A4 Assault Rifle (USA)*, WORLD GUNS, http://world.guns.ru/assault/usa/m16-m16a1-m16a2-m16a3-e.html.

72. *See* Greenberg, *supra* note 7.

73. *See id.* An AK-47—signifying the firearm's official name, Avtomat Kalashnikova, and the year of the model, 1947—is an assault rifle capable of firing six-hundred rounds per minute, designed in the 1940s by the Soviet Union and still used throughout the world. Max R. Popenker, *Kalashnikov AK (AK-47) AKS, AKM and AKMS Assault Rifles (USSR)*, WORLD GUNS, http://world.guns.ru/assault/rus/ak-akm-e.html.

74. *See, e.g.*, Farivar, *supra* note 35.

75. *See id.*

76. Letter from Glenn E. Smith, Chief, Enforcement Division, U.S. Dep't of State, to Cody Wilson, Defense Distributed (May 8, 2013) [hereinafter Takedown Letter], *available at* http://www.scribd.com/doc/140471313/Letter-from-Department-of-State-to-Defense-Distributed.

77. *Id.*; *see also* Amendments to the International Traffic in Arms Regulations, 58 Fed. Reg. 39,280 (July 22, 1993) (codified at 22 C.F.R. pts. 120–130).

78. *See, e.g.*, Andy Greenberg, *State Department Demands Takedown of 3D-Printable Gun Files for Possible Export Control Violations*, FORBES.COM (May 9, 2013, 2:36 PM), http://www.forbes.com/sites/andygreenberg/2013/05/09/state-department-demands-takedown-of-3d-printable-gun-for-possible-export-control-violation/; Roy, *supra* note 9.

> I immediately complied and I've taken down the files . . . [b]ut this is a much bigger deal than guns. It has implications for the freedom of the web. . . . I still think we win in the end . . . [b]ecause the files are all over the Internet, the Pirate Bay has it—to think this can be stopped in any meaningful way is to misunderstand what the future of distributive technologies is about.[79]

Wilson's statement is at least partially accurate: the Defense Distributed CAD files, along with many others, are freely available on the Internet.[80]

It is because of this oddity of "compliance without effect" that traditional regulation and censorship fight for relevance in the technological arena. Compared to the past, when killing a dissident, burning books, or shutting down a printing press would stop dissenting speech[81] (if only for a while), dissidents can now take to the Internet to reach a worldwide audience, spreading their messages in easily reproducible text, audio, and video.[82] In this respect, Wilson's message reached, and continues to reach, the intended audience,[83] and Defense Distributed's designs escaped any real government restraint.[84] Thus, regardless of whether the U.S. Department of State admits it or not, it may have won the battle, but it lost the war.

III. REGULATIONS AFFECTING 3D-PRINTED FIREARMS

Given the hypothetical scenario of a 3D-printed arsenal, it is unsurprising that some might worry about possible misuses of the technology. The potential for misuse, whether accidental or intentional, poses serious demands on traditional firearms regulations.[85] While the U.S. Department of State looked to the ITAR,[86] others have suggested using the Undetectable Firearms Act[87] or the Invention Secrecy Act to limit the proliferation of 3D-printed firearms.[88] These regulations may

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79. Roy, *supra* note 9.

80. *See, e.g.*, *id.*; *see also* Derek Mead, *With 3D-Printed Gun Files Safely on the Pirate Bay, What's Next?*, MOTHERBOARD (May 10, 2013, 11:20 AM), http://motherboard.vice.com/blog/with-3d-printed-gun-files-safely-on-the-pirate-bay-whats-next-1 (describing file availability).

81. *See* Van Vechten Veeder, *The History and Theory of Law of Defamation*, 3 COLUM. L. REV. 547, 561–63 (1903).

82. *See, e.g.*, *Anonymous Hackers Engaged in Year-Long Campaign Targeting US Govt Agencies—FBI*, RT.COM (Dec. 25, 2013, 8:41 AM), http://rt.com/usa/anonymous-government-campaign-fbi-814/; TheAnonMessage, *Anonymous—Operation Defense (CISPA)*, YOUTUBE (Apr. 7, 2012), https://www.youtube.com/watch?v=v8no3E0Hx7k.

83. *See, e.g.*, Greenberg, *supra* note 41.

84. *See, e.g.*, Mead, *supra* note 80.

85. For example, while manufacturing a firearm in the past required machining knowledge and tools, how does a government regulate potential firearm manufacturers if anyone with a 3D printer is capable of producing a functional firearm?

86. *See supra* text accompanying notes 76–77.

87. *See, e.g.*, Jacob Kastrenakes, *Senator Warns of 3D-Printed Gun Dangers as Undetectable Firearm Ban Nears Expiration*, VERGE (Nov. 18, 2013, 12:32 PM), http://www.theverge.com/2013/11/18/5117990/schumer-pushes-undetectable-firearm-act-extension-3d-printed-gun-warning.

88. *See, e.g.*, Jose Abreu, *Obama Regime Begins Using Invention Secrecy Act to Suppress*

have some degree of efficacy in limiting 3D-printed firearms, but ultimately these regulatory schemes are becoming rapidly inadequate to deal with emerging technologies such as 3D printers.

A. International Traffic in Arms Regulations

1. Background and Use

The ITAR[89] was enacted in 1976 during the Cold War, ostensibly to protect U.S. interests domestically and internationally.[90] This set of regulations specifically limits the export[91] or import of defense- and military-related goods and information that appear on the U.S. Munitions List (USML) to a "foreign person."[92] The USML includes a surprisingly extensive catalog, arranged in twenty categories,[93] including firearms;[94] ammunition;[95] missiles;[96] explosives and propellants;[97] ships;[98] tanks;[99] aircraft;[100] military training equipment;[101] personal protective equipment;[102] toxicological agents;[103] spacecraft;[104] submarines;[105] and any technical data, articles, or services that the government deems classified, whether enumerated in the USML or not.[106] In fact, the USML is so broad that it may be difficult to contemplate any weapon or technology that a defense-related agency could not restrict based loosely upon *some* clause of the USML.[107] Whatever the breadth, however, the ITAR

Guns, ABREU REP. (Aug. 20, 2013), http://www.abreureport.com/2013/08/obama-regime-begins-using-inventions.html.

89. 22 C.F.R. §§ 120–130 (2014); *see also* Amendments to the International Traffic in Arms Regulations, 58 Fed. Reg. 39,280 (July 22, 1993) (codified at 22 C.F.R. pts. 120–130).

90. Dan L. Burk, *Patenting Speech*, 79 TEX. L. REV. 99, 103–04 (2000).

91. 22 C.F.R. § 120.17 (defining "export").

92. 22 C.F.R. § 120.16 (defining "foreign person" to be "any natural person who is not a lawful permanent resident as defined by 8 U.S.C. [§] 1101(a)(20) or who is not a protected individual as defined by 8 U.S.C. [§] 1324b(a)(3)" as well as "any foreign corporation, business association, partnership, trust, society or any other entity or group that is not incorporated or organized to do business in the United States, as well as international organizations, foreign governments and any agency or subdivision of foreign governments (e.g., diplomatic missions)").

93. 22 C.F.R. § 121.1 (enumerating Categories I–XX).

94. *Id.* (enumerating firearms under Category I).

95. *Id.* (enumerating ammunition and ordnance under Category III).

96. *Id.* (enumerating missiles under Category IV).

97. *Id.* (enumerating explosives and propellants under Category V).

98. *Id.* (enumerating various naval categories under Category VI).

99. *Id.* (enumerating tanks and military ground vehicles under Category VII).

100. *Id.* (enumerating aircraft and related articles under Category VIII).

101. *Id.* (enumerating military training equipment and training under Category IX).

102. *Id.* (enumerating personal protective equipment and shelters under Category X).

103. *Id.* (enumerating toxicological agents under Category XIV).

104. *Id.* (enumerating spacecraft under Category XV).

105. *Id.* (enumerating submarines under Category XX).

106. *Id.* (including nonenumerated classified articles, technical data, and defense services under Category XVII).

107. For example, Category IX—Military Training Equipment and Training includes under

principally regulates U.S. goods or information from finding its way into the hands of foreign persons—which effectively amounts to non-U.S. citizens.[108]

However, it appears that Defense Distributed's mere posting of its CAD files on the Internet constituted an export in the eyes of the Department of State. The takedown demand sent to Defense Distributed noted,

> Defense Distributed may have released ITAR-controlled technical data without the required prior authorization from the Directorate of Defense Trade Controls (DDTC), a violation of the ITAR.
>
> Technical data regulated under the ITAR refers to information required for the design, development, production, manufacture, assembly, operation, repair, testing, maintenance or modification of defense articles, including information in the form of blueprints, drawings, photographs, plans, instructions or documentation. . . . Pursuant to § 127.1 of the ITAR, it is unlawful to export any defense article or technical data for which a license or written approval is required without first obtaining the required authorization from the DDTC. . . . *Until the Department provides Defense Distributed with final [Commodity Jurisdiction] determinations, Defense Distributed should treat the [CAD files listed in the takedown demand] as ITAR-controlled. This means that all such data should be removed from public access immediately.*[109]

Because Defense Distributed's CAD files had already been downloaded by over one hundred thousand users,[110] perhaps it is only natural for the State Department to

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section (b) "[s]imulation devices for the items covered by this subchapter" and under section (d) "[c]omponents, parts, accessories, attachments, and associated equipment specifically designed, modified, configured, or adapted for the articles in paragraphs (a), (b) and (c) of this category." *Id.* (enumerating military training equipment and training under Category IX). Under these definitions, and considering the U.S. military's use of video games as training tools, it would not be too absurd to see the Department of Defense arguing for restrictions on new virtual reality devices (e.g., Oculus Rift), military-based games (e.g., Arma 2), or representative controllers (e.g., controllers in the shape of an M4 assault rifle). *See, e.g.*, Sebastian Anthony, *Omnidirectional Treadmill + Oculus Rift = At-Home Virtual Reality Finally Arrives*, EXTREMETECH (Apr. 22, 2013, 7:58 AM), http://www.extremetech.com/extreme/153919-omnidirectional-treadmill-oculus-rift-at-home-virtual-reality-finally-arrives (describing virtual reality devices); Damien Gayle, *The Games Controller that Looks Just Like a Real Gun: Fears Over Latest Xbox Gadget Designed To Resemble Military-Grade Weapon*, MAIL ONLINE (Oct. 8, 2012, 11:11 AM), http://www.dailymail.co.uk/sciencetech/article-2214609/The-games-controller-mistaken-real-gun--fears-latest-Xbox-addon.html (describing Delta Six controller); Hamza Shaban, *Playing War: How the Military Uses Video Games*, ATLANTIC (Oct. 10, 2013, 5:04 PM), http://www.theatlantic.com/technology/archive/2013/10/playing-war-how-the-military-uses-video-games/280486/ (describing U.S. military's use of video games).

108. *See* Burk, *supra* note 90, at 104 ("This system of review and licensing was originally designed to keep munitions technology out of the hands of the Soviet Union, but since the end of the Cold War the system is now (supposedly) employed to keep the technology out of the hands of terrorists, drug lords, child pornographers, and other targets of law enforcement investigation." (footnote omitted)).

109. Takedown Letter, *supra* note 76, at 1–2 (emphasis added).

110. Andy Greenberg, *3D-Printed Gun's Blueprints Downloaded 100,000 Times in Two*

automatically assume some of those users were foreign persons, but the takedown demand never actually makes this assertion.[111] Instead, the Department flatly stated, "Defense Distributed *may* have released ITAR-controlled technical data,"[112] "Defense Distributed *should* treat the [CAD files listed in the takedown demand] as ITAR-controlled,"[113] and "all such data *should* be removed from public access immediately."[114] However, it is unlikely that Defense Distributed felt that these demands were anything but mandatory if the company wanted to avoid legal action from the State Department.[115] The Department of State effectively proceeded on a presumption of "guilty until proven to comply with ITAR-regulations," despite failing to offer any actual evidence of an export to a foreign individual.[116] If nothing else, such a thinly veiled threat should be treated as an inadequate and unenforceable request, just as an insufficient notice-and-takedown request under the Digital Millennium Copyright Act would be treated.[117]

Thus, the foundation for the ITAR-based demand was at least foundationally lacking in this instance—although it appeared to serve the State Department's purpose—however, Defense Distributed's "voluntary" compliance was a hollow victory. While the government may claim a victory now, the future effectiveness of the ITAR faces clear challenges with the ever-increasing connectivity and decentralization of the Internet.[118]

2. De Facto Obsolescence of the ITAR

While the regulations under the ITAR may have experienced greater effectiveness in the pre-Information Age, that trend is unlikely to continue. Although the physical export and import of tanks, submarines, and spacecraft will remain viable targets for the ITAR, technical data is far more likely to be sent than a physical article today.[119] Try as it might, the U.S. government cannot possibly prevent every leak of

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Days (With Some Help from Kim Dotcom), FORBES.COM (May 8, 2013, 5:12 PM), http://www.forbes.com/sites/andygreenberg/2013/05/08/3d-printed-guns-blueprints-downloaded-100000-times-in-two-days-with-some-help-from-kim-dotcom/.

111. *See* Takedown Letter, *supra* note 76.

112. *Id.* at 1 (emphasis added).

113. *Id.* at 2 (emphasis added).

114. *Id.* (emphasis added).

115. *See* Roy, *supra* note 9 (noting that even though Wilson believed Defense Distributed to be immune from the State Department's review procedures, he still immediately complied with the demands).

116. *See* Takedown Letter, *supra* note 76.

117. *See* 17 U.S.C. § 512(c)(3) (2012) (limiting liability of service provider in event of faulty copyright notice). While this analogy seems particularly relevant due to the nature and medium of the data offense and is deserving of scholarly review, such review is beyond the scope of this Comment.

118. That is, the fracturing of centralized communications networks controlled by a few entities into individual devices in the hands of individuals.

119. *Cf.* Geoffrey Ingersoll, *REPORT: Chinese Hackers Stole Plans for Dozens of Critical US Weapons Systems*, BUS. INSIDER (May 28, 2013, 11:11 AM), http://www.businessinsider.com/china-hacked-us-military-weapons-systems-2013-5 (discussing the theft of digital U.S. military technology plans and personal information via hacking and "human engineering").

information,[120] and dissidents can send this data instantly, globally, and, sometimes, anonymously.[121] On top of this aging issue, the ITAR is inherently limited as an export control measure, leaving gaping domestic loopholes.[122] Put simply, the ITAR is not effective in preventing the exchange of data or new technologies in today's world.

To understand the ITAR's ineffectiveness against the dissemination of Defense Distributed's CAD files, one need only consider the ITAR's enforcement scope. While the USML is remarkably vast, the targets of prohibition are still non-U.S. citizens.[123] Hypothetically, what limitations would the ITAR place on Defense Distributed if the company had limited the distribution of its CAD files to only lawful U.S. citizens?[124] There would no longer be an export to a foreign person for the ITAR to regulate. Many commentators fear the proliferation of plastic firearms being used by foreign terrorists,[125] but the ITAR does nothing to prevent a U.S. citizen—who is not otherwise classified as a foreign person—from obtaining CAD files from another U.S. citizen and creating the exact same harm. The ITAR's effect is nullified simply by changing the destination, but the potential harm is still clearly present.

Additionally, once the technical data—in this case CAD files—reaches the Internet, the ITAR has effectively failed. Whether this technical data reaches the public from an inventor like Defense Distributed or from a U.S. citizen that received the data legally, the disclosure is nearly irreversible.[126] While the same can be said for most laws that are reactive in nature,[127] sending technical data differs in one major aspect: ease of action. It is no longer necessary to transfer physical goods across

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120. *See, e.g.*, Amar Toor, *Pentagon Papers Whistleblower Says NSA Leak Is Most Important in US History*, VERGE (June 10, 2013, 8:43 AM), http://www.theverge.com/2013/6/10/4413936/daniel-ellsberg-edward-snowden-nsa-leak-more-important-than-pentagon-papers (referencing multiple information leaks).

121. *See, e.g.*, Adi Robertson, *NSA Tried and Failed To Compromise Tor, but Browser Vulnerabilities Gave Some Users Away*, VERGE (Oct. 4, 2013, 12:00 PM), http://www.theverge.com/2013/10/4/4802512/nsa-failed-to-compromise-tor-network-but-exploited-browser-vulnerabilities.

122. For example, while transfer of ITAR-controlled articles or information to a foreign individual would be regulated by ITAR, transfer of that same article or information between two U.S. citizens with no foreign ties, in person and in the United States, would neither implicate a foreign person nor an import or export.

123. *See* Burk, *supra* note 90, at 104.

124. While this hypothetical poses obvious verification and fraud possibilities, the implication for conflict within the hypothetical remains tangible.

125. *See, e.g.*, Andy Greenberg, *3D-Printed Guns as Art: London Design Museum Buys Two 'Liberator' Printed Pistols*, FORBES.COM (Sept. 15, 2013, 4:23 PM), http://www.forbes.com/sites/andygreenberg/2013/09/15/3d-printed-guns-as-art-london-design-museum-buys-two-liberator-printed-pistols/ (noting Senator Schumer's comments).

126. *See* Mead, *supra* note 80; *see also, e.g.*, *Unflattering Beyoncé*, KNOW YOUR MEME (Feb. 7, 2013, 2:16 AM), http://knowyourmeme.com/memes/unflattering-beyonce (last modified Dec. 3, 2013) (documenting Streisand Effect in conjunction with pictures of singer Beyoncé from Super Bowl XLVII).

127. For example, it would be illogical to charge an individual with aiding, planning, or committing a murder until he commences such activities. Doing so would effectively amount to a thoughtcrime. *See generally* GEORGE ORWELL, NINETEEN EIGHTY-FOUR (1987) (popularizing concept of thoughtcrime).

borders when the data can be effortlessly shared over the Internet, and once Pandora's Box is opened by this transfer, the ITAR fails.

Thus, the ITAR faces issues both in preventing information transfer to foreign and domestic persons alike. While the State Department took down one source of Defense Distributed's CAD files, does this even matter when any individual around the world can still download the files? Further, does the perceived oppression and subsequent backlash from the enforcement do more harm than good? Whatever the answer—which will surely be a major point of contention in the years to come—the ITAR has some viable uses for the physical transfer of articles or information, but the Information Age has quickly antiquated the ITAR's effectiveness. This antiquation, however, is not limited to the ITAR.

B. Undetectable Firearms Act

1. Background and Use

In addition to the ITAR, several authorities and commentators[128] have noted that 3D-printed plastic firearms should be banned under the Undetectable Firearms Act of 1988 (UFA).[129] Specifically, the UFA states,

> It shall be unlawful for any person to manufacture, import, sell, ship, deliver, possess, transfer, or receive any firearm—
>
> (A) [that] . . . is not as detectable as [3.7 ounces of stainless steel], by walk-through metal detectors . . . or
>
> (B) any major component of which, when subjected to inspection by the types of x-ray machines commonly used at airports, does not generate an image that accurately depicts the shape of the component.[130]

The Act was largely a reaction to polymer components like those used in Glock firearms.[131] At the time, some groups took to naming Glock firearms "terrorist specials"[132] for their use of plastics instead of metal, which lessened the detectable signatures of the weapon.[133] Several gun advocacy groups, such as the National Rifle Association (NRA), eventually supported a compromise version of the UFA "bann[ing] the future production and sale of firearms with less than four ounces of metal,"[134] and President Reagan signed the UFA into law.[135]

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128. *See, e.g.*, *3D Plastic Guns: US Lawmakers Seek Ban on National Security Grounds*, RT.COM (Nov. 15, 2013, 11:43 AM), http://rt.com/usa/banning-undetectable-plastic-firearms-697/.

129. Undetectable Firearms Act of 1988, 18 U.S.C. § 922(p) (2012).

130. *Id.* § 922(p)(1).

131. *See* Dave Kopel, *The Cheney Glock-n-Spiel*, DAVE KOPEL (July. 27, 2000, 10:45 AM), http://www.davekopel.com/NRO/2000/The-Cheney-Glock-n-Spiel.htm; MAC, *3D Guns Still Scaring People*, BANG SWITCH (July 5, 2013, 3:21 PM), http://www.thebangswitch.com/3d-guns-still-scaring-people-3/.

132. *See* Kopel, *supra* note 131.

133. *See id.*

134. *Id.*

135. Matt Sledge, *Undetectable Firearms Act: Rep. Steve Israel Pushes for Renewal as Defense Distributed Pulls Prank*, HUFFINGTON POST (Apr. 2, 2013, 2:22 AM),

Since being signed into law in 1988, Congress renewed the UFA in 1998 and 2003.[136] The Act nearly expired on December 9, 2013,[137] but several Congresspersons—including Representative Steve Israel and Senator Chuck Schumer—strongly pushed for a renewal of the Act, this time using 3D-printed weapons as a rallying cry.[138] Senator Schumer stated, "The expiration of this law, combined with advances in 3D-printing, make what was once a hypothetical threat into a terrifying reality."[139] To this end, both Senator Schumer and Representative Israel introduced proposals for extending the UFA.[140] Interestingly, Representative Israel's proposal also adds ammunition magazines and firearm receivers to the previously regulated list of undetectable components;[141] additions that are potentially due to Defense Distributed's creation of 3D-printed magazines and receivers.[142]

However, despite the dour predictions of so many individuals, the basic principle of the UFA remains the same: firearm components must be detectable by airport scanners and detectors. This basic principle of detection, however, is also the UFA's largest weakness. As long as the design is detectable, or as long as the good is not actually a firearm, then the UFA does not apply.

2. De Facto Obsolescence of the UFA

Much like the challenges facing the ITAR, the UFA will most likely face a similar reduction in effectiveness even if Congress again extends the UFA. Also like the ITAR, the UFA's primary issue is one of scope. While the ITAR's export and import scope limits the law's applicability for domestic use, the UFA's scope limits applicability to firearms not meeting the minimum detection thresholds. Assuming a 3D-printed firearm has a detectable signature equal to a 3.7 ounce stainless steel block and the firearm's major components are detectable by an airport x-ray scanner, the 3D-printed firearm is not in violation with the UFA.[143]

Aside from the obvious fact that a CAD file is no more a functional, regulated firearm under the UFA than a picture of a nuclear bomb is a functional, regulated bomb, Defense Distributed took the UFA's requirements into account when designing its weapons.[144] The group's CAD files, or at least the high-profile ones,

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http://www.huffingtonpost.com/2013/04/01/undetectable-firearms-act-steve-israel-defense-distributed_n_2994020.html.

136. *See 3D Plastic Guns: US Lawmakers Seek Ban on National Security Grounds*, *supra* note 128.

137. *See* Michael Weinberg, *Undetectable Firearms Law Passes Without 3D Printing*, PUB. KNOWLEDGE (Dec. 10, 2013), http://publicknowledge.org/blog/undetectable-firearms-law-passes-without-3d-p.

138. *See, e.g.*, *3D Plastic Guns: US Lawmakers Seek Ban on National Security*, *supra* note 128; Rich Brown, *The Undetectable Firearms Act and 3D-Printed Guns (FAQ)*, CNET NEWS (Dec. 10, 2012, 1:49 PM), http://news.cnet.com/8301-11386_3-57558213-76/the-undetectable-firearms-act-and-3d-printed-guns-faq/;Weinberg, *supra* note 137.

139. *See 3D Plastic Guns: US Lawmakers Seek Ban on National Security*, *supra* note 128.

140. Weinberg, *supra* note 137.

141. Undetectable Firearms Modernization Act, H.R. 1474, 113th Cong. (1st Sess. 2013).

142. *See* Greenberg, *supra* note 7.

143. *See* Brown, *supra* 138.

144. *See* Greenberg, *supra* note 7 (describing the insertion of a six ounce cube of

did comply with the UFA. The AR-15 and AK-47 receivers did not violate the UFA because receivers were exempted from the definition of "firearm,"[145] and magazines were similarly exempted.[146] Both of these exclusions are arguably why Representative Israel's proposal aims to expand the UFA's scope to include these designs.[147] Additionally, the Liberator—perhaps the best known design released by Defense Distributed—specifically included a six ounce block of metal for the express purpose of complying with the UFA.[148] While some might see the inclusion of this block as "extraneous,"[149] the fact remains that the Liberator's design expressly calls for the inclusion of a detectable block, which brings a real-life Liberator design into UFA compliance.

Further, even if the metal block is extraneous, the violation for removing the block should not create liability for Defense Distributed. By analogy, a driver's removal of a seatbelt, airbags, and brakes from an automobile manufacturer's designs clearly would not impose liability on Ford or General Motors. Additionally, even if the user removed the metal block in violation of the UFA, the bullets and firing pin (a nail) are still detectable by most—if not all—properly functioning metal detectors,[150] and without either of these components the gun is effectively a plastic toy. While this is not to say that the plastic firearm, bullets, and a firing pin could not slip past screening and pose a very real threat, the same could also be said for traditional weapons.[151] As some have noted, "At the moment plastic guns are unlikely to pose any more threat to American society than the estimated 300 million + conventional weapons already owned by Americans."[152] The Liberator's design calls for a detectable block that is fifty percent greater than the UFA requires, and failure by a user to adhere to the design should not create liability in the CAD file's designer.

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nonfunctional steel to enable detection by a metal detector).

145. Undetectable Firearms Act of 1988, 18 U.S.C. § 922(p)(2)(A) (2012) (exempting the frame or receiver from the definition of firearm).

146. *See id.* § 922(p)(1)(A).

147. *See supra* text accompanying notes 141–42.

148. *See* Greenberg, *supra* note 7.

149. J.D. Tuccille, *3D-Printed Handgun Prompts Congressman To Propose Impotent Legislation*, REASON.COM (May 4, 2013, 11:55 AM), http://reason.com/blog/2013/05/04/3d-printed-handgun-prompts-congressman-t.

150. Metal detectors can be tuned to certain levels of sensitivity, but anyone who has been stopped for two pennies in a pocket or a belt bucket can readily attest that 3.7 ounces of stainless steel would surely set off many detectors. *See, e.g.*, Michael Bernzweig, *Understanding and Selecting Walk Through Security Metal Detectors*, METALDETECTOR.COM (2008), http://www.metaldetector.com/learn/buying-guide-articles/security-use/understanding-selecting-walk-through-security-metal-detectors. For comparison, 3.7 ounces is roughly equal to 105 grams—or about the weight of a stick of butter. *How Much Is 100 Grams?*, HEALTHALICIOUSNESS.COM, http://www.healthaliciousness.com/blog/How-much-is-100-grams.php.

151. *See* Matthew Mosk, Angela Hill & Timothy Fleming, *Gaping Holes in Airline Security: Loaded Gun Slips Past TSA Screeners*, ABC NEWS (Dec. 16, 2010), http://abcnews.go.com/Blotter/loaded-gun-slips-past-tsa-screeners/story?id=12412458.

152. *See 3D Plastic Guns: US Lawmakers Seek Ban on National Security Grounds*, *supra* note 128.

Finally, recent improvements in 3D-printing technology allowing a user to print metal guns[153] would make the UFA a moot point if the user printed a metal gun instead of a plastic gun. If, for example, an individual printed a replica M1911—a gun that clearly exceeds the 3.7 ounce requirement[154]—this firearm would not run afoul of the UFA. While metal-based 3D printing is not economically feasible at this point in time,[155] the price of metal-based 3D-printing will most likely decrease—as new technology tends to do[156]—and such 3D printing may be subject to much lower barriers to entry than exist currently. Thus, the current focus on criminals printing undetectable firearms[157] could rapidly evolve into criminals printing *any* firearm, but these firearms could be readily identifiable by airport scanners and therefore elude the UFA's scope.

Thus, while the UFA is so often touted as a perfect solution to plastic firearms, it is far from flawless, and the UFA is unlikely to prevent the actual design and distribution of CAD files. While a 3D-printed firearm may violate the UFA, Defense Distributed's designs—by the group's express intent[158]—did not violate the UFA. Even if a user of Defense Distributed's CAD files removed the detectable block of metal, it is hard to imagine Defense Distributed being charged with a subsequent UFA violation.[159] Finally, continued advances in 3D-printing mediums may entirely sidestep the metal-content issue. For these reasons, the UFA is, and will most likely continue to be, a nonstarter to any actual control of 3D-printed firearm designs.

C. Invention Secrecy Act

1. Background and Use

Finally, some advocate for the use of the Invention Secrecy Act of 1951 (ISA)[160] to control influxes of new technology.[161] Starting during the First World War, the U.S. government wished to control certain technologies that might harm the well-being of the United States.[162] Along these lines, Congress authorized the U.S. Patent and Trademark Office (USPTO) to temporarily restrict access and publication of these technologies.[163] These efforts diminished after the end of the First World

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153. *See supra* note 42 and accompanying text.

154. *M1911A1 .45 Caliber Pistol*, FED'N AM. SCIENTISTS (Jan. 20, 1999 8:12 A.M.), http://www.fas.org/man/dod-101/sys/land/m1911a1.htm.

155. *See supra* notes 46–47 and accompanying text.

156. *See supra* text accompanying notes 17–18.

157. *See supra* note 125 and accompanying text.

158. *See* Greenberg, *supra* note 7.

159. Given the State Department's apparent preparedness in removing the CAD files from the Internet, it is similarly likely that the Department would have added UFA violations to its letter if it reasonably believed them to be available.

160. 35 U.S.C. §§ 181–188 (2012). *See generally* Sabing H. Lee, *Protecting the Private Inventor Under the Peacetime Provisions of the Invention Secrecy Act*, 12 BERKELEY TECH. L.J. 345 (1997).

161. *See* Abreu, *supra* note 88.

162. *See* Lee, *supra* note 160, at 348.

163. *See id.*

War but were reinvigorated with the rise of the Second World War.[164] Originally, the so-called secrecy orders would restrict these sensitive technologies for the duration of the War, meaning that most secrecy orders from the First World War expired in about one year.[165] But, in preparation for the Second World War, Congress set the duration for two years and then amended the two-year period to extend for the duration of the War.[166] Finally, in response to Department of Defense requests to reestablish invention secrecy—and make certain temporary secrecy orders permanent—Congress passed the ISA in 1951.[167]

The ISA allows the U.S. government to restrict the publication and award of certain technologies in the patent application process if the government feels that the technology is "detrimental to the national security . . . ."[168] This restriction could extend to an application for foreign patent rights as well.[169] These patent secrecy orders remain in effect for one year,[170] requiring renewal each year,[171] except during periods of declared war or national emergency.[172] In effect, if the government feels that publication of some technology may threaten national security,[173] it can order that this technology remain secret. However, it is important to note that the scope of the ISA is limited to patents, not just any publication.[174]

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164. *See id.* at 349–50.

165. *See id.* at 349.

166. *See id.* at 349–50.

167. *See id.* at 351–52.

168. 35 U.S.C. § 181 para. 1 (2012).

169. *Id.* § 182 (describing involuntary forfeiture of patent should subject material be published or filed in a foreign protection system).

170. *Id.* § 181 para. 4.

171. *Id.*

172. *Id.* It is not entirely clear when, if ever, during the timeframe of 1951–2014 that the government could not argue that the country was not in such a period, as the United States has been in a near-constant state of military involvement throughout the world. *See, e.g.*, *Timeline of United States Military Operations*, WIKIPEDIA http://en.wikipedia.org/wiki/Timeline_of_United_States_military_operations (listing extensive U.S. military operations from 1775 to present) (last modified Dec. 11, 2014).

173. In addition to physical security, the USPTO recently issued a request for comments to limit patents that are "detrimental to the nation's economic security." Notice of Request for Comments on the Feasibility of Placing Economically Significant Patents Under a Secrecy Order and the Need To Review Criteria Used in Determining Secrecy Orders Related to National Security, 77 Fed. Reg. 23,662 (Apr. 20, 2012).

174. Some correctly note that this grants the government a monopoly on the information, but the scope still remains limited to a patent application. *See* Captain Gary L. Hausken, *The Value of a Secret: Compensation for Imposition of Secrecy Orders Under the Invention Secrecy Act*, 119 MIL. L. REV. 201, 202 (1988) ("The imposition of the secrecy order effectively controls access to not only the application, but to the ideas and technology contained within it. When combined with other forms of information control, the secrecy order provides the government with a monopoly to exploit the invention contained within the application." (footnotes omitted)).

2. De Facto Obsolescence of the ISA

It is this limited scope—patent rights—that ultimately voids any relevance to the Defense Distributed situation or any similar publication scenarios. Defense Distributed did not intend to secure the temporal monopoly provided by patent rights; it intended to design and publish the CAD files for anyone to access.[175] Securing patent protection for Defense Distributed's designs would be entirely contrary to the philosophy of crypto-anarchism, for which Wilson strongly advocated.[176] While certain aspects of the manufacturing and design process pioneered by Defense Distributed may have met the weighty burdens of the patent process,[177] the point becomes moot a year after the disclosure of the designs to the public.[178] While Defense Distributed has not expressly stated that it will forgo patent protection, it is fair to assume—based on the group's stated philosophy—that it will not seek patent protection.

Additionally, even if an inventor of a plastic firearm were to apply for patent protections, it is not certain that such a technology would be "detrimental to national security . . . ."[179] The Defense Distributed designs have already taken root across the Internet, so the expected detriment to the country may be already done. Conversely, perhaps this issue has already been decided by the government in an ISA proceeding, but the public obviously would not know of such a proceeding.[180]

Thus, while some advocate for the application of the ISA to plastic firearms, the ISA once again fails to provide much—if any—limitation to the creation and distribution of 3D-printed firearms such as the Liberator. Assuming the inventor does not wish to secure patent protections, there is no ISA procedure that would limit a mass distribution of such a firearm design through the Internet. While ISA limitations could potentially suppress some 3D-printed firearm designs, the Act would do—and did—nothing in this instance, and it is unlikely to have any effect for similar design publications in the future.

IV. IMPLICATIONS OF TREATING CAD FILES AND 3D-PRINTED GOODS AS DISPARATE FROM TRADITIONAL GOODS

Beyond merely posing regulatory issues, many wonder how an influx of 3D-printed weapons might affect the public welfare.[181] While some fervently support Defense Distributed's vision of enabling every American citizen to bear arms with a 3D-printed firearm,[182] others see the company's vision as dangerous or "misguided."[183] Similarly misguided, however, are individuals that see 3D printers

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175. *See* Farivar, *supra* note 35; *see also supra* text accompanying notes 51–53 (explaining crypto-anarchist philosophy).

176. *See supra* Part II.A.

177. The design and process arguably meets the core patentability requirements: subject matter, novelty, nonobviousness, utility, and description. *See* 35 U.S.C. §§ 101–103, 112 (2012).

178. *See id.* § 102(a)–(b).

179. 35 U.S.C. § 181 para. 1 (2012).

180. It is a *secrecy* order after all; informing the public of the patent would defeat the purpose.

181. *See, e.g.*, *supra* text accompanying notes 138–39.

182. *See* Greenberg, *supra* note 58.

183. *See id.*

as deserving of disparate treatment due to the technology's potential use as gun factories.[184] Based on the potential for beneficial utility, the previous treatment of analogous technologies, and the phenomenal costs of effective enforcement, disparate treatment of 3D printers and 3D-printed goods like the Liberator is unwarranted.

A. Freedom of Information

The idea of dangerous free speech is not new, sometimes being referred to as "crime-facilitating speech."[185] In one scholar's definition, "crime-facilitating speech" is

> (1) any communication that,
> (2) intentionally or not,
> (3) conveys information that
> (4) makes it easier or safer for some listeners or readers (a) to commit crimes, torts, acts of war (or other acts by foreign nations that would be crimes if done by individuals), or suicide, or (b) to get away with committing such acts.[186]

In this sense, Defense Distributed's CAD files could be seen as facilitating the harms that might ensue in the hands of the users, whether the designer intended for the outcome or not.

One individual "described the Wiki Weapon project as an executable version of 'The Anarchist's [sic] Cookbook' where you simply *get* the molotov cocktail instead of reading about how to make one . . . ."[187] However, as any movie or television viewer can attest, there is a sharp distinction between watching an action and performing that same action;[188] treating *The Anarchist Cookbook* as an actual Molotov cocktail would be just as irrational as treating a CAD file of a M1911 pistol as a real pistol. Thus, lines must be drawn between something that teaches or depicts harm and the harmful act itself.

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184. Taken to a logical conclusion, if the potential for misuse resulted in bans on products, then motor vehicles, airplanes, medications, and *all* firearms should be banned posthaste.

185. *See generally* Eugene Volokh, *Crime-Facilitating Speech*, 57 STAN. L. REV. 1095 (2005).

186. *Id.* at 1103 (footnote omitted).

187. Kopstein, *supra* note 51 (emphasis in original).

188. For example, it is unlikely that most individuals would feel comfortable disarming a bomb as depicted in *The Hurt Locker* (Voltage Pictures 2008) or walking a tightrope strung between the two towers of World Trade Center as documented in *Man on Wire* (Discovery Films 2008). *See also* Steven G. Gey, *The Apologetics of Suppression: The Regulation of Pornography as Act and Idea*, 86 MICH. L. REV. 1564, 1594 (1988) ("It is permissible to purchase and possess the 'Anarchists' [sic] Cookbook'; it is not permissible to follow the instructions in that book by buying the ingredients of a Molotov cocktail and mixing up a few incendiaries on the kitchen table. The first amendment permits many things to be experienced second-hand through print or videotape that cannot be done in person. It is not constitutionally significant that the vicarious experience may produce in the viewer the same emotions or responses as the act itself." (footnote omitted)).

Similarly, it could hardly be argued that most academic or illustrative materials should be banned because of the subject being taught. For example, a user-submitted YouTube video explaining how to hack a wireless device[189] should—and most likely would—be treated as illustrative material instead of inciting illegal activity. If the opposite were true, it would effectively make the majority of topics at security conferences like Def Con or Black Hat—such as 3D printing keys for high-security locks, hacking pacemakers, or electronically disabling a vehicle's brakes—illegal.[190] In the given CAD file scenario, why should a CAD file depicting a firearm be treated any differently than these comparable materials or instructions?

Perhaps the distinction that some would make derives from an instinctual reaction that the CAD files allow criminals to be but a step away from an arsenal. Thus, the files effectively enable a tangible good with little-to-no barriers to creation.[191] However, such a tangible-intangible dichotomy has no place in a predictable and reasonable legal field, as it would be entirely subjective in nature.[192] Further, even if a CAD file could be used to create a functional weapon, what if the inventor meant the design to be a political statement—as Defense Distributed arguably meant to do in this instance?[193] Such issues would make any bright-line determinations of a harmful design difficult or impossible, and such uncertainty should be avoided whenever possible—and certainly when the result of overregulation would be to harm an emerging technology with immensely beneficial uses.[194]

B. Taking Cues from the ITAR "Crypto Cases"

In addition to recognizing the potential disparate treatment of CAD files in comparison to an article of crime-facilitating speech such as *The Anarchist Cookbook*, it is also imperative to recognize past treatment of ITAR-restricted information. Two lines of cases, *Bernstein* and *Junger*, specifically examined the use of encryption software, which was an ITAR-restricted USML item.

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189. *See, e.g.*, Bryan Smith, *Hacking WPA/WPA2 in Backtrack 5 R3 [HD + Narration]*, YOUTUBE (June 12, 2013), https://www.youtube.com/watch?v=zAh0yQdLXDc.

190. *See, e.g.*, Adrianne Jeffries, *The Top 10 New Reasons To Be Afraid of Hackers*, VERGE (July 31, 2013, 9:40 AM), http://www.theverge.com/2013/7/31/4568992/top-10-new-reasons-to-be-afraid-of-hackers-def-con-black-hat/in/4339859.

191. *See* Greenberg, *supra* note 7 ("'A terrorist, someone who's mentally ill, a spousal abuser, [or] a felon can essentially open a gun factory in their garage,' Schumer said in a press conference.").

192. For example, what limits should one arbitrarily select as being too difficult or taking too long to put a criminal more than a step away from a tangible arsenal?

193. *See* Bump, *supra* note 56. Even the design's muse seems politically motivated. *See supra* text accompanying notes 67–70 (describing the Liberator as the spiritual heir of a firearm for freedom fighters).

194. *See, e.g.*, Ashley Dara, *3D Printing Umbilical Cord Clamps in Haiti*, MAKE (Oct. 18, 2013, 12:45 PM), http://makezine.com/2013/10/18/3d-printing-umbilical-cord-clamps-in-haiti/.

1. *Bernstein* Line

In the *Bernstein* line of cases, Daniel Bernstein, "a PhD candidate in mathematics at [the] University of California at Berkeley working in the field of cryptography,"[195] sued the U.S. government for the right "to publish and communicate his ideas on cryptography."[196] Bernstein alleged that "he [was] not free to teach [his] Snuffle [encryption] algorithm, to disclose it at academic conferences, or to publish it in journals or online discussion groups without a[n ITAR] license."[197] Initially, Bernstein's research paper was among the items classified by the government under the USML, but the government subsequently reclassified the paper after Bernstein filed the lawsuit.[198] Judge Patel of the U.S. District Court for the Northern District of California mooted "the claims pertaining to the paper,"[199] despite being "disquiet[ed]"[200] by the government's reversal of its position towards the academic paper only *after* Bernstein filed the lawsuit, but still rejected the government's motion to dismiss ("*Bernstein I*").[201] Judge Patel held that functional language deserves free speech protections,[202] that source code is protectable speech,[203] and that Bernstein's First Amendment claims were colorable.[204] In a subsequent decision ("*Bernstein II*"), Judge Patel held that the "ITAR licensing system as applied to Category XIII(B) [which pertains to cryptography] acts as an unconstitutional prior restraint in violation of the First Amendment"[205] and that "the technical data provision—only insofar as it relates to items in Category XIII(b)—is unenforceable";[206] he also noted, however, that neither ITAR as a whole nor several ITAR definitions are impermissibly vague or overbroad.[207]

In an interesting turn of events, less than a month prior to *Bernstein II*, President Clinton issued Executive Order 13026,[208] which "transferred jurisdiction over the export of nonmilitary encryption products to the Department of Commerce . . . ,"[209] and the Commerce Department then "issued an interim rule regulating the export of certain encryption products."[210] Following the shift in the enforcing agency, Judge

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195. Bernstein v. U.S. Dep't of State (*Bernstein I*), 922 F. Supp. 1426, 1428 (N.D. Cal. 1996).
196. *Id.* at 1430.
197. *Id.*
198. *Id.* at 1434.
199. *Id.*
200. *Id.*
201. *Id.* at 1439.
202. *Id.* at 1435.
203. *Id.* at 1436.
204. *Id.* at 1437–39.
205. Bernstein v. U.S. Dep't of State (*Bernstein II*), 945 F. Supp. 1279, 1290 (N.D. Cal. 1996).
206. *Id.* at 1292.
207. *Id.* at 1292–95.
208. Exec. Order No. 13,026, 3 C.F.R. § 58,767 (1996).
209. Bernstein v. U.S. Dep't of State (*Bernstein III*), 974 F. Supp. 1288, 1291 (N.D. Cal. 1997), *aff'd sub nom.* Bernstein v. U.S. Dep't of Justice, 176 F.3d 1132 (9th Cir. 1999), *reh'g granted, opinion withdrawn*, 192 F.3d 1308 (9th Cir. 1999).
210. *Id.* at 1291–92; *see also* Encryption Items Transferred from the U.S. Munitions List to the Commerce Control List, 61 Fed. Reg. 68,572 (Dec. 30, 1996) (codified at 15 C.F.R. pts. 730, 732, 734, 736, 738, 740, 742, 744, 748, 750, 768, 772 & 774) (issuing interim rule regulating export of certain encryption products).

Patel, in yet another decision ("*Bernstein III*"), determined that the regulations under the Department of Commerce *still* violated the First Amendment due to prior restraint[211]—which seemed obvious in light of the near identicalness of the regulations[212]—that Bernstein and others should not face prosecution for teaching, writing, using, discussing, or publishing of Bernstein's encryption software;[213] and that *Bernstein III* would supersede, but not vacate, *Bernstein II*.[214] Judge Patel also explicitly stated, "While the government cannot avoid the constitutional deficiencies of its regulations by rotating oversight of them from department to department, the court does not believe that such was the intent here."[215] In essence, Bernstein emerged overwhelmingly victorious at the district court level.

The government appealed to the Ninth Circuit, which, in a panel decision ("*Bernstein IV*"), affirmed Judge Patel's decisions below.[216] Judge Fletcher found that Bernstein, now a professor at the University of Illinois at Chicago,[217] had First Amendment protection for his encryption software as expressive speech[218] and could "properly bring a facial challenge against the [ITAR] regulations."[219] Ultimately finding the regulations to be "an impermissible prior restraint on speech";[220] Judge Fletcher also noted that these, or similar, regulations could pose Fourth Amendment issues.[221] Thus, Bernstein once again prevailed over the government's ITAR regulations. Following the panel decision, however, the government requested that the panel opinion be withdrawn and the case be reheard en banc, to which the Ninth Circuit agreed.[222]

Finally, before the case could be reheard en banc, the government made changes to the regulations, prompting the Ninth Circuit to remand the case back to the District Court instead of hearing it en banc.[223] Despite the changes, several advocacy groups still questioned the scope and intent of the revised regulations.[224] The government, however, chose to back away from regulating cryptographers under the regulations, effectively mooting potential harm to Bernstein and the entire line of cases.[225] As

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211. *Bernstein III*, 974 F. Supp. at 1310.

212. *Id.* at 1304 ("Plaintiff contends that the new encryption regulations suffer from identical deficiencies. Defendants do not argue that the effect of the new regulations is notably different from that of the ITAR.").

213. *Id.* at 1310.

214. *Id.*

215. *Id.*

216. Bernstein v. U.S. Dep't of Justice (*Bernstein IV*), 176 F.3d 1132, 1135, 1147, *reh'g granted, opinion withdrawn*, 192 F.3d 1308 (9th Cir. 1999).

217. *Id.* at 1135.

218. *Id.* at 1141.

219. *Id.* at 1143.

220. *Id.* at 1147.

221. *Id.* at 1146.

222. Bernstein v. U.S. Dep't of Justice (*Bernstein V*), 192 F.3d 1308 (9th Cir. 1999).

223. *See* Press Release, Elec. Frontier Found., Professor Pushes for Revised Encryption Regulations (Jan. 7, 2002), *available at* https://www.eff.org/press/archives/200201.

224. *See* Press Release, Elec. Frontier Found., Civil Liberties Grps. Say New Encryption Exp. Regulations Still Have Serious Constitutional Deficiencies (Jan. 13, 2000), *available at* https://w2.eff.org/Privacy/Crypto/20000113_eff_pr.php.

225. *See* Press Release, Daniel J. Bernstein, Gov't Backs Away from Crypto Regulations

predicted, Judge Patel dismissed Bernstein's case; thus, ending "[t]he longest-running court case against the government's encryption regulations . . . ."[226]

In effect, the *Bernstein* line of cases proved to be a net gain for cryptographers and Bernstein, forcing the government to revise and back down from what the courts deemed a clear violation of the First Amendment. Additionally, at least in Bernstein's case, the court saw cryptography, software, and source code as protectable expressive speech. But *Bernstein* was not the sole example of courts finding encryption and software to be protected speech.

2. *Junger* Line

In the *Junger* line of cases, Peter Junger, a professor at Case Western Law School, wrote encryption code for publication on his website and in his book.[227] Junger applied for a determination from the government concerning whether his software and book would be restricted by export regulations.[228] The government responded that the regulations covered the majority of Junger's works pertaining to encryption software,[229] and Junger challenged this decision in court ("*Junger I*").[230] Judge Gwin found that the regulations need only survive intermediate scrutiny;[231] "encryption source code is not sufficiently communicative" under the *Spence* standard;[232] the regulations were "not narrowly directed at expressive conduct, and therefore not a prior restraint";[233] and the regulations satisfied intermediate scrutiny.[234] Thus, Judge Gwin denied Junger's summary judgment motion and granted the government's summary judgment motion.

On appeal, however, Chief Judge Martin, Jr.—writing for a unanimous Sixth Circuit—reversed and remanded *Junger I*. Chief Judge Martin, Jr., in a brisk five-page decision ("*Junger II*"), found that First Amendment protection "is not reserved for purely expressive communication."[235] Noting that "[t]he [U.S.] Supreme Court has expressed the versatile scope of the First Amendment by labeling as 'unquestionably shielded' the artwork of Jackson Pollack, the music of Arnold Schoenberg, or the Jabberwocky verse of Lewis Carroll,"[236] Chief Judge Martin, Jr. explained that source code is indeed a protected, expressive means of speech secured by the First Amendment.[237]

(Oct. 18, 2002), *available at* http://cr.yp.to/export/2002/10.18-bernstein.txt.

226. *See* Press Release, Daniel J. Bernstein, Crypto Case on Indefinite Hold (Oct. 15, 2003), *available at* http://cr.yp.to/export/2003/10.15-bernstein.txt.

227. Junger v. Daley (*Junger I*), 8 F. Supp. 2d 708, 713–14 (N.D. Ohio 1998), *rev'd*, 209 F.3d 481 (6th Cir. 2000).

228. *Id.* at 714.

229. *Id.*

230. *Id.* at 711.

231. *Id.* at 715.

232. *Id.* at 717–18.

233. *Id.* at 719.

234. *Id.* at 723.

235. Junger v. Daley (*Junger II*), 209 F.3d 481, 484 (6th Cir. 2000).

236. *Id.*

237. *Id.* at 485.

The court did, however, "recognize that national security interests can outweigh the interests of protected speech and require the regulation of speech";[238] but the government bears this burden and did not meet its burden in this case.[239] Similar to the Ninth Circuit in *Bernstein IV*, the Sixth Circuit remanded the case back to the district court to reexamine the effect of the government's revisions to the regulations before the case could progress further.[240] Unfortunately, Junger dismissed the case on remand,[241] so we are again left wondering at the final result of the case, although the outcome would likely have followed a similar theme as occurred in *Bernstein* on remand.

3. Comparison to Defense Distributed and CAD Files

Given that cryptography research and code was treated as an article of free speech by two circuits, while having clearly functional aspects and being restricted under the veil of national security, why should a CAD file be any different? It is curious that a CAD file, which is nothing more than the output of a computer program,[242] would be treated as having less First Amendment protections than the protections granted in either *Bernstein* or *Junger*.

Defense Distributed clearly had an expressive message in mind—that is, for the furtherance of Second Amendment rights among U.S. citizens[243]—which would likely be afforded more protection than encryption software.[244] Further, 3D artwork,[245] animation,[246] and printing[247] have been used in a wide range of projects—often with far wider audiences than an encryption program[248]—thus, it seems peculiar that encryption software is afforded protection from ITAR, while digital visual art (such as a CAD file) is not similarly protected. Because of these distinctions

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238. *Id.*

239. *See id.*

240. *Id.* Not all commentators agree with the Sixth Circuit's broad categorization of source code as protected speech. *See generally* Recent Case, Junger v. Daley*, 209 F.3d 481 (6th Cir. 2000)*, 114 HARV. L. REV. 1813 (2001).

241. Junger v. Daley, 1:96-cv-01723-JG (N.D. Ohio Nov. 16, 2000) (dismissing case with prejudice).

242. *See, e.g.*, Blake Courter, *A Brief Introduction to CAD File Formats*, GRABCAD (Apr. 22, 2013), http://blog.grabcad.com/2013/04/a-brief-introduction-to-cad-file-formats/.

243. *See supra* note 193 and accompanying text.

244. If one assumes that source code is roughly as expressive to programmers as CAD files are to designers, then the additional political message would afford the CAD file greater weight as expressive speech.

245. *See, e.g.*, Aquil Akhter, *45 Amazing Examples of Code Generated and 3D CG Artworks*, SMASHING MAG. (Aug. 21, 2009), http://www.smashingmagazine.com/2009/08/21/45-amazing-examples-of-code-generated-and-3d-cg-artworks/.

246. *See, e.g.*, *List of Computer-Animated Films*, WIKIPEDIA, https://en.wikipedia.org/wiki/List_of_computer-animated_films (last modified Dec. 6, 2014).

247. *See, e.g.*, Nick Clark, *Cutting-Edge Technology: 3D Printed Artworks Exhibited, and Not a Paper Jam in Sight*, INDEPENDENT.CO.UK (Nov. 7, 2013), http://www.independent.co.uk/arts-entertainment/art/news/cuttingedge-technology-3d-printed-artworks-exhibited-and-not-a-paper-jam-in-sight-8927904.html.

248. *See, e.g.*, *List of Highest-Grossing Animated Films*, WIKIPEDIA, https://en.wikipedia.org/wiki/List_of_highest-grossing_animated_films (last modified Dec. 8, 2014).

and the seemingly greater expressivity implied by the Liberator, Defense Distributed's should have received as much, if not more, First Amendment protection than encryption software.

C. Cost Burdens of Enforcement

Lastly, outside of the above issues regarding disparate treatment, concerns about the economics and possibility of enforcement must be addressed. Put another way, it would be preferable if the cost of regulating 3D-printed firearms would not amount to millions or billions of dollars and if the regulations would be effective.[249] A 2010 estimate placed the cost of firearm violence at more than $174 billion, which equals a "sum of $564 per American."[250] While this is certainly an alarming figure, it speaks of the systemic cost of firearm violence, including the initial medical and police costs, as well as the continuing work, mental health, and quality of life expenses.[251] It is important to note, however, that these particular costs in no way estimate the cost of 3D-printed firearm violence specifically, as said violence is effectively unheard of at this point. Setting aside the potential cost of violence, however, this Comment instead will consider the cost of *enforcing* regulation on 3D-printed firearms.

Starting from the presumption that the government cannot, or would not, pass a blanket prohibition of 3D printers, preventing individuals from designing firearms in CAD programs will prove entirely ineffective. While some software manufacturers have implemented technological safeguards against illegal activity, such as currency counterfeiting,[252] it is patently absurd that every CAD software manufacturer would implement firearm detection measures in their code and that such code would reliably and consistently detect firearms and firearm components.[253] Besides this absurdity, designing a 3D model of a firearm can have a variety of legitimate uses—for example, weapon models in video games.[254] Thus, preventing CAD files of firearms at the point of origin would be entirely ineffective for regulating 3D-printed firearms.

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249. *Cf.* Richard Branson, *War on Drugs a Trillion-Dollar Failure*, CNN.COM (Dec. 7, 2012, 6:05 PM), http://www.cnn.com/2012/12/06/opinion/branson-end-war-on-drugs/; Aaron Houston, *America's Longest War Has Shown Once Again Prohibition Doesn't Work*, U.S. NEWS & WORLD REP. (July 6, 2012, 5:02 PM), http://www.usnews.com/debate-club/is-it-time-to-scale-back-the-war-on-drugs/americas-longest-war-has-once-again-shown-that-prohibition-doesnt-work (discussing the high cost and ineffectiveness of the illegal drug regulations).

250. Abram Brown, *How Guns and Violence Cost Every American $564 in 2010*, FORBES.COM (Jan. 14, 2013, 9:00 AM), http://www.forbes.com/sites/abrambrown/2013/01/14/how-guns-and-violence-cost-every-american-564-in-2010/. Some view calculations such as these to be "amoral." *See, e.g.*, Harry Binswanger, *With Gun Control, Cost Benefit Analysis Is Amoral*, FORBES.COM (Jan. 1, 2013, 11:15 AM), http://www.forbes.com/sites/harrybinswanger/2013/01/01/with-gun-control-cost-benefit-analysis-is-amoral/.

251. *See* Brown, *supra* note 250.

252. *See, e.g.*, *Photoshop Help: Photoshop and CDS*, ADOBE, http://www.adobe.com/special/products/photoshop/cds.html.

253. *Cf.* Matthew Taylor, *How To Counterfeit Money*, MATTHEW TAYLOR http://www.matthewtaylor.co.nz/2012/02/27/how-to-counterfeit-money/ (suggesting to simply use a program other than new versions of Adobe Photoshop to edit banknotes).

254. David Houghton, *Fantastic Video Game Weapons Vs Their Real-Life Equivalents*, GAMESRADAR (Feb. 15, 2010), http://www.gamesradar.com/fantastic-video-game-weapons

Similarly, attempting to prevent individuals from uploading firearm CAD files to the Internet will prove equally futile. While some 3D model repositories proactively filter out such designs,[255] not all file-sharing websites will be so cooperative or proactive.[256] This leaves uploaders with plenty of options to share their designs. Next, assuming the uploader uses some sort of anonymization technique—for example, Tor or a Virtual Private Network[257]—the complexity and cost of identifying the uploader increases dramatically.[258] Putting these two factors together, any uploader with even minimal technical ability[259] can upload a CAD file with near anonymity from the comfort of his or her home or any open Wi-Fi network, making any realistic attempts of regulation futile.

Finally, if the firearm CAD files do reach the Internet, enforcement must now shift to either (1) regulating the entire Internet, (2) regulating individual 3D printers, or (3) regulating inputs for 3D printers—all options that will prove overbroad, overly expensive, or both. With regard to option (1), the government might be attempting to capture and store everything it can from the Internet—legally or not[260]—but it is unlikely that it will be able to track and unmask every uploader in the near future.[261] This leaves us with options (2) and (3).

Option (2)—regulating each individual 3D printer—would prove ineffective and excessively expensive. Imagine a regulation specifying that any firearm or component of a firearm may not be printed by a 3D printer without individual government authorization. This regulation would prove administratively unworkable by even a moderate volume of requests to repair a broken firearm component (e.g., a trigger or trigger guard) by 3D printing the component; to design and print custom grip panels; or to simply print a nonfunctional replica of a firearm for display purposes. Aside from the administrative costs of such a licensing scheme, preventing an unauthorized user from designing and printing these components would prove as ineffective as preventing another person from whittling the same component from a block of wood or milling it from a block of metal. Even the proposal from Representative Israel[262] gives no real method of preventing such designs from being printed.[263] Simply put, the government has no viable way of regulating 3D printers

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-vs-their-real-life-equivalents.

255. *E.g.*, Andy Greenberg, *3D-Printing Firm Makerbot Cracks Down on Printable Gun Designs*, FORBES.COM (Dec. 19, 2012, 4:30 PM), http://www.forbes.com/sites/andygreenberg/2012/12/19/3d-printing-startup-makerbot-cracks-down-on-printable-gun-designs/.

256. *See* Mead, *supra* note 80.

257. *See, e.g.*, Douglas Crawford, *Tor vs. VPN*, BESTVPN (May 16, 2013), https://www.bestvpn.com/blog/5888/tor-vs-vpn/.

258. *See, e.g.*, Robertson, *supra* note 121 (noting that even the NSA has difficulties identifying users anonymized with Tor).

259. This is not hard to imagine given the uploader's ability to create or upload a CAD file of a functional firearm or at least to follow a guide to do so. *See Running the Tor Client on Microsoft Windows*, TOR PROJECT, https://www.torproject.org/docs/tor-doc-windows.html.en.

260. *See, e.g.*, T.C. Sottek, *The Edge of the Abyss: Exposing the NSA's All-Seeing Machine*, VERGE (Nov. 12, 2013, 12:00 PM), http://www.theverge.com/2013/11/12/5082666/the-edge-of-the-abyss-exposing-the-nsas-all-seeing-machine.

261. *See, e.g.*, Robertson, *supra* note 121.

262. *See supra* text accompanying note 140.

263. Cory Doctorow, *Congressman Calls for Ban on 3D Printed Guns*, BOING BOING (Dec.

to prevent the printing of firearms, and any such attempts to regulate each 3D printer would cause far more administrative headaches than it could potentially solve.

Finally, option (3)—regulating the inputs of 3D printers—stands a greater chance of working but will still fail due to its overbroad nature. For example, if each 3D-printed firearm required a specific type of plastic to make the firearm, then the government might attempt to regulate this specific input to indirectly limit 3D-printed firearms. However, current 3D-printed firearm designs are capable of being printed with a commercial-grade 3D printer and standard ABS plastic.[264] Thus, while Defense Distributed created the original Liberator with an industrial-grade printer, commonly available printers and materials are clearly capable of reproducing a similar product, and attempting to regulate such inputs would effectively regulate every design using these common materials or would simply result in the creation of functional variants using unregulated materials. Ultimately, regulating the inputs of 3D printers would prove as ineffective as options (1) and (2).

D. Summary of Implications and Feasibility

When looking at the past, present, and future implications of regulating 3D-printed firearms, one trend seems to prevail: problems. Treating CAD files disparate from a software encryption program, a how-to manual, or a book seems inconsistent with previous decisions. CAD files arguably represent an expressive speech and will be afforded First Amendment protection, barring outright censorship.

Even if regulations were put in place, actual enforcement of those regulations would be laughable. Regulating uploaders or 3D printers is unlikely to succeed, and costs associated with attempting such regulations would be astronomical. Thus, attempting to regulate 3D-printed firearms or their respective CAD files will likely face numerous hurdles, and overall regulation would prove too onerous for tangible efficacy.

V. A PROPOSAL FOR A NEW STANDARD OF REGULATING 3D-PRINTED GOODS

Given the relative inadequacy of existing regulations, the potential for stiflingly overbroad new regulations, and the multitude of public policy rationales against such new regulations, it is necessary to devise a more reasoned standard for instances of first-impression with emerging technologies like 3D printers. A large part of such a reasoned standard must be examining the potential for legitimate use of the technology and weighing such legitimate use against potential misuse. Taking inspiration from both patent and copyright law doctrines, as well as U.S. Supreme Court wisdom, this Comment proposes a "substantial legal uses" standard based off the "substantial noninfringing uses" standard from the Court's decision in *Sony Corp. of America v. Universal City Studios, Inc.*[265]

9, 2012, 11:37 AM), http://boingboing.net/2012/12/09/congressman-calls-for-ban-on-3.html.

264. *See* Greenberg, *supra* note 41.

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

A. Sony Betamax *and the "Substantial Noninfringing Uses" Standard*

In *Sony Corp. of America v. Universal City Studios, Inc.*—also known as the "Betamax case"[266]—the U.S. Supreme Court reviewed whether the primary usage of Sony's Betamax video tape recorder was for legal purposes or not.[267] Specifically, Universal City Studios and Walt Disney Productions ("Universal") believed that the primary usage of Sony's new technology would be for copyright infringement perpetrated by Betamax customers.[268] Thus, Universal sued Sony and Sony's distributors ("Sony") in 1976, alleging both direct and indirect infringement.[269]

The California District Court ruled for Sony three years later on the grounds of fair use.[270] Specifically, Judge Ferguson found "that home-use recording from free television is not a copyright infringement and that, even if it were, the corporate defendants are not liable and an injunction is not appropriate."[271] On appeal, however, the Ninth Circuit reversed and found Sony liable for contributory infringement.[272] Judge Kilkenny, writing for the Ninth Circuit, reasoned, "We find no Congressional intent to create a blanket home use exception to copyright protection and that home videorecording [sic] does not constitute fair use. In addition, the appellees are legally responsible for the infringing activity."[273] Sony appealed this judgment.[274]

Writing for the U.S. Supreme Court, Justice Stevens reversed the Ninth Circuit.[275] Summarizing the decisions below, Justice Stevens noted,

> The Court of Appeals' holding that respondents are entitled to enjoin the distribution of VTR's, to collect royalties on the sale of such equipment, or to obtain other relief, if affirmed, would enlarge the scope of respondents' statutory monopolies to encompass control over an article of commerce that is not the subject of copyright protection. Such an expansion of the copyright privilege is beyond the limits of the grants authorized by Congress.[276]

Justice Stevens went on to note a number of useful features of the Betamax video recorder, including separate tuners for viewing and recording; reusable tapes; timers for recording when the users were away; and pause and fast-forward functions

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266. *See, e.g.*, *The Betamax Case*, ELEC. FRONTIER FOUND., https://w2.eff.org/legal/cases/betamax/.

267. *Sony Betamax*, 464 U.S. at 419–20.

268. Universal City Studios, Inc. v. Sony Corp. of Am., 480 F. Supp. 429, 459 (C.D. Cal. 1979), *aff'd in part, rev'd in part*, 659 F.2d 963 (9th Cir. 1981), *rev'd*, 464 U.S. 417 (1984).

269. *See id.* at 457–63.

270. *See id.* at 446–57.

271. *Id.* at 469.

272. Universal City Studios, Inc. v. Sony Corp. of Am., 659 F.2d 963, 974–76 (9th Cir. 1981), *rev'd*, 464 U.S. 417 (1984).

273. *Id.* at 977.

274. Sony Corp. of Am. v. Universal City Studios, Inc. (*Sony Betamax*), 464 U.S. 417 (1984).

275. *Id.* at 456.

276. *Id.* at 421.

allowing the user to skip advertisements.[277] The most desirable feature, according to customers, was the "time-shifting" ability—that is, "the practice of recording a program to view it once at a later time, and thereafter erasing it."[278] This same feature, however, could potentially violate copyright law if the recording was a "copy" for copyright purposes and not excused by fair use.[279] In essence, Universal argued that Sony facilitated copyright infringement by providing would-be infringers with the tools to copy.[280] To resolve this conflict, Justice Stevens looked to another realm of intellectual property: patent law.[281]

The Patent Act of 1952[282] expressly defines "both the concept of infringement and the concept of contributory infringement . . . ."[283] Stevens noted, "The prohibition against contributory infringement is confined to the knowing sale of a component especially made for use in connection with a particular patent. . . . [T]he Act expressly provides that the sale of a 'staple article or commodity of commerce suitable for *substantial noninfringing use*' is not contributory infringement."[284] Additionally, Stevens noted that the Court has significantly restricted the scope of contributory infringement suits under patent law to prevent a copyright holder from "extend[ing] his monopoly beyond the limits of his specific grant [of patent rights]."[285] As stated by the Court previously, "[A] sale of an article which though adapted to an infringing use is also adapted to other and lawful uses, is not enough to make the seller a contributory infringer. Such a rule would block the wheels of commerce."[286]

While recognizing the fundamental differences between the realms of patent and copyright, Justice Stevens noted the need for the Court to balance the intellectual property holder's protection rights with the rights of those "engag[ing] in substantially unrelated areas of commerce."[287] Thus, "the sale of copying equipment, like the sale of other articles of commerce, does not constitute contributory infringement if the product is widely used for legitimate, unobjectionable purposes. Indeed, it need merely be capable of *substantial noninfringing uses*."[288]

Looking to both authorized and unauthorized time-shifting behaviors by Betamax customers, Justice Stevens found that Sony's Betamax video recorder was capable of the necessary substantial noninfringing uses.[289] Summarizing the District Court's findings, to which the U.S. Supreme Court affirmed, Justice Stevens stated,

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277. *Id.* at 422–23.

278. *Id.* at 423.

279. *Id.* at 463 (Blackmun, J., dissenting).

280. Universal City Studios, Inc. v. Sony Corp. of Am., 480 F. Supp. 429, 461–62 (C.D. Cal. 1979), *aff'd in part, rev'd in part*, 659 F.2d 963 (9th Cir. 1981), *rev'd*, 464 U.S. 417 (1984).

281. *See Sony Betamax*, 464 U.S. at 439.

282. Patent Act of 1952, 35 U.S.C. §§ 1–376 (2012).

283. *Sony Betamax*, 464 U.S. at 440; s*ee also* 35 U.S.C. § 271 (codifying patent infringement).

284. *Sony Betamax*, 464 U.S. at 440 (emphasis added) (quoting 35 U.S.C. § 271(c)).

285. *Id.* at 441.

286. *Id.* (alteration in original) (quoting Henry v. A.B. Dick Co., 224 U.S. 1, 48 (1912)).

287. *Id.* at 442.

288. *Id.* (emphasis added).

289. *Id.* at 456.

> Sony demonstrated a significant likelihood that substantial numbers of copyright holders who license their works for broadcast on free television would not object to having their broadcasts time-shifted by private viewers. And second, respondents failed to demonstrate that time-shifting would cause any likelihood of nonminimal harm to the potential market for, or the value of, their copyrighted works. *The Betamax is, therefore, capable of substantial noninfringing uses*.[290]

Thus, the Court held "Sony's sale of such equipment to the general public does not constitute contributory infringement of respondent's copyrights."[291] It is from this standard that this Comment derives inspiration for a standard to view emerging technologies.

B. Workability and Use of the Proposed "Substantial Legal Uses" Standard

Taking into account the potential impact of 3D printing to both the patent[292] and copyright[293] realms of intellectual property, *Sony Betamax*'s fusion of patent and copyright law seems especially appropriate as a muse. As with the balancing that must occur with contributory infringement, the specter of emerging technologies must be weighed against the potential for overbroad and damaging regulation. In this case, overbroad regulation on 3D printing would result in a significant and unnecessary obstacle. This Comment provides a variation of the substantial noninfringing uses standard of *Sony Betamax* to provide a solution: substantial *legal* uses.

Under this Comment's "substantial legal uses" standard, instead of assuming the absolute worst possible outcome of a new technology and implementing myopic policies in a knee-jerk reaction, a court or legislature would examine the potential legal uses of the good or medium. In essence, this proposal attempts to instill common sense into an arena of hyperbole. Instead of assuming the conclusion—for example, "Video Killed the Radio Star"[294]—the question would instead be "What legal uses does video provide?"

Keeping continuity with previous decisions, Sony's Betamax video recorder (or VHS, Blu-Ray, etc.) would not be banned merely because the technologies provide an individual with a tool to perpetrate a crime. In the same vein, 3D printers possess clear potential for substantial legal uses despite some potential illegal uses. As has already been seen and created, 3D printers have created a wide variety of tangible, beneficial goods;[295] 3D printers are even being used to save lives in poverty and

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290. *Id.* (emphasis added).

291. *Id.*

292. *See generally* Davis Doherty, Note, *Downloading Infringement: Patent Law as a Roadblock to the 3D Printing Revolution*, 26 HARV. J.L. & TECH. 353 (2012); Wilbanks, *supra* note 14.

293. *See generally* Haritha Dasari, *Assessing Copyright Protection and Infringement Issues Involved with 3D Printing and Scanning*, 41 AIPLA Q.J. 279 (2013); Brian Rideout, *Printing the Impossible Triangle: The Copyright Implications of Three-Dimensional Printing*, 5 J. BUS. ENTREPRENEURSHIP & L. 161 (2011).

294. *See generally* THE BUGGLES, *Video Killed the Radio Star*, on THE AGE OF PLASTIC (Island Records 1979).

295. *See supra* notes 28–30 and accompanying text.

grief-stricken areas.[296] Just as some manuscript advocates likely condemned Gutenberg for the potential misuse of his printing press, it should be blatantly obvious to any scholar that the printed word remains one of the most important inventions for human society. So too should the potential uses of 3D printers be acknowledged. Similarly, the vast majority of inputs and outputs of a 3D printer are likely to be capable of substantial legal uses. For example, a 3D printer could print a school project, a building design, a cup holder, a button, or an unlimited number of other designs.

This unlimited potential also bares the heart of this issue—potentially supplying an individual with a 3D-printed arsenal—but this assumption is flawed because it plays to the exception instead of the rule. Ultimately, designs must be treated on a case-by-case, factual basis. One person might print the exterior and projectiles to a potential pipe bomb intending to wreak havoc, and another person might wish to print an inert replica of a World War II grenade for display in his or her home with war memorabilia. The former explosive clearly has little-to-no legal purpose, while the latter has benign, or perhaps historical, intent. Thus, although a 3D printer could be used to print a weapon, a murderer could just as easily kill with a spatula, a toilet tank lid, or a chessboard[297]—the latter two also being undetectable to metal detectors—and it is clearly overzealous to enact blanket restrictions.

Finally, looking specifically at 3D-printed firearms as a contestable output under the proposed substantial legal uses standard, this Comment proposes that a design that would otherwise be legal—but for being printed on a 3D printer—should be treated as a legal firearm. Put another way, a Model 1911 pistol, printed in metal or plastic, would be treated as equivalent to a machined Model 1911 pistol (assuming all other federal and state requirements and restrictions, such as licensure and detectability, are met).

Stepping back, there are substantial legal uses for a 3D-printed firearm—such as recreation, hunting, personal defense, or merely collection—as long as the firearm owner follows existing rules. Excluding specific classes of restricted weapons, such as fully automatic firearms, most U.S. citizens may buy, own, sell, and use firearms if they so choose. Indeed, the ATF has clearly stated that an individual may create his or her own firearms, subject to certain design limitations (e.g., automatic weapons).[298] The method selected by a citizen for making that firearm—whether by machining, casting, whittling, or printing—should make no difference in determining the legality of the firearm's creation or ownership.

However, this careful examination of emerging technologies is apparently too cumbersome for some politicians faced with these new threats. On December 4, 2013, Philadelphia, Pennsylvania, became the first city in the United States to outlaw 3D-printed guns[299] despite the fact that "there hasn't been a documented example yet

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296. *See supra* note 194.

297. Admin, *12 Most Unusual Murder Weapons Used in Real Life*, RAWJUSTICE.COM (Sept. 13, 2010), http://rawjustice.com/2010/09/13/12-most-unusual-murder-weapons-used-in-real-life/.

298. *See* Press Release, Bureau of Alcohol, Tobacco, Firearms and Explosives, 3-D Printing Tech. of Firearms (Nov. 13, 2013), *available at* https://www.atf.gov/sites/default/files/assets/pdf-files/111313-hq-3-d-printing-technology-of-firearms.pdf.

299. PHILA. CODE, § 10-2001 to -2003 (2013) (codifying Bill No. 130584 to "prohibit[] the use of a three-dimensional printer in order to manufacture a firearm"); Alexis Kleinman, *Philadelphia*

of any hobbyists or weapons enthusiasts in Philadelphia firing or even creating 3D-printed guns in city limits. . . ."[300] When asked for the basis of the ban, Steve Cobb—the director of legislation for the ban's sponsor, Kenyatta Johnson—stated, "It's all pre-emptive. . . . It's just based upon internet [sic] stuff out there."[301] Philadelphia is not alone in its knee-jerk reaction approach to legislation, however, as "lawmakers in California, New York City and Washington, DC have all suggested that officials adopt legislation that would limit what 3D printers could produce, particularly after Defense Distributed's model made waves with the federal government."[302] While it may be true that "[w]e must be proactive in seeking solutions to this new threat rather than wait for the inevitable tragedies this will make possible,"[303] it is equally true that lawmaking solely "based upon internet [sic] stuff"[304] thoughtlessly endangers emerging technologies. While proactive legislation is a welcome variation on current congressional trends, perhaps the Philadelphia City Council should have performed a good-faith assessment of the technology and consulted experts to reach an informed decision. Even then, and as discussed above, a federal license[305] should not be required to create 3D-printed firearms that are the functional equivalents of traditional firearms.

Ultimately, it is better to know of these technologies in public than to demonize them so that they are developed in secret. Should the government decide to make the creation of 3D-printed firearms illegal, the only realistic outcomes are (1) development of potential weapons outside of government knowledge or regulation; (2) anonymization and fracturing of existing designs; and (3) hyperbolic elevation of plastic firearms as uncontrollable weapons, actually driving adoption by way of the Streisand Effect.[306] Thus, not only would a more reasoned and thoughtful approach to 3D-printed firearm regulation be beneficial from the aspect of engineering, but it would potentially serve to prevent violence in the long run.

CONCLUSION

While the control of various aspects of citizens' lives through the regulation of harmful circumstances and substances is understandable—if not noble—from a

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Is the First U.S. City To Ban 3D-Printed Guns, HUFFINGTON POST (Nov. 26, 2013, 2:49 PM), http://www.huffingtonpost.com/2013/11/26/3d-gun-philadelphia_n_4344733.html.

300. *First Ban in the Country: 3D-Printed Guns Now Illegal in Philadelphia*, RT.COM (Nov. 27, 2013, 8:30 AM), http://rt.com/usa/philly-gun-ban-johnson-280/.

301. *Id.*

302. *Id.*

303. *Id.*

304. *Id.*

305. PHILA. CODE, § 10-2002 (2013) ("No person shall use a three-dimensional printer to create any firearm, or any piece or part thereof, *unless such person possesses a license to manufacture firearms under Federal law, 18 U.S.C. § 923(a)*." (emphasis added)).

306. The Streisand Effect is a phenomenon whereby an act of censorship of a subject unintentionally results in increased publication of the subject. Specifically, Barbra Streisand's attempted suppression of photographs of her Malibu, California, home led to extensive public attention, parody, and distribution of the photographs. *See* Wendy Seltzer, *Free Speech Unmoored in Copyright's Safe Harbor: Chilling Effects of the DMCA on the First Amendment*, 24 HARV. J.L. & TECH. 171, 215 & n.229 (2010).

public policy perspective, it must also be recognized that such control can be naïve and archaic when applied to certain areas of technological advance. Moats and drawbridges no longer protect homes, reading and writing are no longer restricted to the wealthy, and information exchange is global and nearly instantaneous. Even the U.S. military and intelligence agencies fail to guard their own secrets.[307] Technological decentralization makes the traditional control of information[308]—good or bad—a child's fantasy. Understanding that disruptive technological advances need not necessarily doom civilization will be vital for the organic growth of such advances and society as a whole.

3D printers represent just such a disruptive advance. Based on the First and Second Amendment implications of potential litigation, the courts may see some very strange bedfellows—for example, the Electronic Frontier Foundation, the American Civil Liberties Union, and the National Rifle Association—arguing for both the freedom of information and firearm rights. But it is because of these exceptional implications that such groups, which would otherwise be diametrically opposed, can collaborate.

In sum, while this Comment uses Defense Distributed and 3D-printed firearms as a useful anecdote, the proposed "substantial legal uses" standard is meant to have far broader effects. Whether the case is a 3D-printed good, a video recorder, or a digital currency,[309] the potential for overbroad and unnecessary regulation poses a serious, deleterious risk to emerging technologies. Thus, this Comment's proposal attempts to bring some much-needed reason to what might otherwise result in an impetuous reaction of legislation.

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307. *See, e.g.*, Toor, *supra* note 120.

308. *See supra* text accompanying note 118.

309. *See, e.g.*, Danton Bryans, *Bitcoin and Money Laundering: Mining for an Effective Solution*, 89 IND. L.J. 441 (2014) (describing Bitcoin, a disruptive digital currency, and proposing solutions to potential government regulation of digital currencies).