

# DEEPER THAN A PAPER CUT: IS IT POSSIBLE TO REGULATE THREE- DIMENSIONALLY PRINTED WEAPONS OR WILL FEDERAL GUN LAWS BE OBSOLETE BEFORE THE INK HAS DRIED?

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## I. INTRODUCTION

“You don’t bring a 3-D printer to a gun fight – yet.”<sup>1</sup> Advances in technology have indisputably changed all aspects of life, affecting both the average computer user and the criminal mastermind. The use of computers and related technologies have not only created new crimes, but also changed the way that traditional crimes are committed. The three-dimensional (3-D) printer, an innovative technology used to turn digital files into a physical reality, is demonstrative of this notion.<sup>2</sup>

The 3-D printing revolution has developed gradually since the early 1980s.<sup>3</sup> In the last few years, however, this technology has progressed exponentially and attracted mainstream attention.<sup>4</sup> A machine that allows users to download files and print physical objects sounds like science fiction, but 3-D printers are already being used to create practical objects.<sup>5</sup> As 3-D printers become increasingly functional and accessible, various areas of the law will be ill-equipped to handle the ramifications of such futuristic technology.

The legal issues implicated by the ability to manufacture items from a desktop 3-D printer will initially and primarily concern intellectual property rights, such as patent, copyright, and trademark infringement.<sup>6</sup> This technology, however, will also sneak up on current federal firearm laws and threaten to significantly undercut existing attempts at gun control.<sup>7</sup> The lack of

1. Rich Brown, *You Don't Bring a 3D Printer to a Gun Fight – Yet*, CNET (Sept. 6, 2012, 4:00 AM), [http://news.cnet.com/8301-11386\\_3-57499326-76/you-dont-bring-a-3d-printer-to-a-gun-fight-yet](http://news.cnet.com/8301-11386_3-57499326-76/you-dont-bring-a-3d-printer-to-a-gun-fight-yet).

2. Michael Weinberg, *3D Printing*, PUBLIC KNOWLEDGE, <http://publicknowledge.org/issues/3d-printing> (last visited Mar. 13, 2014).

3. *Hit Rewind...The History of 3D Printing*, 3D INNOVATIONS (Mar. 22, 2012), <http://www.3d-innovations.com/blog/?p=373>.

4. *See id.* (“3D printing technology is not very old and has progressed at a rapid speed. We believe that the options are endless with the continued advancement and improvement of this technology.”).

5. *See generally* Christopher Barnatt, *3D Printing*, EXPLAININGTHEFUTURE.COM, <http://www.explainingthefuture.com/3dprinting.html> (last visited Mar. 13, 2014) (providing an overview of 3-D printer technology).

6. MICHAEL WEINBERG, *IT WILL BE AWESOME IF THEY DON'T SCREW IT UP: 3D PRINTING, INTELLECTUAL PROPERTY, AND THE FIGHT OVER THE NEXT GREAT DISRUPTIVE TECHNOLOGY* 12–14 (2010), available at <http://publicknowledge.org/files/docs/3DPrintingPaperPublicKnowledge.pdf>.

7. John Paul Titlow, *How 3D Printing Is Inflaming the Gun Control Debate*, READWRITE (Aug. 29,

regulations to adequately police the manufacture of 3-D printed firearms, the 3-D printed weapons themselves, or the possession of such, may have extreme effects on civil rights and criminal liabilities.<sup>8</sup> Indeed, the regulation of 3-D printers and their output may be the next arena in which the War on Terror and organized crime is fought.<sup>9</sup>

Beyond the legal implications, 3-D printing already has, and will continue to, fundamentally alter many industries.<sup>10</sup> For example, a large industrial 3-D printer could build a house in less than twenty-four hours; the machine would lay down a concrete foundation, erect walls, and even insert the necessary wiring and plumbing.<sup>11</sup> The rapid and self-guided construction of an entire building could mean the end of sub-standard living in the developing world or make housing more affordable domestically.<sup>12</sup> The current state of commercial 3-D printing is quite impressive: 3-D printers have been used in the creation of replacement human organs, spacecraft parts for NASA, and spare parts for the U.S. Army in the field.<sup>13</sup> This technology has already exceeded the bounds of model making and demonstrates incredible promise. However, like the Internet before it, 3-D printing will also prove itself to be a revolutionary, disruptive technology.<sup>14</sup>

It began as a hypothetical concept but quickly became a dangerous reality: 3-D printers allow individuals to effortlessly and inexpensively transform digital files into deadly physical objects.<sup>15</sup> Recreational gun enthusiasts have already manufactured a firearm using a 3-D printer and made the blueprints accessible on the Internet.<sup>16</sup> This technology gives the general public the ability to create untraceable and undocumented do-it-yourself guns. The most notable consequence is that unqualified, or ill-intentioned, in-home weapon manufacturers could sidestep current federal gun laws. The individual would not need a license, registration, background check, or even much technical knowledge—just a 3-D printer and Internet access.<sup>17</sup> The rapid

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2012), <http://readwrite.com/2012/08/29/how-3d-printing-is-inflaming-the-gun-control-debate>.

8. See 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 (2012) (analyzing 3-D printers and whether the right to bear arms under the Second Amendment also means the right to make arms).

9. *3D Gun Manufacturing Project Derailed as Printer Is Withdrawn*, GUNMAG.COM (Nov. 14, 2012, 7:40 PM), <http://www.thegunmag.com/3d-gun-manufacturing-project-derailed-as-printer-is-withdrawn/>.

10. See Matt Silverman, *How Does 3D Printing Work, Anyway?*, MASHABLE (Aug. 1, 2012), <http://mashable.com/2012/08/01/how-does-3d-printing-work/> (listing the following industry examples: medical, automotive, architecture, and defense).

11. Claudine Zap, *3D Printer Could Build a House in 20 Hours*, YAHOO NEWS (Aug. 10, 2012, 6:41 PM), <http://news.yahoo.com/blogs/sideshow/3d-printer-could-build-house-20-hours-224156687.html>.

12. *Id.*

13. Barnatt, *supra* note 5.

14. Weinberg, *supra* note 2.

15. See Clay Dillow, *FYI: Is It Legal to 3-D Print a Handgun?*, POPULAR SCI. (Oct. 4, 2012, 2:00 PM), <http://www.popsci.com/technology/article/2012-10/fyi-it-legal-3-d-print-handgun> (“Regardless of your personal feelings toward [gun control], . . . at the very least . . . [we must] look at what happens in a world where information (which wants to be free) can be easily converted into physical objects – many of which (like firearms) are not supposed to flow freely.”).

16. Todd Wasserman, *3D Printing’s Next Frontier: Guns*, MASHABLE (Oct. 4, 2012), <http://mashable.com/2012/10/04/3d-printers-guns/>.

17. See generally Dillow, *supra* note 15 (reviewing the legality of a 3-D printed weapon).

advancement in 3-D printing technology and improvements to 3-D printed firearms are threatening the stagnant regulatory scheme.

Part II of this Note gives background on the 3-D printing process, provides an explanation of digitally manufactured firearms, and discusses the current federal regulations at issue. Part III examines the various approaches to and inherent flaws in regulating the manufacture or possession of 3-D printed firearms. It also considers the policy implications and the heightened concerns created with the 3-D printer's application to criminal activity. Part IV recommends an approach to regulating 3-D printed firearms that balances the most critical individual, technological, and public policy concerns.

## II. BACKGROUND

The ethical and legal questions surrounding 3-D printing and firearms are significant. The unique nature of 3-D printing technology and its capabilities regarding firearm manufacture calls into question what limits should be placed on individual ownership of 3-D printers, the possible consequences of unrestricted use, and whether technological advancement outweighs concerns over public safety. As the technology continues to improve and become accessible and as individuals increasingly turn to 3-D printing as a means of firearm manufacture, the U.S. government will struggle with traditional firearm regulations and how to apply such protections to the increasingly digital world of the twenty-first century.

### A. *The Three-Dimensional Printing Revolution*

The 3-D printer works by using digital data to produce a solid three-dimensional object through a layering process<sup>18</sup> known as Additive Manufacturing.<sup>19</sup> Depending on the type of printer, there are various layering techniques for Additive Manufacturing, each with its own benefits.<sup>20</sup> The 3-D printer is most often praised for its efficiency; the process requires little to no human supervision, produces less waste than traditional manufacturing, and eliminates the need for factory assembly by printing interlocking or complete parts.<sup>21</sup> The 3-D printer can manufacture highly complex inner structures, shapes, and material combinations, which would otherwise be too difficult, or even impossible, to produce using conventional manufacturing processes.<sup>22</sup>

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18. Silverman, *supra* note 10.

19. Barnatt, *supra* note 5; *3D Printing – A New Industrial Revolution?*, BBC (Oct. 30, 2012, 8:18 AM), <http://www.bbc.co.uk/news/technology-20137791>.

20. See Daniel Burrus, *3D Printing (Additive Manufacturing) Is Turning the Impossible Into the Possible*, HUFFINGTON POST (Oct. 10, 2012, 6:56 PM), [http://www.huffingtonpost.com/daniel-burrus/3d-printing-additive-manu\\_b\\_1951777.html](http://www.huffingtonpost.com/daniel-burrus/3d-printing-additive-manu_b_1951777.html) (describing different kinds of 3-D printers).

21. *How 3-D Printing Could Disrupt the Economy of the Future*, BLOOMBERG (May 14, 2013, 5:00 PM), <http://www.bloomberg.com/news/2013-05-14/how-3-d-printing-could-disrupt-the-economy-of-the-future.html>.

22. *Id.*

Once a design file is downloaded and sent to the 3-D printer, the machine deposits material, typically a specialized plastic or metal, layer by layer.<sup>23</sup> The layers are continuously fused together until the model or final product is finished.<sup>24</sup> Today, there are several companies in the business of making industrial 3-D printers for commercial purposes.<sup>25</sup> The industrial 3-D printer is expensive, remaining inaccessible to the public, with prices starting at ten thousand dollars.<sup>26</sup>

In addition to commercial usage, some 3-D printer companies produce machines designed for use with the average enthusiast's desktop computer.<sup>27</sup> The existence of consumer-level products is indicative of the 3-D printer's movement toward the mainstream.<sup>28</sup> A few years ago, 3-D printers were rare, expensive, and difficult to operate, but this manufacturing technology is quickly becoming more advanced and more accessible.<sup>29</sup> While high-end consumer desktop 3-D printers are costly, with prices starting at \$2,000, it is estimated that by 2015, these printers should cost no more than a few hundred dollars.<sup>30</sup>

Along with the hardware, 3-D printing requires specialized software to create the digital models.<sup>31</sup> The computer assisted design (CAD) blueprints are templates of what will become the printed solid object.<sup>32</sup> The software varies in complexity and the amount of required user expertise.<sup>33</sup> A more advanced hobbyist can use professional or fee-licensed software based on the object and quality level desired.<sup>34</sup> For the beginner, there are free object designs, CAD software, and tutorials available on the Internet.<sup>35</sup> This makes the software relatively easy to use and any blueprints widely accessible to the public.

23. Barnatt, *supra* note 5.

24. *Id.*

25. *Who Make 3D Printers?*, 3DERS.ORG, <http://www.3ders.org/3d-printer/who-make-3d-printers.html> (last visited Mar. 13, 2014).

26. John Herrman, *How to Get Started: 3D Modeling and Printing*, POPULAR MECHANICS (Mar. 15, 2012, 6:30 AM), <http://www.popularmechanics.com/technology/how-to/tips/how-to-get-started-3d-modeling-and-printing>; *Comparison Chart of All 3D Printer Choices for Approximately \$20,000 or Less*, ADDITIVE3D.COM, [http://www.additive3d.com/3dpr\\_chrt.htm](http://www.additive3d.com/3dpr_chrt.htm) (last visited Mar. 13, 2014).

27. *Stratasys 3D Printing*, MCAD.COM, <http://www.mcad.com/stratasys> (last visited Mar. 13, 2014) ("From 3D printers to 3D production systems, Stratasys machines let you quickly build working models or end-use thermoplastic parts from your desktop or factory floor.")

28. See Mark Gibbs, *The End of Gun Control? [Updated]*, FORBES (July 28, 2012, 4:24 PM), <http://www.forbes.com/sites/markgibbs/2012/07/28/the-end-of-gun-control/> (discussing the increasing use of 3-D printing for guns).

29. *Id.*

30. See Barnatt, *supra* note 5 (discussing the various price options of 3-D printing); see also David Lumb, *The Top Nine Consumer 3-D Printers for Every Budget*, FAST COMPANY (Aug. 28, 2013), <http://www.fastcolabs.com/3016490/9-consumer-3-d-printers-for-every-budget> (discussing the various price options of 3-D printing).

31. *What Is 3D Printing?* 3D PRINTER HUB, <http://3dprinterhub.com/what-is-3d-printing#software> (last visited Mar. 13, 2014).

32. Herrman, *supra* note 26.

33. *Id.*

34. See *Best 3D Software*, 3D PRINTER HUB, <http://3dprinterhub.com/3d-printer-software> (last visited Mar. 13, 2014) (displaying a comparison grid for the best 3-D software).

35. See *Free 3D Tutorials: From 3D Tips & Tricks to Advanced 3D Software Tutorials in 4 Seconds*, FREE3DTUTORIALS.COM, <http://www.free3dtutorials.com/> (last visited Mar. 13, 2014) (providing access to advanced 3-D software tutorials).

As an alternative to purchasing a costly 3-D printer for in-home use, Internet-based companies provide on-demand 3-D printing services.<sup>36</sup> This process simply requires the user to upload a project, wait for approval of the model, select the desired materials, and pay for the order.<sup>37</sup> MakerBot is currently one of the leading 3-D printer companies and has made the most notable move towards creating a consumer market for 3-D printing services.<sup>38</sup> In early 2012, MakerBot opened the first 3-D printer retail store in New York City.<sup>39</sup> The store allows shoppers to browse and purchase an assortment of 3-D printed items or view their newest line of 3-D printers, which are targeted toward “professional designers who want an object factory on their desk.”<sup>40</sup>

The technology is not new; the 3-D printer has been used quietly for decades across numerous industries.<sup>41</sup> Only recently, though, has 3-D printing become economical, accessible, and widespread.<sup>42</sup> Because of the increased mainstream awareness, the 3-D printing and manufacturing market is rapidly emerging.<sup>43</sup> Many of the larger 3-D printing companies are already publicly traded.<sup>44</sup> In 2012, the 3-D printer and services market was assessed at approximately \$2.2 billion—a 29% increase from the previous year.<sup>45</sup> Researchers estimate that the market will hit \$6.5 billion by 2019 and expect to see a 300% increase in the size of the 3-D printing industry by 2020.<sup>46</sup> The industry boom is caused by the users’ ability to quickly, effortlessly, and inexpensively generate physical objects from the convenience of their computer.<sup>47</sup>

In his 2013 State of the Union Address, President Obama publicly endorsed 3-D printing as a potential source for new jobs and called on

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36. See Herrman, *supra* note 26 (discussing the influx of easy-to-use software and on-demand printing services available to individuals).

37. *Id.*

38. Christopher Mims, *Stratasys Just Acquired MakerBot, the One 3D Printing Firm that Could Have Disrupted It*, QUARTZ (June 19, 2013), [http://qz.com/96109/stratasys-just-acquired-makerbot-the-one-3d-printing-firm-that-could-have-disrupted-it](http://qz.com/96109/stratasys-just-acquired-makerbot-the-one-3d-printing-firm-that-could-have-disrupted-it/) (“MakerBot’s revenue was \$11.5 million in the first quarter of 2013. . . .”); Ashlee Vance, *The Era of Retail 3D Printing Begins*, BLOOMBERG BUSINESSWEEK (Sept. 21, 2012), <http://www.businessweek.com/articles/2012-09-21/the-era-of-retail-3d-printing-begins>. The company was recently acquired by Stratasys for an anticipated value of \$604 million. Mims, *supra*. The initial acquisition involved 4.76 million shares totaling \$403 million and, depending on Makerbot’s continued performance, Stratasys could acquire an additional 2.38 million shares. *Id.*

39. Vance, *supra* note 38.

40. *Id.*

41. See *A Brief History of 3D Printing*, T. ROWE PRICE, [http://individual.troweprice.com/staticFiles/Retail/Shared/PDFs/3D\\_Printing\\_Infographic\\_FINAL.pdf](http://individual.troweprice.com/staticFiles/Retail/Shared/PDFs/3D_Printing_Infographic_FINAL.pdf) (last visited Mar. 13, 2014) (highlighting some of the industries that 3-D printing has revolutionized since the 1980s: for example, aviation, medical, automotive).

42. *Your Future Will Be Manufactured on a 3-D Printer*, BLOOMBERG (May 12, 2013, 5:00 PM), <http://www.bloomberg.com/news/2013-05-12/your-future-will-be-manufactured-on-a-3d-printer.html>.

43. Silverman, *supra* note 10; *3D Printing Scales Up*, ECONOMIST (Sept. 7, 2013), <http://www.economist.com/news/technology-quarterly/21584447-digital-manufacturing-there-lot-hype-around-3d-printing-it-fast>.

44. Silverman, *supra* note 10.

45. *3D Printing Scales Up*, *supra* note 43.

46. Matt Clinch, *3D Printing Could Be About to Get Even Cooler*, CNBC (Sept. 9, 2013, 2:09 AM), <http://www.cnbc.com/id/101014617>.

47. Silverman, *supra* note 10.

Congress to help “guarantee that the next revolution in manufacturing is made in America.”<sup>48</sup> In 2012, through a private-public partnership, the National Additive Manufacturing Innovation Institute was formed to encourage 3-D printing and manufacturing domestically.<sup>49</sup> It is a collaborative effort between U.S. governmental agencies, industrial organizations, and academic institutions with the shared goal of promoting innovation and education in Additive Manufacturing.<sup>50</sup>

In addition to institutions, the do-it-yourself crowd recognizes and praises 3-D printing for its many benefits: cheap manufacturing, quick production, less waste, better-quality products, accessibility, sustainability, new combinations of materials, virtually unrestricted concept development, original shapes and structures, reduction in time to market, and innovative business models.<sup>51</sup> Like all cutting-edge technology, advances in 3-D printing came quickly, with machines capable of printing in over one hundred different materials.<sup>52</sup> Some of these materials include: rubber and hard plastics, as well as polyurethane-like, temperature resistant, opaque, transparent, and even highly detailed stainless steel.<sup>53</sup>

The 3-D printer will undoubtedly create a market for locally, rather than commercially, manufactured goods and enable innovation in product design and development across many industries.<sup>54</sup> Yet, because 3-D printing raises unprecedented legal and ethical concerns, the industry should be closely monitored as it continues to grow and reach consumers.<sup>55</sup>

### B. *The 3-D Printed Gun: Download and Shoot*

Currently, the ability to print an entirely plastic and fully functional firearm that truly rivals a traditionally manufactured gun has not been perfected.<sup>56</sup> But, it seems that the appeal of 3-D printed guns, which are

48. Doug Gross, *Obama's Speech Highlights Rise of 3-D Printing*, CNN TECH (Feb. 13, 2013, 3:22 PM), <http://www.cnn.com/2013/02/13/tech/innovation/obama-3d-printing>.

49. *When America Makes America Works*, AM. MAKES, <http://www.americamakes.us> (last visited Mar. 13, 2014).

50. *See id.* (“America Makes is working to accelerate AM and 3DP technologies and increase our nation’s global manufacturing competitiveness.”).

51. Matt Petronzio, *How 3D Printing Actually Works*, MASHABLE (Mar. 28, 2013), <http://mashable.com/2013/03/28/3d-printing-explained/>; Silverman, *supra* note 10; Daniel Tamarjan, *9 Benefits of 3D Printing*, AUGMENTED TOMORROW (June 26, 2012), <http://augmentedtomorrow.com/9-benefits-3d-printing/>.

52. Silverman, *supra* note 10.

53. *Id.*

54. *3D Printing Controversy Continues: TechCrunch Stirs the Pot*, ON 3D PRINTING (Aug. 26, 2012), <http://on3dprinting.com/2012/08/26/3d-printing-controversy-continues-techcrunch-weighs-in/>.

55. *See ZDNet's Tech Predictions: 2013 Will See a Dramatic Rise in 3D Printing*, 3DERS.ORG (Dec. 26, 2012), <http://www.3ders.org/articles/20121226-zdnet-tech-predictions-2013-will-see-a-dramatic-rise-in-3d-printing.html>.

56. *See Our Plan*, DEF. DISTRIB., <http://defdist.org/our-plan/> (last visited Feb. 25, 2013) (accessed by searching on Way Back Machine, an internet archive). The 3-D printed gun does not yet possess the same firepower or accuracy as a traditionally manufactured weapon. Notably though, the first 3-D printed metal gun is more accurate than a factory-made model. Iain Thomson, *World's First 3D-Printed Metal Gun 'More Accurate' Than Factory-Built Cousin*, REGISTER (Nov. 8, 2013), [http://www.theregister.co.uk/2013/11/08/first\\_3d\\_printed\\_gun\\_more\\_accurate\\_than\\_commercially\\_produced\\_equivalent/](http://www.theregister.co.uk/2013/11/08/first_3d_printed_gun_more_accurate_than_commercially_produced_equivalent/).

expected to be inexpensive, easy to make, unidentifiable, and practically disposable, means that the creation of such has become a question of “when” and not “if.”<sup>57</sup> Many gun enthusiasts and organizations are passionate about making a reliable 3-D printed gun a reality and have successfully pushed the concept from impossible to plausible.<sup>58</sup> A nonprofit digital publisher, known as Defense Distributed, leads the 3-D printed firearm movement.<sup>59</sup> The group’s mission was to create “a fully-printable gun comprised of near 100% printable parts” and make the blueprints freely available to the public, effectively circumventing U.S. gun control laws.<sup>60</sup>

The reasons for creating a dependable plastic firearm using a 3-D printer vary.<sup>61</sup> For do-it-yourself gunsmiths, 3-D printers are an attractive alternative for manufacturing weapons due to the continuously decreasing price of the printers, materials, and ammunition.<sup>62</sup> Some view the ability to 3-D print an entirely plastic firearm as a technical challenge.<sup>63</sup> For others, like Defense Distributed, the aspiration to create such a futuristic and accessible firearm is rooted in notions of civil liberties.<sup>64</sup> Regardless of the motivation, the building process and desired result is the same: a working gun built with some amount of plastic.<sup>65</sup> The first few steps to produce a 3-D printed firearm are identical to the process to create any other object: obtain a 3-D printer and find the gun blueprints online.<sup>66</sup> The technology provides new tools for modern gunsmithing and will eventually make firearm and spare parts manufacturing incredibly cheap and simple.<sup>67</sup>

A 3-D printed firearm is not as reliable as a traditional gun, but as the printers and materials continue to improve, the designs will surely evolve. The main difficulty in manufacturing for the technologically advanced gun hobbyist is an issue with the resin, which may cause the plastic gun to melt or explode due to pressure and heat after firing the weapon.<sup>68</sup> The malfunction or

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57. Mic Wright, *Making Guns in Your Garage: How 3D Printers Will Revolutionize the Manufacture of Deadly Weapons*, TELEGRAPH (Oct. 5, 2012), <http://blogs.telegraph.co.uk/technology/micwright/100007925/making-guns-in-your-garage-how-3d-printers-will-revolutionise-the-manufacture-of-deadly-weapons/>.

58. *Id.*

59. Andy Greenberg, *'Wiki Weapon Project' Aims to Create a Gun Anyone Can 3D-Print at Home*, FORBES (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/>; see *Our Plan*, *supra* note 56.

60. *Student's Printed Gun Plan Blocked as 3D Printer Lease Is Terminated*, PRINT WEEK (Oct. 10, 2012), <http://www.printweek.com/print-week/news/1135142/students-printed-gun-plan-blocked-3d-printer-lease-terminated>; see *Our Plan*, *supra* note 56 (“This project might change the way we think about gun control and consumption. How do governments behave if they must one day operate on the assumption that any and every citizen has near instant access to a firearm through the Internet? Let’s find out.”).

61. *Our Plan*, *supra* note 56; Brown, *supra* note 1.

62. *Our Plan*, *supra* note 56.

63. Henry Fountain, *Tools of Modern Gunmaking: Plastic and a 3-D Printer*, N.Y. TIMES (Jan. 29, 2013), <http://www.nytimes.com/2013/01/30/science/surprising-tools-of-modern-gunmaking-plastic-and-a-3-d-printer.html>.

64. See *Our Plan*, *supra* note 56.

65. Fountain, *supra* note 63.

66. See David Cardinal, *The 3D-Printed Gun: When Is High Tech Too Hot to Handle?*, EXTREME TECH (Oct. 3, 2012, 11:33 AM), <http://www.extremetech.com/extreme/137269-the-3d-printed-gun-when-is-high-tech-too-hot-to-handle>.

67. See Brown, *supra* note 1.

68. *Id.*



misfire of a 3-D printed gun can cause serious injury and poses a safety threat to the gunsmith in the testing phase.<sup>69</sup> Even for those 3-D printed guns that can successfully fire multiple rounds, there are questions regarding durability, as repeated use will eventually cause the plastic to deform, crack, or otherwise fail.<sup>70</sup>

The evolution of the 3-D printed gun has moved at an unimaginable rate; it only took two years for the concept of printing plastic firearms to move from an improbable idea to a safety-threatening reality.<sup>71</sup> Initially, 3-D printers were incapable of printing all of the working parts of a gun.<sup>72</sup> Instead, modern gunsmiths began by printing a specific component, like a magazine or receiver, and then added the printed part to an existing firearm to create a functioning weapon.<sup>73</sup> Defense Distributed's first attempt at printing the receiver for an AR-15 semi-automatic rifle was unsuccessful, as the gun failed after only half a dozen shots.<sup>74</sup> Within months of their initial efforts, however, Defense Distributed fine-tuned the design and unveiled a high-capacity rifle magazine that successfully shot over 600 rounds before running out of ammunition.<sup>75</sup> Defense Distributed's actions appear to be a fundamentally political exercise, as evidenced by the successful printing of an AK-47 magazine, which the group aptly named the "Feinstein AK Mag" after gun control advocate Senator Diane Feinstein.<sup>76</sup> The group was also focused on 3-D printing 30-round magazine clips in anticipation of Senator Feinstein's Assault Weapons Ban bill, which would have served to limit magazine size.<sup>77</sup>

Defense Distributed's latest success, a plastic .380 caliber handgun, is the world's first fully 3-D printed firearm.<sup>78</sup> The controversial weapon, known as the Liberator, is made up of sixteen parts.<sup>79</sup> The Liberator was printed in just four hours using a second-hand Stratasys Dimension SST 3-D printer and ABS

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69. Wright, *supra* note 57.

70. Fountain, *supra* note 63.

71. Iain Overton, *How to Stop a Plastic Gun Murder*, INDEPENDENT (Sept. 27, 2013), <http://www.independent.co.uk/voices/comment/how-to-stop-a-plastic-gun-murder-8844290.html>.

72. *Id.*

73. Charlie Wells, *Exclusive: Man Prints Gun at Home Says It "Wasn't That Difficult,"* NY DAILY NEWS (Aug. 1, 2012, 1:29 PM), [http://articles.nydailynews.com/2012-08-01/news/32986150\\_1\\_gun-control-gun-enthusiast-3d](http://articles.nydailynews.com/2012-08-01/news/32986150_1_gun-control-gun-enthusiast-3d) ("[T]o the best of my [(Michael Guslick's)] knowledge, this is the world's first 3D printed firearm to actually be tested.")

74. Cyrus Farivar, *"Download This Gun": 3D-Printed Semi-Automatic Fires over 600 Rounds*, ARS TECHNICA (Mar. 1, 2013, 8:00 AM), <http://arstechnica.com/tech-policy/2013/03/download-this-gun-3d-printed-semi-automatic-fires-over-600-rounds/>.

75. *Id.*

76. Geoffrey Ingersoll, *3D Printing Company Names AK-47 Magazine After Gun Control Congresswoman*, BUS. INSIDER (Mar. 8, 2013, 5:26 AM), <http://www.businessinsider.com/defense-distributed-feinstein-ak-mag-2013-3>.

77. Erin Lee Carr, *Click, Print, Gun: The Inside Story of the 3D-Printed Gun Movement*, MOTHERBOARD (Mar. 25, 2013, 12:19 PM), <http://motherboard.vice.com/read/click-print-gun-the-inside-story-of-the-3d-printed-gun-movement-video>.

78. Andy Greenberg, *3D-Printed Guns as Art: London Design Museum Buys Two 'Liberator' Printed Pistols*, FORBES (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/>.

79. Andy Greenberg, *Meet the 'Liberator': Test-Firing the World's First Fully 3D-Printed Gun*, FORBES (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/>.

plastic, a robust, heat-resistant material.<sup>80</sup> Technically, the gun requires two components that were not created on the 3-D printer: a metal firing pin and a non-functional metal piece.<sup>81</sup> The second metal component is extraneous to the gun's operation and can be easily removed by the user.<sup>82</sup>

The Liberator fires standard .380 rounds, includes interchangeable barrels, and can shoot multiple rounds without breaking.<sup>83</sup> Defense Distributed provided the schematics online, making the Liberator the world's first open-source weapon.<sup>84</sup> Additionally, digital plans are now openly available to 3-D print a high capacity magazine for AK-47 assault weapons, a lower receiver for AR-15 rifles, a single-shot .380 caliber handgun, a .22 caliber rifle, and a six-shooter.<sup>85</sup>

### C. *The Current Federal Firearm Regulatory Scheme*

The 3-D printed firearm further complicates the ongoing gun control debate, which largely surrounds the Second Amendment and related Supreme Court precedent.<sup>86</sup> The Second Amendment guarantees the right to private gun ownership.<sup>87</sup> In the United States, federal firearm legislation is limited; instead, states and municipal authorities enact their own laws to regulate guns at a local level.<sup>88</sup> The existing federal legislation permits all non-prohibited persons, or a majority of citizens, to meet the licensing requirements for lawful acquisition and ownership.<sup>89</sup> The latest gun related tragedies, like the Aurora, Colorado and Newtown, Connecticut mass shootings, have prompted a

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80. *Id.*

81. *Id.*

82. *Id.*

83. *Id.*

84. *Id.*

85. Robert Beckhusen, *Gun Lobby Loves 3D-Printed Weapons*, WIRED (Aug. 10, 2012, 6:30 AM), <http://www.wired.com/dangerroom/2012/08/3d-weapons/>; Overton, *supra* note 71. Similarly, in a do-it-yourself project, individual Michael Guslick used a Stratasys 3-D printer and blueprints downloaded from the Internet to print the lower receiver of an AR-15 rifle and turn it into an operable gun. Dominique Mosbergen, *Michael Guslick, Amateur Gunsmith, Claims to Have Used 3D Printer to Make Functional Semiautomatic AR-15 Rifle at Home*, HUFFINGTON POST (Aug. 9, 2012, 4:23 PM), [http://www.huffingtonpost.com/2012/08/08/man-3d-printer-rifle\\_n\\_1753513.html](http://www.huffingtonpost.com/2012/08/08/man-3d-printer-rifle_n_1753513.html).

86. U.S. CONST. amend. II; *see* District of Columbia v. Heller, 554 U.S. 570, 572 (2008) (holding that the Second Amendment protects the individual's right to possess firearms for traditionally lawful purposes); *see also* Adam Winkler, *The Second Amendment Is All For Gun Control*, DAILY BEAST (Feb. 17, 2013), <http://www.thedailybeast.com/articles/2013/02/17/the-second-amendment-is-all-for-gun-control.html> (“[T]he Second Amendment guarantees individuals the right to own guns . . . nearly *any* restriction on the manufacture, ownership, or use of firearms infringes this sacred right.”).

87. U.S. CONST. amend. II.

88. *General Questions*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <http://www.atf.gov/firearms/faq/general.html> (last visited Mar. 13, 2014).

89. Kelli Saam, *The U.S. and the World: How Other Countries Approach Gun Control*, KRCR NEWS (Feb. 21, 2013, 11:39 AM), <http://www.krcrtv.com/Guns-In-America/The-U-S-and-the-world-How-other-countries-approach-gun-control/-/18552662/18555738/-/15hheca/-/index.html>. This is known as a permissive system. *See* FRANKLIN E. ZIMRING, Comment to EVALUATING GUN POLICY: EFFECTS ON CRIME AND VIOLENCE 403 (Jens Ludwig & Phillip J. Cook eds., 2003) (“The California system, typical of ‘permissive licensing’ strategies, grants permits to all persons who are not disqualified by age, criminal record, or other disability.”).

renewed focus in Congress to update gun control legislation.<sup>90</sup> In 2013, President Obama asked Congress to vote on his proposals to reduce gun violence, which include: universal background checks for all gun purchasers, mental health programs, school safety measures, capacity limitations on ammunition magazines, and a renewal of the Assault Weapons Ban.<sup>91</sup> The controlling federal firearm legislation includes: the National Firearms Act of 1934,<sup>92</sup> the Gun Control Act of 1968,<sup>93</sup> the Violent Crime Control and Law Enforcement Act of 1994,<sup>94</sup> the Brady Handgun Violence Prevention Act of 1993,<sup>95</sup> and the Undetectable Firearms Act of 1988.<sup>96</sup> The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) is the primary agency responsible for enforcing these Federal firearms laws.<sup>97</sup>

### 1. *The National Firearms Act of 1934*

The National Firearms Act of 1934 (NFA) regulates the transfer and possession of firearms.<sup>98</sup> In 1934, Congress enacted the NFA as an exercise of its authority to tax, the underlying purpose of which was to prohibit the manufacture and transfer of specific firearms that posed a significant crime problem:<sup>99</sup> short-barreled rifles and shotguns, machine guns, silencers, destructive devices, and “any other weapon.”<sup>100</sup> As such, those weapons listed in the NFA are the most heavily regulated by federal law. Today, the manufacture of an NFA firearm requires a tax payment, registration, and approval from the ATF.<sup>101</sup>

### 2. *The Gun Control Act of 1968*

The Gun Control Act of 1968 (GCA) prohibits the importation of firearms, frames, receivers, barrels, and ammunition into the United States.<sup>102</sup>

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90. Emily Swanson, *Gun Control Laws: After Sandy Hook, Poll Finds Bump in Support for Greater Restrictions*, HUFFINGTON POST (Dec. 18, 2012, 8:25 AM), [http://www.huffingtonpost.com/2012/12/16/gun-control-laws-sandy-hook-poll\\_n\\_2309324.html](http://www.huffingtonpost.com/2012/12/16/gun-control-laws-sandy-hook-poll_n_2309324.html).

91. John Gettings & Catharine McNiff, *Milestones in Federal Gun Legislation*, INFOPLEASE, <http://www.infoplease.com/spot/guntime1.html> (last visited Mar. 13, 2014) (providing a timeline of gun legislation and organizations from 1791 to the present); Joseph Straw & Dan Friedman, *President Obama Targets New Gun Control Laws in State of the Union Speech*, NY DAILY NEWS (Feb. 13, 2013, 2:00 AM), <http://www.nydailynews.com/news/national/obama-targets-gun-control-laws-state-union-speech-article-1.1262710>.

92. National Firearms Act, 26 U.S.C. §§ 5801–5872 (2012).

93. Gun Control Act of 1968, 18 U.S.C. §§ 921–928 (2012).

94. Violent Crime Control and Law Enforcement Act of 1994, 42 U.S.C. §§ 13701–14223 (2012).

95. Brady Handgun Violence Prevention Act of 1993, 18 U.S.C. §§ 921, 922, 924, 925 (2012).

96. Undetectable Firearms Act of 1988, 18 U.S.C. §§ 922, 924, 925 (2012).

97. *Department of Justice Agencies*, U.S. DEP’T JUST., <http://www.justice.gov/agencies/index-list.html> (last visited Mar. 13, 2014).

98. National Firearms Act, 26 U.S.C. § 5844 (2012).

99. *History of the National Firearms Act*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <https://www.atf.gov/firearms/nfa/index.html> (last visited Mar. 13, 2014).

100. National Firearms Act, 26 U.S.C. § 5845 (2012).

101. *General Questions*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <http://www.atf.gov/firearms/faq/general.html#gca-manufacturing> (last visited Mar. 13, 2014).

102. *General Overview*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <http://www.atf.gov/>

The GCA was enacted to “keep firearms out of the hands of those not legally entitled to possess them because of age, criminal background or incompetency, and to assist law enforcement authorities in the states and their subdivisions in combating the increasing prevalence of crime in the United States.”<sup>103</sup> Defendants in federal firearms cases are most often charged under the GCA—specifically, the subsection that makes it unlawful for a prohibited person to ship, transport, possess, or receive a firearm.<sup>104</sup> The maximum penalty for the unlawful possession of firearms is ten years in prison.<sup>105</sup>

According to the GCA, the receiver is the main piece of a gun considered to be a firearm for regulatory purposes.<sup>106</sup> The receiver is defined as “[the] part of a firearm which provides housing for the hammer, bolt or breechblock, and firing mechanism, and which is usually threaded at its forward portion to receive the barrel.”<sup>107</sup> The law requires that all newly manufactured firearms bear a unique serial number.<sup>108</sup> Additionally, under the GCA, licensed gun manufacturers must maintain records of each firearm produced for inspection by a regulating authority.<sup>109</sup>

### 3. *The Violent Crime Control and Law Enforcement Act of 1994*

In 1994, Congress passed the Federal Assault Weapons Ban, a subsection of the Violent Crime Control and Law Enforcement Act, which lasted for ten years.<sup>110</sup> The law amended the GCA by limiting the number of bullets contained in high-capacity magazines and prohibiting the manufacture, transfer, or possession of certain semi-automatic firearms for civilian use.<sup>111</sup> Experts agree that because of the various loopholes, it was ultimately unsuccessful in reducing overall gun violence, although it may have reduced the number of mass shootings.<sup>112</sup> In the last three decades, there have been sixty-two mass shootings; the majority were committed using assault weapons with high-capacity magazines.<sup>113</sup>

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firearms/guides/importation-verification/general-overview.html (last visited Mar. 13, 2014).

103. S. REP. NO. 90-1097, at 28 (1968).

104. RONALD J. FRANDBEN & MICHAEL N. BOWLING, FEDERAL FIREARMS CASES, FY2008 2 (2010), available at <https://www.ncjrs.gov/pdffiles1/bjs/grants/229420.pdf>.

105. Gun Control Act of 1968, 18 U.S.C. § 924(a)(2) (2012).

106. See *id.* § 921(a)(3) (“The term ‘firearm’ means[:] (A) any weapon (including a starter gun) which will or is designed to or may readily be converted to expel a projectile by the action of an explosive; (B) the frame or receiver of any such weapon; (C) any firearm muffler or firearm silencer; or (D) any destructive device. Such term does not include an antique firearm.”).

107. 27 C.F.R. § 478.11 (2013).

108. *Id.* § 479.102. There are seven specific marking requirements to uniquely identify each firearm. *Firearms Verification Overview*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <http://www.atf.gov/firearms/guides/importation-verification/firearms-verification-overview.html> (last visited Mar. 13, 2014).

109. 27 C.F.R. § 479.102.

110. 18 U.S.C. § 922(v) (2000) (repealed 2004).

111. Brad Plumer, *Everything You Need to Know About the Assault Weapons Ban*, in *One Post*, WASH. POST (Dec. 17, 2012, 10:34 AM), <http://www.washingtonpost.com/blogs/wonkblog/wp/2012/12/17/everything-you-need-to-know-about-banning-assault-weapons-in-one-post/>.

112. *Id.*

113. Sabrina Siddiqui, *Assault Weapons Ban, High-Capacity Magazine Measures Fail in Senate Vote*,

In Congress's latest effort to reduce gun violence by semi-automatic weapons, Senator Dianne Feinstein introduced the Assault Weapons Ban of 2013.<sup>114</sup> The proposed bill would have been a more permanent and extensive ban on semi-automatic weapons than the now-expired Federal Assault Weapons Ban.<sup>115</sup> The proposed law was defeated in the Senate by a vote of 40-60.<sup>116</sup> Thus, semi-automatic weapons that were formerly banned under the Violent Crime Control and Law Enforcement Act remain legal unless banned by state or local laws.

#### 4. *The Brady Handgun Violence Prevention Act of 1993*

Congress passed the Brady Handgun Violence Prevention Act of 1993 (Brady Act) as a measure to keep firearms from prohibited persons.<sup>117</sup> The law established federal background checks on firearm purchasers in the United States.<sup>118</sup> The National Instant Criminal Background Check System (NICS) determines whether a potential buyer is prohibited from obtaining a firearm under the GCA.<sup>119</sup> However, the Brady Act allows unlicensed private sellers, who do not engage in the business of dealing firearms, to transfer firearms to others without a background check.<sup>120</sup> Federal authorities do not maintain records of individual citizens who are permitted to acquire, possess, carry, sell, or transfer a firearm or ammunition, perpetuating the background check loophole.<sup>121</sup>

The NICS is used by Federal Firearms Licensees (FFLs) to determine purchase eligibility.<sup>122</sup> The NICS annually runs millions of background checks for firearm purchases.<sup>123</sup> Each background check represents a single transaction, which permits the purchase of multiple guns.<sup>124</sup> In 2011, less than one percent of those purchases were denied.<sup>125</sup> Depending on whether or not the NICS matches any records in the databases searched, the FFL is advised as to whether the firearm transfer may proceed or must be denied.<sup>126</sup>

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HUFFINGTON POST (Apr., 13 2013, 6:27 PM), [http://www.huffingtonpost.com/2013/04/17/assault-weapons-ban\\_n\\_3103120.html](http://www.huffingtonpost.com/2013/04/17/assault-weapons-ban_n_3103120.html).

114. Diane Feinstein, *Assault Weapons Ban Summary*, DIANNE FEINSTEIN, <http://www.feinstein.senate.gov/public/index.cfm/assault-weapons-ban-summary> (last visited Feb. 25, 2013).

115. Ed O' Keefe, *Lawmakers Unveil New Assault Weapons Ban*, WASH. POST (Jan. 24, 2013, 12:35 PM), <http://www.washingtonpost.com/blogs/post-politics/wp/2013/01/24/lawmakers-to-unveil-new-assault-weapons-ban/>.

116. Siddiqui, *supra* note 113.

117. The Brady Handgun Violence Prevention Act of 1993, 18 U.S.C. § 922 (2012).

118. *National Instant Criminal Background Check System: Fact Sheet*, FBI (May 21, 2010, 10:30 PM), <http://www.fbi.gov/about-us/cjis/nics/general-information/fact-sheet>.

119. *National Instant Criminal Background Check System*, FBI (Mar. 17, 2010, 5:55 PM), <http://www.fbi.gov/about-us/cjis/nics>.

120. *Id.*

121. *See generally* Department of Justice Information Systems, 28 C.F.R. § 25 (2010).

122. *National Instant Criminal Background Check System*, *supra* note 119.

123. Jack Date et al., *Guns in America: A Statistical Look*, ABC NEWS (Dec. 11, 2012), <http://abcnews.go.com/US/guns-america-statistical/story?id=17939758>.

124. *Id.*

125. *Id.*

126. *National Instant Criminal Background Check System: NICS Overview*, FBI (May 21, 2010, 10:30

### 5. *The Undetectable Firearms Act of 1988*

The Undetectable Firearms Act of 1988 (UFA 1988) prohibits the manufacture, import, sale, shipment, delivery, possession, transfer, or receipt of any firearm that may go unnoticed, or does not accurately depict the shape of the component, through an X-ray machine or other metal detector.<sup>127</sup> This law was originally passed in response to a then non-existent all-plastic firearm.<sup>128</sup> As such, the law required that firearms contain at least 3.7 ounces of metal to be legally recognized.<sup>129</sup> The initial ban expired after ten years in order to account for any changes in technology, including security machines or firearms.<sup>130</sup> But in 1998, the Act was extended for an additional five years.<sup>131</sup> Congress passed the Undetectable Firearms Act of 2003 (UFA 2003) to reauthorize the ban, with the understanding that travelers should “not be put at risk by allowing individuals to pass through airport security with undetectable firearms.”<sup>132</sup> The UFA was set to expire in December 2013.<sup>133</sup> However, now that 3-D printing a functioning gun made entirely out of plastic is possible, the Act was renewed for an additional ten years.<sup>134</sup> In response to the now existent 3-D printed plastic firearm, Congressman Steve Israel introduced the Undetectable Firearms Modernization Act.<sup>135</sup> The proposed legislation contains language that specifically targets the 3-D printed weapon.<sup>136</sup>

## III. ANALYSIS

The debate over 3-D printed guns and their potential impact on the legal system began well before the Israel legislation’s existence.<sup>137</sup> Today, though, the question remains whether existing laws, which are used to regulate traditional firearms, can adequately police the plastic guns manufactured using a 3-D printer. At a basic level, it is unclear whether 3-D printed firearms are considered weapons under the GCA or the NFA in the current regulatory scheme.<sup>138</sup> The classification will impact the legality and regulation of using a

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PM), <http://www.fbi.gov/about-us/cjis/nics/general-information/nics-overview>.

127. Undetectable Firearms Act of 1988, 18 U.S.C. § 922(p) (2012) (mandating that firearms contain at least 3.7 ounces of stainless steel and resemble the shape of a handgun).

128. *Id.*

129. *Id.*

130. Editorial, *The Expiring Ban on Plastic Guns*, N.Y. TIMES (Nov. 19, 2013), [http://www.nytimes.com/2013/11/20/opinion/the-expiring-ban-on-plastic-guns.html?\\_r=0](http://www.nytimes.com/2013/11/20/opinion/the-expiring-ban-on-plastic-guns.html?_r=0).

131. *Id.*

132. *Id.*

133. *Id.*

134. Press Release, Steve Israel, With Announcement of Fully Plastic Gun, Rep. Israel Stresses Need for Revamped Undetectable Firearms Act (May 3, 2013), available at [http://israel.house.gov/index.php?option%3Dcom\\_content%26task%3Dview%26id%3D1178%26Itemid%3D131](http://israel.house.gov/index.php?option%3Dcom_content%26task%3Dview%26id%3D1178%26Itemid%3D131).

135. *Id.*

136. Undetectable Firearms Modernization Act, H.R. 1474, 113th Cong. (2013).

137. Dan Roberts, *3D-Printed Guns Prompt US House to Renew Prohibition on Plastic Firearms*, GUARDIAN (Dec. 4, 2013, 1:07 PM), <http://www.theguardian.com/world/2013/dec/04/3d-guns-house-renew-prohibition-plastic-firearms> (“But the law was originally drafted in 1998, years before the advent of 3D-printing technology made domestic production of such weapons a reality.”).

138. Jensen-Haxel, *supra* note 8, at 456–59.

3-D printer to manufacture plastic firearms and the acquisition, transfer, sale, or possession of a 3-D printed firearm.<sup>139</sup> The issue becomes more complex when one considers the file-sharing aspect and accessibility of the firearm blueprints online. As with traditional guns, there appears to be a divide between those who believe that 3-D printed firearm manufacture and possession falls squarely within the rights granted by the Constitution and related federal law<sup>140</sup> and those that consider 3-D printed firearms to be a significant threat to the public and require heavy regulation.<sup>141</sup>

The rapid growth of the 3-D printing industry, the recent successes of 3-D printed firearm manufacturers, and the renewed effort to regulate guns in the United States signal the need for some type of regulatory scheme. Lawmakers must act quickly, though, to police this continually advancing technology and minimize the considerable danger it presents. The revolutionary nature of this technology is undeniable and therefore necessitates full consideration of the competing interests before any regulation can be successfully implemented.

In the context of firearms, however, it would be irresponsible to overlook the potentially devastating effects on public safety and gun control efforts. The government needs a regulatory framework that strikes a feasible balance between public welfare and technological advancement. Due to the unstoppable nature of 3-D printed gun innovation and related file sharing, perhaps the proper resolution is a blanket prohibition of in-home 3-D printers.<sup>142</sup> Another potentially viable solution could be to permit the ownership of 3-D printers and merely rely on current federal firearm laws for regulation of the 3-D printed weapons.<sup>143</sup> In this scheme, there would be no distinction between traditional and digitally manufactured weapons. Lastly, instead of regulating the private ownership of 3-D printers, it may be necessary to restrict accessibility to the hardware and software that manufactures these firearms.<sup>144</sup> This Part examines the relative benefits and potential drawbacks of each of these approaches.

#### A. *Prohibition on Private Ownership of 3-D Printers*

If implemented, a ban on in-home 3-D printing would only permit use of commercial 3-D printers. Prohibiting the ownership of the 3-D printer and directly barring citizens from printing potentially untraceable and undetectable firearms might be the easiest method to crack down on these weapons. As a result of the recent mass shootings, the U.S. government is working to

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139. Brown, *supra* note 1.

140. Ansel Halliburton, *The Constitution and the 3D Plastic Printed Pistol*, TECHCRUNCH (May 15, 2013), <http://techcrunch.com/2013/05/15/the-constitution-and-the-3d-printed-plastic-pistol/>.

141. Jana Winter, *Homeland Security Bulletin Warns 3D-Printed Guns May Be 'Impossible' to Stop*, FOX NEWS (May 23, 2013), <http://www.foxnews.com/us/2013/05/23/govt-memo-warns-3d-printed-guns-may-be-impossible-to-stop/>.

142. See *infra* Part III.A.

143. See Beckhusen, *supra* note 85 (“[Current] laws were written assuming people could make their own guns”); see also *infra* Part III.B.

144. See *infra* Part III.C.

implement measures that limit access to firearms.<sup>145</sup> A prohibition of this nature could also mean that Congress need not create new laws or even re-evaluate existing firearm laws to address the 3-D printed plastic gun.

Given technology's ability to advance rapidly and Congress's well-documented sluggish legislative passage rates, this solution recognizes that legislative efforts might not be capable of keeping pace with desktop 3-D printers and related gun manufacturing advancements.<sup>146</sup> A ban on the private ownership of 3-D printers would effectively close this avenue of firearm manufacture and theoretically eliminate the many security threats posed by 3-D printed firearms.

### 1. *A Short-Sighted Reaction to an Unstoppable Problem*

Implementing a ban on 3-D printers would not be the first time that the U.S. government has prohibited user technology designed to circumvent the law.<sup>147</sup> Currently, the main deterrent to possessing a 3-D printer is the cost of ownership; essentially, the price indirectly regulates the number of 3-D printed weapons.<sup>148</sup> The 3-D printing industry's push to offer affordable printers into the market, though, could eventually allow federally-prohibited persons to obtain in-home 3-D printers and manufacture undocumented and untraceable plastic firearms.

Although the majority of consumers do not need a 3-D printer in their homes,<sup>149</sup> there are a number of concerns associated with prohibiting the private ownership of 3-D printers. The main worry is that at this time, given the online release of the Liberator's files, any governmental action would only deter rather than prevent the proliferation of 3-D printed firearms.<sup>150</sup> As a result, a ban on 3-D printer ownership may be a delayed and stifling measure.<sup>151</sup> It is also unclear whether prohibiting ownership of this technology, as a tool to create firearms, interferes with the right to build self-defense weapons.<sup>152</sup>

A regulation of this nature may also sacrifice individual innovation and deny law-abiding citizens the many benefits of desktop 3-D printing.<sup>153</sup> In

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145. Bryan Koenig, *Nearly a Year After Sandy Hook, Nation Remains Torn About What to Do Next*, CNN (Nov. 25, 2013, 5:15 PM), <http://www.cnn.com/2013/11/25/politics/guns-sandy-hook-next> (discussing efforts made by the Obama Administration and Congress to make tougher gun laws).

146. See Winter, *supra* note 141 (discussing a Department of Homeland Security intelligence bulletin on 3-D printing technology concerns).

147. See Ian Paul, *Do Government Policies and Laws Hinder Tech Advances?*, TECHHIVE (Jun. 15, 2011, 6:00 PM), [http://www.techhive.com/article/230384/laws\\_that\\_harm\\_or\\_curtail\\_internet\\_use.html](http://www.techhive.com/article/230384/laws_that_harm_or_curtail_internet_use.html) (relating that, pressed by Congressman Schumer, Apple removed third party DUI apps, which allows the user to locate checkpoints in real time, from the app store and updated their submission guidelines).

148. See Ryan Whitwam, *Why the 3D Printing Revolution Won't Happen in Your Garage*, EXTREME TECH (Aug. 22, 2012, 8:03 AM), <http://www.extremetech.com/extreme/134833-why-the-3d-printing-revolution-wont-happen-in-your-garage> (stating that a consumer 3-D printer is currently priced around \$2000).

149. *Id.*

150. Winter, *supra* note 141.

151. Jensen-Haxel, *supra* note 8, at 495.

152. See, e.g., Jensen-Haxel, *supra* note 8 (discussing the right to build self-defense weapons).

153. See Charles W. Finocchiaro, Note, *Personal Factory or Catalyst for Piracy? The Hype, Hysteria,*



reality, most citizens are not only qualified to obtain a gun under current federal law, but will be upstanding in their use of 3-D printers.<sup>154</sup> It is more likely that only criminals, or other prohibited persons, would want a 3-D printer for illicit purposes like firearm manufacture or possession. As such, a ban on personal 3-D printers may hinder a rapidly growing industry, one that is expected to revolutionize manufacturing in America.<sup>155</sup> It could be that owning a 3-D printer is “[t]he Holy Grail of this market – the one that could do for 3-D printing what the iPod did for portable music players.”<sup>156</sup>

It may be the case that individuals may refuse to surrender private access to 3-D printers and their necessary materials.<sup>157</sup> There is a risk that a ban on personal 3-D printers may create a currently non-existent but potentially dangerous black market.<sup>158</sup> However, legislative initiatives that limit ownership of 3-D printers, though paternalistic and technologically stifling, may be the most appropriate measure to solve America’s gun problem.<sup>159</sup>

## 2. *The Prohibition Could Effectively Reduce Criminal Activity*

A bar on ownership has at least three key benefits: properly targeting criminal activity, keeping current federal firearm regulations valid, and aiding in gun control.<sup>160</sup> 3-D printers in the hands of persons who are federally prohibited from gun possession, such as felons or children, pose considerable public safety risks. It is already the case that criminals have taken to using 3-D printers for unlawful pursuits: 3-D printers have been used to manufacture skimmers to rob ATM machines<sup>161</sup> and 3-D print keys capable of opening high security handcuffs.<sup>162</sup>

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*and Hard Realities of Consumer 3-D Printing*, 31 CARDOZO ARTS & ENT. L.J. 473, 494 (2013) (“Although current units remain limited and improvement may be gradual, clearly 3-D printing technology has tremendous potential to eventually promote innovation and produce new industries by lowering the costs of entry in manufacturing. . . .”).

154. *See id.* (“3D printers are potentially capable of a far greater number of noninfringing uses than the VTR [Video Tape Recorder] at issue in Sony. . . .”).

155. John Biggs, *Like It or Not, 3D Printing Will Probably Be Legislated*, TECHCRUNCH (Jan. 18, 2013), <http://techcrunch.com/2013/01/18/like-it-or-not-i-think-3d-printing-is-about-to-get-legislated/>; Zach Walton, *3D Printing, Robots Will Revolutionize American Manufacturing*, WEBPRONNEWS (Feb. 15, 2013), <http://www.webpronews.com/3d-printing-robots-will-revolutionize-american-manufacturing-2013-02>.

156. Rob Enderle, *Are Personal 3D Printers the Next Personal Computers?*, DIGITAL TRENDS (Dec. 8, 2012), <http://www.digitaltrends.com/cool-tech/are-personal-3d-printers-the-next-personal-computers/>.

157. *See* Jensen-Haxel, *supra* note 8, at 496 (“While there is cause for concern, we must refuse to surrender free access to 3D printers and their feed materials.”).

158. *See id.* at 448 (“3D printers will render current firearm regulations obsolete by allowing individuals to easily produce firearms”).

159. Biggs, *supra* note 155.

160. *See* Jensen-Haxel, *supra* note 8, at 469 (advocating crime reduction and maintaining the current regulatory system).

161. Brian Krebs, *Gang Used 3D Printers for ATM Skimmers*, KREBS ON SECURITY (Sept. 20, 2011), <http://krebsonsecurity.com/2011/09/gang-used-3d-printers-for-atm-skimmers/> (“An ATM skimmer gang stole more than \$400,000 using skimming devices built with the help of high-tech 3D printers. . . .”).

162. Andy Greenberg, *Hacker Opens High Security Handcuffs with 3D-Printed and Laser-Cut Keys*, FORBES (July 16, 2012, 9:00 AM), <http://www.forbes.com/sites/andygreenberg/2012/07/16/hacker-opens-high-security-handcuffs-with-3d-printed-and-laser-cut-keys/>.

Presently, criminals in need of a firearm are more likely to purchase a gun illegally than use an expensive 3-D printer.<sup>163</sup> The advancement of 3-D printers means that prohibited persons could look to owners of the technology as a constant, sustainable source for obtaining or manufacturing firearms. Removing the very tool could prevent felons from 3-D printing a plastic gun, using it to commit a crime, and then melting or otherwise destroying it.<sup>164</sup> Using a parade of horrors mentality, this cycle could be repeated endlessly without limit. The Department of Homeland Security warned that 3-D printed weapons could hinder ballistics testing because the 3-D printed guns can be manufactured without serial numbers.<sup>165</sup> Recently, a Texas company manufactured the first metal gun using a 3-D printer.<sup>166</sup> There will remain, for some time, barriers that keep 3-D printed metal weapons inaccessible to criminals.<sup>167</sup> Eventually, though, the 3-D printer's costs and accessibility will mean that guns will be untraceable, numerous, and easier to acquire by prohibited persons.

In the United States, minors are federally prohibited from possessing a handgun.<sup>168</sup> The home access to 3-D printers could provide children with the tools necessary to manufacture a functional firearm. The hazardous nature of the 3-D printed gun is two-fold: they are dangerous when they work and they are dangerous when they do not work. The crude nature of the 3-D printed gun means that children can be seriously injured if the weapon malfunctions during the testing phase.<sup>169</sup> In addition to being a self-hazard, if taken into schools, the 3-D printed gun clearly threatens other children. Alarming, the Liberator's outward toy-like appearance masks its inherent threat. According to the ATF, the bullets from a 3-D printed weapon, like the Liberator, "penetrate sufficiently to reach vital organs and perforate the skull."<sup>170</sup> A ban on 3-D printer ownership mitigates the risk that minors will seriously injure themselves or others using a 3-D printed weapon.

The United States is already the most armed nation in the world, owning about a third of all guns worldwide.<sup>171</sup> In 2010, before the 3-D printed gun, the

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163. Hod Lipson & Melba Kurman, *The Next Front in the Gun Control Debate—How to Handle 3D Printed Guns*, FOX NEWS (Feb. 13, 2013), <http://www.foxnews.com/opinion/2013/02/13/next-front-in-gun-control-debate-how-to-handle-3d-printed-guns/> ("The danger is not just that criminals will make guns—there are already easier ways for criminals to get guns today through various black market channels.").

164. Greenburg, *supra* note 162.

165. Jana Winter, *Homeland Security Bulletin Warns 3-D Printed Guns May Be 'Impossible' to Stop*, FOX NEWS (May 23, 2013), <http://www.foxnews.com/us/2013/05/23/govt-memo-warns-3d-printed-guns-may-be-impossible-to-stop/>.

166. Scott McGowan, *3D Printed Metal Gun Will Sell to Lucky 100*, SOLID CONCEPTS (Feb 19, 2014), <http://www.solidconcepts.com/news-releases/3d-printed-metal-gun-will-sell-lucky-100/>.

167. *See id.* ("The serialized 1911 3D printed metal guns will be priced at \$11,900 while supplies last.").

168. National Gun Control Act of 1968, 18 U.S.C. § 922(x)(2) (2012).

169. Lipson & Kurman, *supra* note 163.

170. 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](http://www.huffingtonpost.com/2013/11/13/3d-guns-atf_n_4269303.html).

171. *See* Allison Brenan, *Analysis: Fewer US Gun Owners Own More Guns*, CNN (July 31, 2012, 8:05 PM), <http://www.cnn.com/2012/07/31/politics/gun-ownership-declining/> ("A 2007 survey by the U.N's Office on Drugs and Crime found that the United States, which has 5% of the world's population, owns 50% of the world's guns.").

ATF reported that approximately 8.5 million firearms entered the U.S. market.<sup>172</sup> In 2012, 3-D printing was viewed as such new technology that the ATF had not determined if a 3-D printed plastic gun would even be legally recognized.<sup>173</sup> In 2013, the ATF responded to President Obama's gun control initiative by creating an annual report of the lost and stolen guns in the United States.<sup>174</sup> This effort would be easily undermined if 3-D printers were used to illegally manufacture firearms without any registration, serial numbers, sales history, or unique identifiers.

Controlling the number of 3-D printed guns that would be available on the street appears to be merely collateral to the larger issue of undetectable firearms that threaten security.<sup>175</sup> Yet, the 3-D printer provides a new platform for guns to enter the United States. The volume of printed guns that could be circulated is likely to overwhelm the system and worsen America's gun problems. Prohibiting convicted and future offenders' access to in-home 3-D printers, which would create unregistered weapons, alleviates the concerns regarding the government's ability to control and keep track of the number of firearms in the country.

A blanket prohibition of 3-D printer ownership may have been a more effective solution, if this measure had been passed prior to the online release of firearm blueprints and when the printed plastic gun remained a mere concept. In its attempts to create the world's first 3-D printed gun, Defense Distributed was forced to purchase a 3-D printer after the group was denied the option to lease for violating the manufacturer's policy.<sup>176</sup> If previously implemented, a regulation of this kind could have deterred the creation of an entirely plastic 3-D printed firearm.

### 3. *Will the 3-D Printer Make the National Rifle Association an Advocate of Gun Control?*

The National Rifle Association's (NRA) stance on the Second Amendment and its steadfast opposition to increased firearm regulation is well established.<sup>177</sup> The NRA is traditionally known for protecting its members from infringement upon their constitutional right to keep and bear arms.<sup>178</sup> At this time, it is unclear whether the manufacture or possession of a 3-D printed

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172. Date et. al, *supra* note 123.

173. Alexander Hotz, *Wiki Weapon's Plan to Build Printable 3D Gun Backfires*, GUARDIAN (Oct. 2, 2012, 5:41 PM), <http://www.guardian.co.uk/world/2012/oct/02/wiki-weapon-plan-printable-3d-gun>.

174. THE BUREAU OF ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, 2012 SUMMARY: FIREARMS REPORTED LOST AND STOLEN (2012), *available at* <https://www.atf.gov/sites/default/files/assets/Firearms/2012-summary-firearms-reported-lost-and-stolen-2.pdf>.

175. Reilly, *supra* note 169.

176. Clay Dillow, *3-D Printing Company Confiscates Wiki Weapon Project's Printer*, POPULAR SCIENCE (Oct. 2, 2012, 10:47 AM), <http://www.popsoci.com/science/article/2012-10/3-d-printing-company-confiscates-wiki-weapon-projects-printer>.

177. David Keene, *NRA Chief: Why We Fight for Gun Rights*, CNN (Feb. 1, 2013, 7:45 AM), <http://www.cnn.com/2013/01/31/opinion/keene-nra-guns>.

178. *NRA Digital Network*, NRA, <http://home.nra.org> (last visited Mar. 13, 2014).

gun would be protected under the Second Amendment.<sup>179</sup> A fair assumption is that, given its image as a civil rights group, the NRA would support the right to 3-D print guns, ammunition, or components as a constitutionally protected freedom. The NRA could continue as the nation's foremost defender of Second Amendment rights and advocate for 3-D printed weapons on behalf of its 4 million members. But, the continued movement toward 3-D printers for quick, easy, and cost-effective gun manufacturing has left the NRA facing the competing interests of its members and donors.<sup>180</sup>

The 3-D printer could become a legitimate source of competition with gun manufacturers and threaten to disrupt the twelve billion dollar industry.<sup>181</sup> Since 2005, the gun industry has invested approximately forty million dollars into the NRA.<sup>182</sup> The NRA receives millions of dollars per year directly from the industry, which is comprised of manufacturers, dealers, ammunition and accessory producers, and companies that require easy access to weapons.<sup>183</sup> The NRA stands to lose this funding, though, if it does not intervene and seek to protect the interests of the existing gun industry. Ironically, the NRA might become a large supporter of federal firearm regulation to prohibit the manufacture or possession of 3-D printed weapons.<sup>184</sup> The disruptive nature of this technology could force the NRA to cast aside the interests of its members in order to promote the gun industry's agenda.<sup>185</sup>

#### B. *The Unregulated Use of 3-D Printers*

Generally, Americans believe that the ownership of 3-D printers themselves should be unrestricted.<sup>186</sup> The unregulated use of 3-D printers would permit individuals to own and operate such in their homes. There would be no restrictions on what materials could be used or what objects could be printed. In effect, this would give citizens the right to manufacture firearms and related accessories. The Liberator and other 3-D printed plastic weapons look noticeably different from traditional guns.<sup>187</sup> However, as 3-D printers, designs, and materials improve, the two may eventually become indistinguishable. The industry is already working toward the use of high-

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179. See Kris Van Cleave, *Guns and 3D Printing: Making Gun Parts Virtually from Scratch*, ABC (Feb. 26, 2013, 11:33 PM), <http://www.wjla.com/articles/2013/02/3d-printing-and-the-gun-debate-85688.html> ("Some say its [sic] just an extension of the Second Amendment while others on Capitol Hill say it's a threat to public safety.").

180. Josh Sager, *3-D-Printed Guns Could Doom the NRA*, SALON (May 30, 2013, 1:15 PM), [http://www.salon.com/2013/05/30/how\\_the\\_nras\\_true\\_motives\\_will\\_soon\\_be\\_exposed/](http://www.salon.com/2013/05/30/how_the_nras_true_motives_will_soon_be_exposed/).

181. Adam L. Penenberg, *3D Printers Could Force the NRA to Beg for Regulation*, PANDODAILY (Jan. 12, 2013), <http://pando.com/2013/01/12/3d-printers-could-force-the-nra-to-beg-for-government-regulation/>.

182. *Id.*

183. *Id.*

184. *Id.*

185. *Id.*

186. J.D. Tuccille, *Majority of Americans Would Ban 3D-Printing Guns at Home (Fat Chance!)*, REASON.COM (May 17, 2013, 11:01 AM), <http://reason.com/blog/2013/05/17/majority-of-americans-would-ban-3d-print>.

187. Cody Wilson's *Fully 3D-Printed Gun Works Alarmingly Well*, MOTHERBOARD (May 6, 2013, 2:30 PM), <http://motherboard.vice.com/blog/cody-wilsons-fully-3d-printed-gun-works-alarmingly-well>.

grade metal in 3-D printing manufacturing.<sup>188</sup> Under this regulatory scheme, only current federal firearm laws would serve to regulate 3-D printed guns. This framework assumes that no distinction would be made between traditional and 3-D printed firearms.

*1. Are Existing Firearm Laws Capable of Regulating the 3-D Printed Gun?*

The U.S. government has regulated alternative gun designs since 1934.<sup>189</sup> The 3-D printed weapon could potentially fall into the NFA's catchall "Any Other Weapons" category. If so, gunsmiths using 3-D printers would simply have to register and pay the required \$200 tax.<sup>190</sup> Notably, the gun laws in the United States were written assuming citizens could make their own firearms.<sup>191</sup> It has technically been possible for civilians to legally manufacture guns at home. According to the ATF, the prevalence of illicit home firearm manufacture is reportedly low.<sup>192</sup> This is likely due to the specialized knowledge necessary for manufacturing a traditional gun. The 3-D printer has made the fabrication process cheaper, easier, and quicker. The 3-D printer eliminated the requisite familiarity with firearms for their in-home manufacture. Today, modern gunsmithing requires only a basic proficiency with computers and Internet access.<sup>193</sup> The free and readily-available gun schematics make it easier than ever to exercise the right to manufacture firearms for private use. Reliance on the current firearm framework, as a means of policing 3-D printed weapons, assumes that modern gunsmiths are generally law-abiding, and attempts to manufacture plastic firearms will be met with resistance from bureaucratic procedures and are subject to all controlling state and federal law.

Earlier this year, using the proper regulatory channels, Defense Distributed applied for and was issued a Federal Firearms License.<sup>194</sup> This allowed the group to legally manufacture and successfully fire the world's first 3-D printed plastic firearm.<sup>195</sup> The Liberator's design files were uploaded to the Internet and made available to the public for two days.<sup>196</sup> Defense Distributed's online file sharing was tantamount to unlicensed and unregulated

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188. J. Ricciardello, *3D Printers: A Blessing and a Curse*, L. & SCI. BLOG (Sept. 1, 2013), <http://lawandscienceblog.wordpress.com/tag/undetactable-firearms-act-of-1988/>.

189. National Firearms Act, Pub. L. No. 474, 48 Stat. 1236 (1934) (codified as amended at 26 U.S.C. §§ 5801–22, 5841–44, 5861, 5871–72 (2012)).

190. *National Firearms Act (NFA) – Firearms*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <http://www.atf.gov/firearms/faq/national-firearms-act-firearms.html> (last visited Mar. 20, 2014).

191. See 26 U.S.C. § 5822 (2012) (regulating the making of firearms by any "person" or "individual").

192. *United States—Gun Facts, Figures and the Law*, GUNPOLICY.ORG, <http://www.gunpolicy.org/firearms/region/united-states> (last visited Feb. 21, 2014).

193. See Gibbs, *supra* note 28 (discussing how easy it is for someone with a 3-D printer to access design files for printable gun parts).

194. Andy Greenberg, *State Department Demands Takedown of 3D-Printable Gun Files for Possible Export Control Violations*, FORBES (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/>.

195. *Id.*

196. *Id.*

arms distribution.<sup>197</sup> The U.S. government acted swiftly in ordering the removal of the blueprints.<sup>198</sup> The Department of State cited to current International Traffic in Arms Regulations, the law that regulates the distribution of arms, and requested an injunction against Defense Distributed as a matter of national security.<sup>199</sup>

The government's actions in response to the Liberator's unveiling arguably demonstrate that current federal firearm regulations serve to punish the unlawful use, distribution, manufacture, or possession of a 3-D printed firearm. Although recent legislative proposals, like the Undetectable Firearm Modernization Act belie that notion.<sup>200</sup>

## 2. *When Technology Progresses, the Law Needs To Follow*

Given that prior to 3-D printing, civilians generally did not have the ability to easily and efficiently make guns, the existing gun regulations focus more on the acquisition of manufactured firearms than on their production by private citizens.<sup>201</sup> The UFA is the most central federal regulation to the 3-D printed gun debate.<sup>202</sup> This law criminalizes producing or selling a gun that does not accurately depict the component when viewed using an X-ray scanner.<sup>203</sup> The law serves as a front-line defense against attacks on facilities that rely upon detection technology for security, such as schools, courthouses, airports, or various federal facilities.<sup>204</sup>

In order to comply with the UFA and make a legally recognized firearm, Defense Distributed included the requisite metal component into the Liberator.<sup>205</sup> The gun's design, however, allows the user to easily remove this non-functional piece.<sup>206</sup> It is theoretically possible for someone with a criminal agenda to resort to using this effortlessly produced, easily disposable, and virtually undetectable firearm simply by removing the metal component from the gun and placing it elsewhere.

In July 2013, that possibility became a reality. An investigative reporter in Israel manufactured a plastic gun using a 3-D printer and files downloaded from the Internet.<sup>207</sup> Unsurprisingly, the 3-D printed weapon successfully

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197. *Id.*

198. *Id.*

199. Jeremy A. Kaplan, *As 3D-Printed Rifles Get Real, Are Changes to Gun-Control Laws Coming?*, FOX NEWS (Aug. 9, 2013), <http://www.foxnews.com/tech/2013/08/09/as-3d-printed-rifles-get-real-are-changes-to-gun-laws-coming/>.

200. See generally Israel, *supra* note 134 (discussing the Undetectable Firearms Modernization Act).

201. Adam Clark Estes, *The ATF Has Yet to Be Convinced that 3D-Printed Guns Compare to the Real Thing*, MOTHERBOARD (Mar. 25, 2013, 11:55 AM), <http://motherboard.vice.com/blog/the-atf-is-unconvinced-3d-guns-compare-to-real-thing>.

202. 18 U.S.C. § 922(p) (2012).

203. *Id.* § 922(p)(1)(B).

204. Violence Policy Center *Applauds Introduction of 'Terrorist Firearms Detection Act of 2003'*, VIOLENCE POL'Y CENTER, <http://www.vpc.org/press/0310plastic.htm> (last visited Feb. 22, 2014).

205. Greenberg, *supra* note 79.

206. *Id.*

207. Lazar Berman, *Journalists Print Gun, Point It at Netanyahu*, TIMES ISR., (July 4, 2013, 12:56 PM), <http://www.timesofisrael.com/journalists-print-gun-bring-it-to-netanyahu-speech/>.

bypassed *every* security checkpoint.<sup>208</sup> The reporter then held the gun on his lap while seated less than ten rows away from the prime minister.<sup>209</sup> The undetectable plastic firearm therefore poses a unique, credible threat to public safety and a new challenge to security systems.

### C. Controlling the 3-D Printer's Hardware And Software

#### 1. The Regulation of 3-D Printers

Regulating printers is not a new concept.<sup>210</sup> The U.S. government works with traditional laser printer companies, like Xerox and Hewlett Packard, to prohibit printing counterfeit money, certificates, and other official documents.<sup>211</sup> Printer Dots are microscopic yellow spots that high-quality laser printers add on to printed pages to identify their serial number and make.<sup>212</sup> This technology allows law enforcement officials to track a particular document back to the printer that produced it and presumably the user that printed it.<sup>213</sup> The specifics of this anti-counterfeit measure are only revealed to law enforcement agencies with proper legal authorization.<sup>214</sup>

The limited nature of the laser printer lends itself to government regulation. Traditional printers only produce paper,<sup>215</sup> which is easily adapted to the use of Printer Dot technology. The 3-D printer, however, may prove difficult to regulate in a similar manner. Printer Dot technology successfully helps the government regulate against counterfeiting because laser printers do not vary widely in construction and produce a uniform output: paper.<sup>216</sup> Because of this, the technology can be easily applied across laser printers, regardless of the manufacturer. 3-D printers are different. Currently, these at-home printers can only produce plastic objects.<sup>217</sup> As technology advances though, at-home printers may be able to print objects in hundreds of different materials, a feat industrial printers have already achieved.<sup>218</sup> This means that implementing tracing technology, like Printer Dots, may be less feasible because if 3-D printers can only print one kind of material, each 3-D printer's design will vary based on the output, making it difficult to develop a

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208. *Id.*

209. *Id.*

210. See generally John Breeden II, *Will 3D Printing Have to Be Regulated?*, GCN (Oct. 3, 2012, 12:31 PM), <http://gcn.com/blogs/emerging-tech/2012/10/will-3d-printing-be-regulated.aspx> (explaining the current regulation of the 2-D printer).

211. Melissa Riofrio, *Why You Can't Print Counterfeit Money on Your Color Laser*, PCWORLD (June 7, 2011, 6:00 PM), [http://www.pcwORLD.com/article/229647/counterfeit\\_money\\_on\\_color\\_laser\\_printers.html](http://www.pcwORLD.com/article/229647/counterfeit_money_on_color_laser_printers.html).

212. *Id.*

213. John Whelans, *HP Color Laser Printers – Printing More Than You Thought They Were ...*, MISSING LINK (July 16, 2007), <http://john.whelans.net/archives/245>.

214. *Id.*

215. Jeff Tyson, *How Inkjet Printers Work*, HOW STUFF WORKS, <http://computer.howstuffworks.com/inkjet-printer.htm> (last visited Feb. 22, 2014).

216. Whelans, *supra* note 213.

217. Nick Allen, *Why 3D Printing Is Overhyped (I Should Know, I Do It For a Living)*, GIZMODO (May 17, 2013, 9:17 AM), <http://gizmodo.com/why-3d-printing-is-overhyped-i-should-know-i-do-it-fo-508176750#>.

218. *Id.*

technology capable of tracing all 3-D printers.

## 2. *Requiring a License and Registration to Purchase 3-D Printers and Materials*

If the incorporation of tracing technology into 3-D printers is not feasible, the government could regulate the purchase of printers and related materials. The acquisition of 3-D printers for private use could require a registration or license.<sup>219</sup> Although, requiring a registration or license to purchase a 3-D printer may be of limited value. The technology is already advanced enough to replicate itself.<sup>220</sup> It requires assembly by the owner;<sup>221</sup> however, the 3-D printer's ability to self-replicate could eventually be an insurmountable obstacle.

Additionally, in-home 3-D printers currently only manufacture objects using plastic.<sup>222</sup> Because this is the only material used now, the government could track 3-D printer material purchases.<sup>223</sup> 3-D printer manufacturers usually require users to buy materials from them.<sup>224</sup> As with traditional laser printer ink, these manufacturers mark up the price of their filament.<sup>225</sup> To avoid these high prices, filament extruders allow 3-D printer owners to circumvent the high cost of mass-produced filaments.<sup>226</sup> These devices use plastic pellets to create nearly identical materials offered by 3-D printer manufacturing, allowing for at-home production of materials.<sup>227</sup> As 3-D printers and their materials advance, online orders of filament or related machines could also track purchasers. The many kinds of filament could mean that in-store sales would be too difficult to properly track.

3-D printer materials may also be controlled in a manner similar to the government's regulation of cold medicine purchases.<sup>228</sup> Sudafed contains an ingredient used by amateur chemists to illegally produce methamphetamine.<sup>229</sup>

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219. Cardinal, *supra* note 66.

220. See *Welcome to RepRap.org*, REPRAP, [http://reprap.org/wiki/Main\\_Page](http://reprap.org/wiki/Main_Page) (last visited Mar. 13, 2014) ("RepRap is about making self-replicating machines, and making them freely available for the benefit of everyone.").

221. *Build a RepRap*, REPRAP, [http://reprap.org/wiki/Build\\_A\\_RepRap](http://reprap.org/wiki/Build_A_RepRap) (last visited Mar. 13, 2014).

222. See, e.g., *Printing Materials*, REPRAP, [http://reprap.org/wiki/Printing\\_materials](http://reprap.org/wiki/Printing_materials) (last visited Mar. 13, 2014) (listing thermoplastics and duroplastics as the only materials with which a RepRap printer can print); see also *3D Printer Extruder Head for Multiple New and Different Types of Plastic*, PRWEB (Dec. 12, 2013), <http://www.prweb.com/releases/2013/12/prweb11409303.htm> ("A problem with current 3D print heads is the limited filament sizes and the lack of variety of plastics that they can use. Most 3D printers are only able to utilize 2 types of filament, PLA and ABS.").

223. *Printing Materials*, *supra* note 222.

224. *3D Printing Scales Up*, *supra* note 43.

225. *Id.*

226. Harry McCracken, *How an 83-Year-Old Inventor Beat the High Cost of 3D Printing*, TIME (Mar. 4, 2013), <http://techland.time.com/2013/03/04/how-an-83-year-old-inventor-beat-the-high-cost-of-3d-printing/>.

227. *Id.*

228. David Whelan, *Losing the War on Meth and Sudafed at the Same Time*, FORBES (May 23, 2012, 12:13 AM), <http://www.forbes.com/sites/davidwhelan/2012/05/23/losing-the-war-on-meth-and-sudafed-at-the-same-time/>.

229. *Id.*



Law enforcement successfully controls Sudafed distribution by requiring photo identification before a customer can complete their purchase.<sup>230</sup> A similar procedure, using a background check and tracking system, could be used to police the 3-D printer and its materials.

### 3. *An On-Demand 3-D Printing Industry*

Presently, only a handful of companies offer on-demand 3-D printing services.<sup>231</sup> However, growth in market competition is expected to decrease printer prices and make it easier for more companies to offer this service.<sup>232</sup> The world's leading 3-D printing marketplace and community is Shapeways.<sup>233</sup> These 3-D printing communities provide a platform for hobbyists to access the technology and a forum for individuals to make, buy, or sell their own products.<sup>234</sup> Communities also promote the exchange of information and encourage users to be creative with their designs<sup>235</sup> but at the same time place certain limitations on the types of products that can be printed.<sup>236</sup>

Facially, these communities seem harmless to 3-D printed weapon concerns: they have unambiguous terms of service that generally refuse to accept products resembling firearms and will remove any files containing such content.<sup>237</sup> These policies assume that members will print a recognizable firearm. The Liberator's untraditional firearm shape may make enforcement of such policies very difficult. Tech-savvy gunsmiths could sidestep these restrictions by designing firearms that continue to bear little resemblance to traditional ones.<sup>238</sup>

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230. See Richard Koman, *Buy Too Much Sudafed and You May Get a Visit from a Cop*, ZDNET (Jul. 19, 2007, 12:27 PM), <http://www.zdnet.com/blog/government/buy-too-much-sudafed-and-you-may-get-a-visit-from-a-cop/3316> (describing the tracking systems that inform local law enforcement of prohibited purchases).

231. SHAPEWAYS, <http://www.shapeways.com/> (last visited Mar. 13, 2014); see also *3D Print Services—Online 3D Printing*, 3DERS.ORG, <http://www.3ders.org/3d-printing/3d-print-services.html> (last visited Mar. 13, 2014) (listing only ten companies in the United States offering 3-D printing services).

232. See Lyndsey Gilpin, *3D Printing: 10 Factors Still Holding It Back*, TECHREPUBLIC (Feb. 19, 2014, 11:33 AM), <http://www.techrepublic.com/article/3d-printing-10-factors-still-holding-it-back/> (describing how the expiration of major patents will increase the number of competing companies and decrease the price of printing technology); see also Zach Walton, *The Cheap Asian 3D Printer Rivals Are Here*, WEBPRONews (Dec. 17, 2013), <http://www.webpronews.com/the-cheap-asian-3d-printer-rivals-are-here-2013-12> (“As we move into 2014 and onward, expect to see more Asian electronics firms getting into 3D printing. These devices will be far cheaper than their American rivals and may help to get desktop 3D printers into even more homes.”).

233. SHAPEWAYS, *supra* note 231.

234. *Id.*

235. *Id.*

236. *Id.*

237. *Frequently Asked Questions*, SHAPEWAYS, <http://www.shapeways.com/support/faq> (last visited Mar. 13, 2014).

238. See Lipson & Kurman, *supra* note 163 (“[C]ustom-made weapons and accessories could be designed to look nothing like mainstream guns today, making their detection more difficult.”).

#### 4. *3-D Printer Lease or Rental Services*

The personal use of 3-D printers could be regulated through a lease arrangement made directly with manufacturers. This procedure for 3-D printer use has already had some success in hindering the creation of plastic firearms.<sup>239</sup> Last year, in its first attempt to generate the world's first 3-D printed gun, Defense Distributed leased a 3-D printer from Stratasys.<sup>240</sup> Stratasys is a direct digital manufacturing company that works with some of the world's top firearm producers.<sup>241</sup> After hearing about their plastic gun manufacturing and digital blueprint project, Stratasys pulled the lease from Defense Distributed as the company maintains a policy against knowingly allowing its 3-D printers to be used for illegal purposes.<sup>242</sup>

The success of this potential regulatory scheme, though, was due to Defense Distributed's public and outspoken mission to manufacture the first 3-D printed firearm. It is unlikely that future 3-D printer lessees will broadcast their illicit intentions in the same manner. As such, manufacturers like Stratasys may not be able to enforce these policies and actually detect the improper use of their equipment unless manufacturers could design 3-D printer rental with internal mechanisms to prevent printing of particular shapes.

#### 5. *Restricting 3-D Printer Software*

Restricting 3-D printer software could come from three sources: 3-D printing websites, the government, and/or 3-D printer software companies.

In response to the Sandy Hook Elementary shootings, MakerBot removed firearm files from the website used to share user-generated models for 3-D printing.<sup>243</sup> In addition, YouTube removed a video of Defense Distributed successfully testing a 3-D printed 30 round rifle magazine.<sup>244</sup> While these efforts are laudable, these website bans do not prevent the information from resurfacing. The removed YouTube video reappeared on the website in a matter of hours.<sup>245</sup> Additionally, groups like Defense Distributed may not respond well to censorship efforts.

In particular, Defense Distributed responded to what it believed to be MakerBot's censorship by creating DEFCAD, a website that's sole purpose is

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239. Robert Beckhusen, *3D-Printer Company Sells to Gun Companies, but Not Desktop Weaponers*, WIRED (Oct. 3, 2012, 1:57 PM), <http://www.wired.com/dangerroom/2012/10/stratasys-followup/>.

240. *Id.*

241. *See id.* ("Two 'representative customers' for Stratasys's 3-D printing machines include Knight's Armament Company—which makes gun grips and produces its own line of firearms—and Remington Arms, the country's largest producer of shotguns and rifles.").

242. *Id.*

243. Kimber Streams, *MakerBot Purges User-Generated Weapon Blueprints from 3D Printing Community Site*, VERGE (Dec. 19, 2012, 5:54 PM), <http://www.theverge.com/2012/12/19/3785794/makerbot-purges-weapon-blueprints-from-thingiverse>.

244. Casey Newton, *YouTube Yanks Video of 3D-Printed Rifle Magazine*, CNET (Feb. 8, 2013, 2:24 PM), [http://news.cnet.com/8301-1023\\_3-57568487-93/youtube-yanks-video-of-3d-printed-rifle-magazine/](http://news.cnet.com/8301-1023_3-57568487-93/youtube-yanks-video-of-3d-printed-rifle-magazine/) (indicating that the video was removed "as a violation of YouTube's policy against spam, scams, and commercially deceptive content").

245. *Id.*

hosting the banned data files.<sup>246</sup> DEFCAD currently averages over 3,000 visitors per hour.<sup>247</sup> Since the website's launch in December 2012, visitors have downloaded over 250,000 data files.<sup>248</sup> These files include bullet casings, pistol suppressors, and grenades.<sup>249</sup> After President Obama's announcement regarding his plan to ban high-capacity magazines,<sup>250</sup> Defense Distributed's design file for the 3-D printed magazine has been downloaded more than 150,000 times from the DEFCAD website.<sup>251</sup>

If 3-D printing software host sites alone were unsuccessful, perhaps government regulation alone, or in combination, would be effective. To circumvent First Amendment implications by banning online files of 3-D printed weapons, the U.S. Department of Defense Trade Controls equated Defense Distributed's uploading of printable gun blueprints to a violation of international arms trafficking laws.<sup>252</sup> The Liberator's design file was downloaded more than 100,000 times in the two days it was available online.<sup>253</sup> While the authorities successfully removed the Liberator's design file from its original host,<sup>254</sup> another file sharing website known as The Pirate Bay continues to make the banned file available.<sup>255</sup> Notably, the Pirate Bay has operated for nearly ten years without ever removing a file.<sup>256</sup> Future governmental action then is also constrained by the inherent difficulty in preventing online file transfers.<sup>257</sup>

Finally, perhaps 3-D printing software should be regulated by the industry. While this idea may sound idealistic, it appears that at least one company is already taking such measures.<sup>258</sup> An international company that

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246. See Ricardo Bilton, *Expanding Beyond 3D Printed Guns, DEFCAD Is Officially the Anti-Makerbot*, VENTURE BEAT (Mar. 11, 2013, 1:05 PM), <http://venturebeat.com/2013/03/11/defcad-anti-makerbot/> (indicating that Defense Distributed created DEFCAD in response to MakerBot's censorship).

247. Ricardo Bilton, *3D-Printing Gun Site DEFCAD Now Attracting 3K Visitors an Hour, 250K Downloads*, VENTURE BEAT (Feb. 19, 2013, 2:51 PM), <http://venturebeat.com/2013/02/19/defcad-gun-traffic-growing/>.

248. *Id.*

249. *Id.*

250. Sam Stein & John Rudolph, *Obama Gun Proposals Unveiled*, HUFFINGTON POST (Jan. 16, 2013, 11:57 AM), [http://www.huffingtonpost.com/2013/01/16/obama-gun-control-proposals\\_n\\_2486919.html](http://www.huffingtonpost.com/2013/01/16/obama-gun-control-proposals_n_2486919.html).

251. Mike Opelka, *The End of Gun Control, or Anarchy? See the Chilling Possibilities Created by 3D Printed Guns*, BLAZE (Jan. 18, 2013, 7:20 AM), [www.theblaze.com/stories/2013/01/18/the-end-of-gun-control-or-anarchy-see-the-chilling-possibilities-created-by-3d-printed-guns/](http://www.theblaze.com/stories/2013/01/18/the-end-of-gun-control-or-anarchy-see-the-chilling-possibilities-created-by-3d-printed-guns/).

252. Ernesto, *Pirate Bay Takes Over Distribution of Censored 3D Printable Gun*, TORRENTFREAK (May 10, 2013), <https://torrentfreak.com/pirate-bay-takes-over-distribution-of-censored-3d-printable-gun-130510/>.

253. *Id.*

254. Tim Mack, *Lawmakers Take Aim at 3-D Gun Printing*, WASH. EXAMINER (Nov. 29, 2013, 8:47 AM), <http://washingtonexaminer.com/lawmakers-take-aim-at-3-d-gun-printing/article/2539833>.

255. CypherPunk39, *Liberator.zip*, PIRATE BAY, <http://pirateproxy.net/torrent/8458218/> (last visited Feb. 25, 2014) ("Earlier this week, the United States government forced Defense Distributed, the creator of a fully 3D printable firearm, to pull the plans for its first printable weapon, The Liberator, from their site. In response, many of us are torrenting the plans in the hopes that this information gets into the hands of as many people as possible. This torrent file contains the plans that can be run on almost any capable 3D printer to create an actual firearm. PLEASE RESEED!").

256. Ernesto, *supra* note 252.

257. Beckhusen, *supra* note 239.

258. Cyrus Farivar, *Worried About Accidentally 3D Printing a Gun? New Software Will Prevent It*, ARS TECHNICA (June 26, 2013, 12:45 PM), <http://arstechnica.com/business/2013/06/worried-about-accidentally-3d-printing-a-gun-new-software-will-prevent-it/>.

sells parts and software to 3-D printer manufacturers has recently invented a firearm component detection algorithm.<sup>259</sup> Currently, the software is only compatible with the same company's 3-D printer, limiting its large-scale usefulness.<sup>260</sup> The program is geared toward the average user who could mistakenly print a gun because online files are not necessarily titled to reveal their true contents.<sup>261</sup> The algorithm uses a central database that collects and stores all online firearm files.<sup>262</sup> An error message then alerts the user that they have encountered a file that contains firearm blueprints.<sup>263</sup>

#### IV. RECOMMENDATION

The initially non-existent 3-D printed firearm sparked a hypothetical debate about gun control and public safety.<sup>264</sup> Today, the first 3-D printed gun has been successfully designed, manufactured, and tested without a clear indication of its place in the current regulatory scheme.<sup>265</sup> It seems that the government had, but missed, the advantage to update existing laws or create new federal firearm legislation prior to the 3-D printed firearm's existence. The development curve for these weapons is expected to improve and make any future 3-D printed firearms much more hazardous.<sup>266</sup> It took only two weeks after the Liberator's design was released online for someone to considerably refine the first 3-D printed gun.<sup>267</sup>

President Obama, while recognizing the benefits of the 3-D printer industry, is making a push on better gun control.<sup>268</sup> The government is now in a position to truly consider and balance the competing interests in industry, safety, and technological advancement. The existence of 3-D printed guns means that legislative initiatives directed specifically toward 3-D printed firearms are now necessary. Any regulations imposed in this arena should accomplish two objectives. First, they should avoid incapacitating this innovative technology. It is imperative that such pioneering equipment be allowed to fully develop and reach its expected potential. Second, the

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259. *Id.*

260. *Id.*

261. *Id.*

262. *Id.*

263. *Id.*

264. Andy Greenberg, *Meet Steve Israel, The Congressman Who Wants to Ban 3D-Printed Guns*, FORBES (Jan. 18, 2013, 9:29 AM), <http://www.forbes.com/sites/andygreenberg/2013/01/18/meet-steve-israel-the-congressman-who-wants-to-ban-3d-printable-guns-qa/>.

265. Alexis Kleinman, *The First 3D-Printed Gun Has Been Fired*, HUFFINGTON POST (May 7, 2013, 2:28 AM), [http://www.huffingtonpost.com/2013/05/06/3d-printed-gun-fired\\_n\\_3222669.html](http://www.huffingtonpost.com/2013/05/06/3d-printed-gun-fired_n_3222669.html).

266. Sager, *supra* note 180.

267. Sebastian Anthony, *The \$25 Lulz Liberator: The First 3D-Printed Gun with a Rifled Barrel*, EXTREME TECH (May 20, 2013, 2:22 PM), <http://www.extremetech.com/extreme/156304-the-25-lulz-liberator-the-first-3d-printed-gun-with-a-rifled-barrel> (premiering the latest 3-D printed firearm, known as the Lulz Liberator, which is plastic, has a rifled barrel, holds nine bullets, is less likely to misfire, and costs only \$25 to make).

268. *See Now Is the Time: The President's Plan to Protect Our Children and Our Communities by Reducing Gun Violence*, WHITE HOUSE (Jan. 16, 2013), [http://www.whitehouse.gov/sites/default/files/docs/wh\\_now\\_is\\_the\\_time\\_full.pdf](http://www.whitehouse.gov/sites/default/files/docs/wh_now_is_the_time_full.pdf) ("We won't be able to stop every violent act, but if there is even one thing that we can do to prevent any of these events, we have a deep obligation, all of us, to try.").

regulations should properly address the legitimate interests in public safety and civil liberties.

In the context of firearms, legislators should be highly suspect of 3-D manufacturing, but could give some deference to internal regulation. The 3-D printing industry has made significant efforts to distance themselves from 3-D printed firearms and related parts.<sup>269</sup> The industry's various on-demand printing services removed the firearm files and presumably limited the public's access to 3-D printed guns. Additionally, developments like the firearm component detection algorithm for use with in-home 3-D printers<sup>270</sup> serve to reduce the proliferation of these weapons.

However, as the technology progresses and federal firearm laws remain stagnant, 3-D printed guns will become items that cannot be actually controlled or banned, and legislation will be required.<sup>271</sup> Although an outright ban on, or heavily regulated use of, personal 3-D printers would accomplish limiting access to and creation of these firearms, it is far too stifling a measure. Instead, the ability to easily and cost-effectively manufacture lethal and untraceable guns using a 3-D printer calls for new or updated firearm regulations to target the increasingly digital world.<sup>272</sup>

Notably, any proposed legislation to regulate 3-D printed firearms may only serve to deter their production due to the difficulty in regulating the online distribution of the design files.<sup>273</sup> An entirely new regulatory scheme at the federal level to criminalize the manufacture or possession of 3-D printed guns by private citizens is unwarranted and is likely to result in substantial backlash. Rather, a cooperative federal-state approach may be the best method for regulating 3-D printed guns. The present federal firearm laws<sup>274</sup> need only be modified to create a uniform system of regulation for 3-D printed weapons, and the states may restrict 3-D printed guns further.

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269. Eric Markowitz, *Regulating 3D-Printed Guns Won't Solve Any Problems*, INC. (Jun. 14, 2013), <http://www.inc.com/eric-markowitz/3d-printed-guns-regulation-wont-solve-problems.html> ("Makerbot, for instance, which makes one of the more popular 3D printers, removed all gun designs listed on its site late last year.").

270. Graeme McMillan, *Now You Don't Have to Worry About Accidentally Printing a Gun*, DIGITAL TRENDS (June 27, 2013), <http://www.digitaltrends.com/cool-tech/now-you-dont-have-to-worry-about-accidentally-printing-a-gun-again/> ("[T]he company's new software will 'prevent 3D printing of guns' by recognizing not designs for specific guns, but instead specific components that would be used in the construction of the firearms.").

271. Liz Klimas, *How Are Advancing Tech, the 'Singularity' and Gov't Regulation All Connected? Buckle Up and Let Glenn Beck Explain*, BLAZE (Jan. 17, 2013, 11:30 PM), <http://www.theblaze.com/stories/2013/01/17/ready-needs-vid-beck-connects-the-dots-between-exponentially-advancing-tech-the-singularity-and-government-regulation/>.

272. Steven Kotler, *Vice Wars: How 3-D Printing Will Revolutionize Crime*, FORBES (July 31, 2012, 12:28 PM), <http://www.forbes.com/sites/stevenkotler/2012/07/31/the-democratization-of-vice-the-impact-of-exponential-technology-on-illicit-trades-and-organized-crime/>.

273. *DHS: It Is Impossible to Stop 3D Plastic Guns from Getting Past Security Checkpoints*, HOMELAND SECURITY NEWS WIRE (May 24, 2013), <http://www.homelandsecuritynewswire.com/dr20130524-dhs-it-is-impossible-to-stop-3d-plastic-guns-from-getting-past-security-checkpoints>.

274. See 18 U.S.C. § 922 (2012) (stating present federal firearm laws); see also Undetectable Firearms Modernization Act, H.R. 1474, 113th Cong. (2013) (stating proposed firearm legislation).

The existing federal laws, those that were intended to regulate traditional firearms, appear to be ill equipped to handle 3-D printed guns.<sup>275</sup> While the ATF “makes every effort to keep abreast of novel firearms technology and firearms trafficking schemes” there remains some uncertainty as to the legal status of 3-D printed firearms.<sup>276</sup> It is unclear whether manufacturing and possessing 3-D printed guns by private citizens falls under the GCA or under the more restrictive NFA.<sup>277</sup> These gun laws were written assuming citizens could make their own firearms and could presumably regulate 3-D printed firearms and parts.<sup>278</sup> The legislature needs to update and definitively classify 3-D printed firearms under the current regulatory scheme and close this loophole.

The classification of 3-D printed firearms under the NFA’s “Any Other Weapon”<sup>279</sup> category would address some of the concerns created by 3-D printed firearms. A classification under the NFA would impose a statutory tax on their manufacture and mandate registration with the ATF.<sup>280</sup> The requirements under the NFA could deter potential gunsmiths and be used as a means of accountability. Individuals wishing to manufacture a 3-D printed firearm would be required to obtain authorization from the ATF.<sup>281</sup> An updated federal classification, in combination with the self-imposed gun control efforts of the 3-D printing industry could successfully reduce access to unregistered and untraceable firearms by certain prohibited persons such as children, felons, and the mentally ill.

An updated scheme of this nature at the federal level would allow for further regulating of 3-D printed firearms from state or local authorities, which could impose their own regulations on these weapons. In 2013, Philadelphia, Pennsylvania became the first city in the United States to ban the use of 3-D printers to manufacture firearms.<sup>282</sup> Additionally, lawmakers in California,

275. In Colin Neagle’s article from Network World, he states:

In early February, Defense Distributed released a video showing a functional 3D-printed magazine capable of holding 30 rounds for an AR-15 assault rifle. A month later, the group obtained a federal firearms license from the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives, granting it the ability to sell its firearm-related technology.

Colin Neagle, *3D-Printed Gun May Be Unveiled Soon*, NETWORK WORLD (Apr. 25, 2013, 8:36 AM), <http://www.networkworld.com/news/2013/042513-3d-gun-269102.html>.

276. Press Release, Bureau of Alcohol, Tobacco, Firearms & Explosives, *3-D Printing Technology 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>.

277. Zach Miners, *Would a 3D-Printed Gun Really Be Legal?*, COMPUTERWORLD (Mar. 21, 2013, 8:07 AM), [http://www.computerworld.com/s/article/9237770/Would\\_a\\_3D\\_printed\\_gun\\_really\\_be\\_legal\\_](http://www.computerworld.com/s/article/9237770/Would_a_3D_printed_gun_really_be_legal_) (“The average person accessing Defense Distributed’s gun designs probably would not have NFA approval either. But even the less restrictive GCA, which was enacted back in 1968, raises questions in the context of 3D printing.”).

278. See *General Questions*, *supra* note 88 (“With certain exceptions a firearm may be made by a non-licensee provided it is not for sale and the maker is not prohibited from possessing firearms.”).

279. 26 U.S.C. § 5845(e) (2012).

280. *National Firearms Act (NFA), Firearms - Frequently Asked Questions*, BUREAU ALCOHOL, TOBACCO, FIREARMS & EXPLOSIVES, <http://www.atf.gov/firearms/faq/national-firearms-act-firearms.html#transfer-procedure> (last visited Mar. 13, 2014).

281. *Id.*

282. *First Ban in the Country: 3D-Printed Guns Now Illegal in Philadelphia*, RT (Nov. 27, 2013, 8:30 AM), <http://rt.com/usa/philly-gun-ban-johnson-280/> (“[It is] illegal for anyone within the city to ‘use a three-

New Jersey, and New York have introduced legislation that would either ban the possession of 3-D printed weapons or substantially regulate their manufacture using a 3-D printer.<sup>283</sup>

It is not the inherent danger presented in guns generally, but rather the undetectable nature of the 3-D printed firearm that needs to be addressed by new legislation. Although the Department of Homeland Security recently released an intelligence bulletin warning that it may be impossible to stop 3-D printed firearms from getting past security checkpoints,<sup>284</sup> the renewal of the UFA was a laudable action by legislators. As a policy matter, though, given the speed with which the 3-D printing technology and firearm manufacturing is progressing, a ten-year extension on a 25-year-old ban will do little to protect the public.<sup>285</sup> From a regulatory perspective, although the UFA requires 3.7 ounces of metal to be present, it does not specify whether the metal has to be permanently part of the plastic firearm or can be removable.<sup>286</sup> This is a significant loophole that needs to be addressed with stricter controls. Future legislative initiatives must require that both 3-D printed guns and 3-D printed parts have permanent metal components. The permanent metal part would serve to make 3-D printed guns detectable by X-ray machines and magnetometers. Currently, the only procedures available to catch 3-D printed firearms are security pat downs at every restricted area.<sup>287</sup> If passed, the Undetectable Firearms Modernization Act would properly close this loophole in existing federal law.<sup>288</sup>

## V. CONCLUSION

The 3-D printing industry is already revolutionizing manufacturing in the United States. The 3-D printer is a highly valuable production tool, giving industries, businesses, and individuals the ability to effortlessly and cost-effectively manufacture products that would otherwise be difficult, if not impossible, to produce.<sup>289</sup> The numerous benefits of 3-D printer technology may outweigh its potential for misuse and require that the technology not be overly regulated so as to not inhibit its growth.

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*dimensional printer to create any firearm, or any piece or part thereof, unless such person possesses a license to manufacture firearms under federal law.”*)

283. *E.g.*, *California Bill Seeks to Pre-Empt Spread of Undetectable 3D-Printed Guns*, NDTV GADGETS (Jan. 14, 2014), <http://gadgets.ndtv.com/laptops/news/california-bill-seeks-to-pre-empt-spread-of-undetectable-3d-printed-guns-470882>.

284. Winter, *supra* note 141.

285. Derek Mead, *Congress’s Plastic Gun Ban Left a 3D-Printed Loophole*, MOTHERBOARD (Dec. 10, 2013, 12:45 PM), <http://motherboard.vice.com/blog/congresss-plastic-gun-ban-left-a-3d-printed-loophole>.

286. *Id.*

287. Winter, *supra* note 141.

288. Press Release, Melville District Office, Rep. Israel Introduces Bipartisan Undetectable Firearms Modernization Act to Protect Americans from Threat of Plastic Guns (Dec. 3, 2013), *available at* <http://israel.house.gov/media-center/press-releases/rep-israel-introduces-bipartisan-undetectable-firearms-modernization-act> (“The Undetectable Firearms Modernization Act includes all the components of the current law, but would also require that two major components for a handgun . . . and three major components for a long gun, such as a rifle or a shotgun . . . be made of detectable and non-removable metal.”).

289. Tamarjan, *supra* note 51.

The nature of 3-D printer technology, though, mandates some degree of regulation before it can be safely placed into consumers' hands. Permitting 3-D printer users to fabricate lethal, untraceable, and undetectable plastic firearms conceivably violates existing federal laws and directly undermines the government's efforts to reduce gun violence and improve gun control. The resulting illicit use of these 3-D printed firearms will seriously endanger the public. The technology is still developing and 3-D printed guns are in their infancy but are already outpacing the government's efforts and legislative initiatives in the gun control arena. If left unregulated, the unsustainable rate of 3-D printed guns are set to take down existing federal firearm regulations layer-by-layer.