

**Submission to the Legal and Constitutional Affairs References Committee
Inquiry**

***The ability of Australian law enforcement authorities to eliminate gun-related
violence in the community***

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Biography

I have ten years of experience in academia, advocacy and policy-making concerning the law, ethics and technology. I am currently a postdoctoral research fellow in the Swinburne Institute for Social Research (Australia), primarily conducting research on the legal and social implications of 3D printing. I have submitted a PhD entitled 'Mind the Gap: Private Power, Online Information Flows and EU Law' to the Department of Law at the European University Institute (Italy), whose substance concerns the extent to which existing EU law and regulation address concentrations of private economic power which impede free information flows online, to the detriment of Internet users' autonomy. My specialties lie in the field of communications and media law and policy - particularly privacy, free expression, data protection, intellectual property, and competition and regulation. I have an MA in Jurisprudence from Balliol College, University of Oxford, an LLM in French and European Law from the Université de Paris 1 Pantheon-Sorbonne and an LLM in Comparative, European and International Law from the EUI.

Introduction

I am pleased to have the opportunity to provide this submission to the Commonwealth Senate Legal and Constitutional Affairs References Committee inquiry into the ability of Australian law enforcement authorities to eliminate gun-related violence in the community.

My academic expertise relevant to this inquiry concerns 3D printing and its implications for law and society, a topic I have been researching for the past 18 months at the Swinburne Institute for Social Research. Accordingly this submission focuses on part C of the Inquiry's Terms of Reference, namely:

the adequacy of current laws and resourcing to enable law enforcement authorities to respond to technological advances in gun technology, including firearms made from parts which have been imported separately or covertly to avoid detection, *and firearms made with the use of 3D printers* (emphasis added)

I will give a brief explanation of how 3D printing works, along with a description of the 3D printing industry, before looking specifically at the issue of 3D printed guns, assessing the options for their regulation. I am happy to expand upon anything contained in this submission or provide more information about 3D printing and the law at the Committee's request.

3D printing

Additive manufacturing, commonly known as 3D printing, is a technology which was first developed in the 1980s and uses a process by which successive layers of material are laid down on top of each other under computer control and according to information contained in a design file, with the end result being a three dimensional object.

3D printing has broken into the mainstream in the last couple of years due to the prices for hardware (ie the printer itself) falling to levels which are affordable for consumers - below the \$1000 mark – due in part to the expiration of some key patents, as well as the wide circulation of content (ie design files) through platforms such as Thingiverse.¹

In the last year or so, the 3D printing industry has experienced increased consolidation around printer manufacturers and online design repositories through a series of mergers and acquisitions, culminating in the emergence of two main vertically-integrated 3D printing

¹ <https://www.thingiverse.com/>

companies: Stratasys and 3D Systems.² However, there are still smaller 3D printing companies which are independent of this emerging duopoly. Also, 3D printing enthusiasts use generic file sharing platforms as well as those affiliated with 3D printer manufacturers, posting 3D printable designs to places such as The Pirate Bay³ and Git Hub,⁴ although Thingiverse (owned by MakerBot which itself was bought by Stratasys last year) remains the most popular online repository for 3D printable design files.⁵

Also important to mention in the context of the 3D printing ecosystem is the RepRap project.⁶ Founded in 2007 by Dr Adrian Bowyer (a senior lecturer in mechanical engineering at the University of Bath), RepRap is an initiative to develop a 3D printer that can re-print most of its own components and thus be 'self-replicating'. The RepRap project releases all of the designs it produces under the free software GNU General Public License. The public is able to modify RepRap designs without needing to seek prior permission on each occasion - so long as they share their creations back with the RepRap community, in accordance with free and open source principles.

Guns and regulation

One major problem 3D printing poses for law and regulation is the possibility that anyone possessing a printer and a relevant design file can create 'undesirable' objects. These undesirable objects might infringe the intellectual property of others in some way,⁷ or are unsafe and dangerous. Undesirable objects which are dangerous lie along a spectrum of severity, from the printing of firearms and other weapons to the printing of objects which may pose mild product liability or health and safety concerns (such as an unofficial spare part for a household appliance which cannot withstand the heat emitted by that appliance).

The issue of 3D printed guns came to attention in 2013 when US-based company Defense Distributed developed blueprints for a gun, the Liberator, which could be created using a 3D

² See: The Economist, 'Power Shift' (21 June 2013) <<http://www.economist.com/blogs/schumpeter/2013/06/3d-printing>> accessed 22 September 2014

³ <http://thepiratebay.se/>

While The Pirate Bay is often conceptualised as an illegitimate site facilitating file sharing which infringes copyright law, in practice a large amount of the file sharing it facilitates is perfectly legitimate eg the copyright holder herself makes the files available.

⁴ <https://github.com/>

⁵ See: Jarkko Moilanen, Angela Daly, Ramon Lobato and Darcy Allen, 'Cultures of Sharing in 3D Printing: What Can We Learn From the Licence Choices of Thingiverse Users?', forthcoming in Journal of Peer Production

⁶ <http://reprap.org/>

⁷ See: 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' (*Public Knowledge*, November 2010) <<https://www.publicknowledge.org/files/docs/3DPrintingPaperPublicKnowledge.pdf>> accessed 22 September 2014

printer. To date, this is the best known and most notorious example of the possibility of creating dangerous objects using 3D printers. The design files, uploaded to the company's website, were downloaded more than 100,000 times in the space of two days alone.⁸ The US State Department eventually ordered Defense Distributed to take down the files due to alleged non-compliance with American arms export control laws,⁹ although the files could still be downloaded from other locations. While overseas and geographically outside of US jurisdiction, Mega's owner Kim Dotcom ordered his staff to remove public links to the 3D printed gun blueprints from the cyberlocker service,¹⁰ in an act of private regulation. Yet the files could still be accessed via The Pirate Bay in November 2013, and I am reliably told that the blueprints are still being circulated on filesharing sites better known for illicit and risqué material such as pornography and cracked software.

It is 3D printing's decentralised nature of production that raises novel problems in terms of the enforcement of laws and regulating restricting access to firearms (as well as product liability, medical regulation, intellectual property, and so on). In the previous era of mass production, there have been certain 'gatekeepers' which regulate the production and circulation of these products and accordingly can themselves be regulated, such that the products produced and transited adhere to certain standards, and that objects such as weapons are subject to strict controls regarding sale, possession and use. This becomes a much more difficult task when, as with 3D printing, the entire production process can occur in the privacy of individuals' homes.

It is true that gatekeepers still exist in the 3D printing ecosystem, including 3D printer manufacturers and online design repositories, and these intermediaries could be obliged, for instance, to handle only 'approved' files or face legal consequences. These intermediaries could be also encouraged via incentives to engage in private regulation of the use of their products and services. Indeed, Danish 3D printing firm Create It REAL announced that it had invented a firearms component detection algorithm which could give 3D printers the option to block the printing of gun parts.¹¹ Mega's decision to take down the Liberator blueprint is another example of private entities engaging in self-regulation. Internet Service Providers could also be tasked with monitoring whether their users are downloading 3D printing design

⁸ Andy Greenberg, '3D-Printed Gun's Blueprints Downloaded 100,000 Times In Two Days (With Some Help From Kim Dotcom)' (*Forbes*, 8 May 2013) <<http://www.forbes.com/sites/andygreenberg/2013/05/08/3d-printed-guns-blueprints-downloaded-100000-times-in-two-days-with-some-help-from-kim-dotcom/>> accessed 22 September 2014

⁹ Namely, the International Traffic in Arms Regulations

¹⁰ Gregory Ferenstein, 'Offshore 3D Printed Gun Blueprint Protector Kim Dotcom Reportedly Deleting Files' (*TechCrunch*, 11 May 2013) <<http://techcrunch.com/2013/05/11/offshore-3d-printed-gun-blueprint-protector-kim-dotcom-reportedly-deleting-files/>> accessed 22 September 2014

¹¹ Cyrus Farivar, 'Worried about accidentally 3D printing a gun? New software will prevent it' (*Arstechnica*, 27 June 2013) <<http://arstechnica.com/business/2013/06/worried-about-accidentally-3d-printing-a-gun-new-software-will-prevent-it/>> accessed 22 September 2014

files containing blueprints for guns or gun parts, along similar lines to the online copyright infringement schemes operating in various parts of the world.

However, the practical success of such enforcement measures is far from assured. Indeed, attempts to regulate users' behaviour by focussing on these gatekeepers and intermediaries may be doomed to failure. The effectiveness of measures which have already been taken to address problems of online copyright infringement must be critically assessed before similar measures are proposed vis-à-vis 3D printing. In practice, these anti-infringement measures seem to have met with limited success inasmuch as users can still obtain infringing content on torrents etc due to the decentralised nature of the Internet, and they can also use encryption, proxies, VPNs etc to avoid detection by such monitoring schemes in the first place.¹² Furthermore, governments can only effectively control what happens within their own borders yet the Internet is transnational as well as decentralised – so directions to take down files comprising designs for 3D printed guns or their parts may only be effective if the website hosting them is within the same jurisdiction. Although the introduction of technical protection measures (similar to those proposed by Create It REAL) which would only permit 'approved' files to be printed on 3D printers may mitigate the liability of 3D printer manufacturers and intermediaries, these measures can easily be circumvented in practice and so may not be a form of effective enforcement of the law. Furthermore, in order to evade such restrictions on 3D printers, individuals could download plans from the RepRap project and make their own 3D printers 'off the radar' which may be capable of printing the forbidden parts.

Conclusion

In sum, the aforementioned circumstances may render attempts to regulate the 3D printing ecosystem largely ineffective, short of outlawing 3D printing, or RepRaps, altogether. Given the many socially positive applications of 3D printing, it is submitted that such a measure would be disproportionate to the potential harm posed by these undesirable and dangerous objects. A moral panic over 3D printed guns should not stifle the benefits of 3D printing for society at large. Open 3D printing projects including the RepRap may have even more societal benefits inasmuch as they enable the technology to be more accessible to underprivileged individuals and communities which may not be able to afford 'off-the-shelf' models such as those sold by the major 3D printer manufacturers.¹³ Thus attempts to regulate 3D printing should be carefully considered by law and policymakers in terms of ensuring that the measures being considered will not harm the many socially beneficial applications of the technology, and will actually be enforceable in practice.

¹² See: Rebecca Giblin, 'Evaluating Graduated Response' (2014) 37 Columbia Journal of Law & the Arts 147

¹³ Sean Dodson, 'The machine that copies itself' (*The Guardian*, 3 July 2008) <<http://www.theguardian.com/technology/2008/jul/03/copy.machine.reprap>> accessed 22 September 2014