I shop online – recreationally! Internet anonymity and Silk Road enabling drug use in Australia

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ABSTRACT

Internet technologies are beginning to influence the sale and supply of illicit drugs in Australia. One such technology, an online marketplace known as Silk Road, had dramatically increased in popularity since its worldwide launch in February 2011. This research and paper were completed prior to the Silk Road's founder, Ross Ulbricht being arrested on 2 October 2013 and Silk Road being taken off line. This research paper will consider such factors; as the increasing use of internet by Australians, the popularity of shopping online and the variance in the quality and price of products available on Silk Road to those available in other drug markets. The case study will provide an in-depth look at Silk Road from an Australian perspective and in light of the continuing popularity of illicit drug use in Australia. Though Silk Road is currently off line, 'Bitcoin' has survived and it will only be a matter of time before a substitute for Silk Road emerges.

Introduction

In 1990, when several Australian universities began connecting to the internet[1] for the first time it was anticipated the humble connection would change the face of research in Australia. It was not at that time foreseen the internet would grow to become one of the most relied upon and frequently used tools, not just in Australia but also throughout the world. The exponential growth of the internet has impacted many aspects of Australian culture whilst improvements to technology such as smartphones and tablet devices have allowed Australians to be more connected and more reliant on the internet for everyday use.

Whilst use of the internet is predominantly benign it is inevitable that crime, which often follows opportunity, will shift to exploit the internet and its associated technologies.[2] The term cyber crime has been used to categorise the growing number of crimes involving computers and/or the internet. Cyber crime consists of crimes committed using the internet such as using the internet to sell illegal goods or to distribute Child Abuse Material[3] and of interest to this research is the growth of internet-enabled crime or crime facilitated through communication tools, information sources and recruitment/financial services[4] made possible with internet enabled computers. The internet does not

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[1] For the purposes of this paper and for ease of reading the word internet will not be capitalised. The internet not capitalised will be used to describe the set of networks that links computers worldwide through a set of communication protocols, as defined in the Oxford English Dictionary.

[2] P Hunton, 'The growing phenomenon of crime and the internet: A cybercrime execution and analysis model' *Computer Law & Security Review*, vol. 25, 2009, p 529.

[3] Global Agenda Council on Organized Crime, *'Organized Crime Enablers'*, World Economic Forum, 2012, p 4.

[4] EUROPOL, 'Internet Facilitated Organised Crime', IOCTA, 2011.

just act as an enabler for child sex exploitation, it contributes to crimes of varying nature including money laundering, human trafficking, drug running and illicit drugs. The internet has become increasingly popular in promoting and facilitating the purchase, supply and manufacture of illicit drugs yet the issue is barely mentioned in cyber crime textbooks[5] and this topic will be explored in this paper.

Literature review

With the growth of cyber crime there has naturally been an increase of attention of law enforcement agencies and criminal enterprises are looking for more and more sophisticated methods for avoiding detection and leading to internet users seeking anonymity. Anonymity, as opposed to being anonymous on your own, refers to 'being indistinguishable in an anonymous set'[6] and allows users to conduct transactions on the internet without being identifiable. Whilst many users want anonymity when accessing the internet much of what we do is monitored and controlled by search engines such as Google and Microsoft who, for example, keep users search data for 18 months.[7] To bypass the strict controls sanctioned by search engines, internet service providers (ISPs), internet filters and law enforcement agencies, some internet users have taken their activity 'underground'. As with real world crime, especially those were the risk is low but the profits high, crime on the internet flourishes in the underbelly of society. This underbelly or underground version of the internet is referred to as the deep web[8] (or deepnet, dark web, invisible web) and is a series of anonymous and virtually untraceable global networks (Goldberg). Within these networks are sites specialising in a wide array of cyber crimes including contract killings, the sale of illicit drugs, computer hacking and malware, money laundering and illegal organ trading (and of course many websites that may choose to be hidden despite the fact they are not conducting illegal activity). The most persistent of crimes being perpetrated in the deep web revolve around Child Abuse Material services and include people trading images, downloading under-age pornography and forums for perpetrators to discuss child sex abuse openly. There are however many other types of sites and one such site previously operating in the deep web, dealing with the sale of illicit drugs and related prohibited paraphernalia was the Silk Road Online marketplace.

The Silk Road Online Anonymous Marketplace (Silk Road) was an anonymous online marketplace that emerged in the deep web in 2011 and was created by a person (or group of people) under the pseudonym 'Dread Pirate Roberts'. Through his arrest it is now known this was, Ross

Ulbricht, of San Francisco, California. Described as an 'eBay for drugs'[9] Silk Road was a marketplace for the trading of illicit drugs, drug paraphernalia and other products. Considered to be *sui generis*[10] the website was the only known website at the time of publication openly selling illicit drugs with the same simplicity that Amazon.com sells books. According to the sites administrators, Silk Road was not intentionally created to support illegal trading with creators aiming to build a 'framework for trading partners to come together for mutual gain in a safe and secure way'.[11] The anonymity promised by the site however did entice 'sellers' and 'buyers' looking to trade in illegal products without attracting unwanted attention from law enforcement. Shortly after opening sellers began creating listings for illegal substances including marijuana, MDMA, LSD and cocaine. The sellers, not bound by traditional trading constraints could sell from anywhere in the world with popular listings appearing from the United States, The Netherlands, Germany and Australia.

The site was embedded in the deep web and relied on several mechanisms to ensure total anonymity for sellers and buyers. The first of these are internet anonymisers and in this instance a specific type of anonymiser know as onion routing. Onion routing, a system created to separate the processes of identification and routing through the internet, was first adopted by the Naval Research Laboratory in the United States in 1995.[12] The inventors of onion routing recognised the importance of creating software, which in a world where everything on the internet is monitored could provide users with an opportunity for anonymity. They adapted the onion routing technology into a software program called TOR (The Onion Router) that was released for public use in 2002. Since its inception TOR has grown in popularity, rising from several hundred users to 400,000 in 2011[13] with approximately 3000 volunteers working together[14] to create the anonymous network that is TOR. The program works like a network of virtual tunnels[15] where users around the world volunteer their computer, allowing traffic to bounce through the tunnels so that users cannot be traced to their destination. The identity of a user's IP address is essentially masked so that any website visited or conversations taking place via instant messaging becomes untraceable, or anonymous. TOR, categorised as a type of anonymising software, is not the first or the only software of its type however it has shown to be one of the

[5] N Phair, '*The online environment: a precursor to illicit synthetic drug law enforcement*', NDLERF Research Proposal, 2012, pp. 2.

[6] TORButton FAQ, viewed on 14 September 2012 www.torproject.org/torbutton/torbutton-faq.html.en.

[7] S Mansfield–Devine, 'Google challenged on search privacy', *Network Security*, vol. 2010, 2010, p.2.

[8] E Ormsby, 'The new underbelly', in *The Sydney Morning Herald*, 2012, viewed on 01 June 2012, http://www.smh.com.au/technology/technology-news/the-new-underbelly-20120531-1zktt.html.

[9] M Barratt, 'A trip down the Silk Road', 2011, viewed on 4 February 2012, http://injectingadvice.com/articles/guestwrite/247-monicabarrat.

[10] M Pesce, 'The darknet ages', The Drum Opinion, 2011, viewed on 13 June 2012, http://www.abc.net.au/unleashed/2754260.html.

[11] Silk Road, 'State of the Road Address', 2012, viewed on 5 October 2012, http://silkroadvb5piz3r.onion/index.php/silkroad/home.

[12] P Syverson, 'Practical Vulnerabilities of the TOR Anonymity Network', *Advances in Cyber Security: Technology, Operation and Experiences*, Fordham University Press, Forthcoming edition.

[13] R Henry, '*A Privacy-Preserving Protocol for Gathering Statistics About TOR Users*', 33rd IEEE Symposium on Security and Privacy (Poster Presentation), May 2012.

[14] TOR Metrics Portal, 2012, viewed on 4 February 2012, https://metrics.torproject.org/network.html.

[15] TOR Frequently Asked Questions, 2012, viewed on 4 February 2012, https://www.torproject.org/about/overview.html.en.

most popular as it combines anonymity with usability and efficiency[16] and appeals to both confident and novice internet subscribers.

Bitcoin

To further support the anonymising program TOR, an anonymous currency called Bitcoin was also used by Silk Road. Bitcoin is a peer-to-peer electronic currency that provides enhanced security and anonymous transactions on the internet when compared with traditional forms of currency such as transfers through western union or Pay-Pal. Bitcoin was created in 2009 by a Japanese science student operating under the pseudonym Satoshi Nakamoto to eliminate the need for third party financial institution when making transactions using the internet.[17] A Bitcoin is created using mining software and each coin is secured by an encrypted public-private key[18] unique to the transaction the Bitcoin is utilised for. Although Bitcoin was the currency of choice for Silk Road users it was not created for illegal online transactions and less than half a percent of Bitcoin users have ever used Silk Road.[19] Predominantly Bitcoin was used by online gaming enthusiasts however media attention rising from Silk Road had drawn attention to Bitcoins uses for illegal transactions, that cannot be traced and its potential for money laundering.

Bitcoins can be obtained from varying methods, the most direct of which is to 'mine' the Bitcoins. Users can download a software program to their computer or computer network and processing power is used to solve a complex mathematical algorithm, which in turns creates Bitcoins for the user. A much simpler method however is to simply purchase Bitcoins from an exchange. The largest exchange house Mt Gox accounts for 80% of all Bitcoin trade[20] and funds deposited via a bank account can be exchanged for Bitcoins. Once obtained the Bitcoins can be stored in a Bitcoin wallet on the user's computer. Once a user has installed TOR and has access to Bitcoins they were able to conduct transactions on Silk Road.

However, Bitcoin, is undoubtedly less secure and operates similarly to conventional, 'hard' currencies; it has a 'floated' value, meaning that the value of Bitcoin (compared to other currencies such as the US dollar or Chinese Yuan) fluctuates according to demand. Purchases of Bitcoins must be made from established, legitimate Bitcoin vendors.[21]

Martin[22] suggests:

"*The purchasing stage is a point of vulnerability to detection by law enforcement. While exchanging Bitcoins for goods purchased on Silk Road is encrypted, transactions involving the conversion of hard currencies into Bitcoins, or vice versa, necessarily leave a trail in official financial records*".

What this also suggests is that law enforcement agencies are able to monitor who is buying and selling Bitcoins should transactions be intercepted, but remain blind as to what transactions are undertaken beyond this initial conversion stage.[23]

Using Silk Road, for those relatively familiar with shopping on the internet, was a moderately simple process. Once TOR is installed and opened on a user's computer the Silk Road URL[24] could be accessed directly from the TOR program. On first contact with Silk Road a user needed to create an account which is a simple process wherein only a user name, password, pin number and challenge-response test known as CAPTCHA was required. Silk Road also asked for an email address however users were advised to give a false email address for the purposes of protecting their anonymity. Once registration was complete the Silk Road front page would load giving the user access to all of the marketplaces listings.

"*Silk Road differs from conventional forms of illicit exchange by being facilitated through the internet. Buyers and sellers use advanced digital encryption to log on to the site anonymously. They then buy and sell all manner of legal, controlled and prohibited narcotics*".[25]

To purchase an item, the item was selected from a list of items and added to a shopping cart. The amount of Bitcoins required to purchase the item was then transferred from the users account to the Silk Road escrow system.[26] Escrow provided users with a level of security from potential fraudulent transactions in the marketplace. The Bitcoins were held in an account managed by Silk Road administrators and once the item had been shipped by the seller Silk Road would remove a predetermined amount of commission and finalise the purchase by releasing the remaining funds to the seller. As with other popular marketplaces that rely on buyer and seller feedback such as eBay.com [27] the user was asked to leave feedback and to comment on the speed of the transaction, the anonymity, shipping speed and the product itself. Feedback would then be published on the sellers profile and would impact on their feedback rating out of 100 that was included in the sellers profile name. Users seeking advice on how to use Silk Road would readily find information available on the

[16] R Dingledine, N Mathewson, & P Syverson, 'TOR: The Second-Generation Onion Router', 13th *USENIX Security Symposium*, 2004, pp. 1–16.

[17] Drug Enforcement Administration, '*Bitcoins and Drug Trafficking: A Marriage made in Cyberspace*', Unclassified Intelligence Report, May 2012, p. 1.

[18] Drug Enforcement Administration, 2012.

[19] T Ensey, 'Bitcoin, The future of Global Commerce or ideal drug money?', 2011, viewed on 04 February 2012, http://www.americanownews.com/story/15209359/bitcoin-future-of-global-commerce-or-internet-fad.

[20] Mt Gox website, 2012, viewed on 14 September 2012, https://mtgox.com/.

[21] J Martin, *Lost on the Silk Road: Online drug distribution and the 'cryptomarket'*, Criminology and Criminal Justice, October 2013, p. 3.

[22] Martin, October 2013.

[23] L Blain 300 million dollars out of thin air, 2013, Gizmag website, available at: http://www.gizmag.com/bitcoin-creation-value-overview/26325/(accessed 13 August 2014).

[24] At the time of writing the URL for Silk Road was http://silkroadvb5piz3r.onion/index.php/silkroad/home.

[25] Blain, 2013. p. 4.

[26] N Cristin, '*Traveling the Silk Road: A measurement analysis of a large anonymous online marketplace*', Carnegie Mellon University working paper, 2012, p. 4.

[27] EBay Feedback System, 2012, viewed on 14 September 2012, http://pages.ebay.com.au/help/account/safety.html#feedback.

clear net with tutorials available on the popular website YouTube.com [28] or by searching in Google.

As a part of the Digital Education Revolution more than $400 million has been spent by the Australian government on issuing laptops to students in high school.[29] The recent launch of the National Broadband Network in Australia combined with the above factors as well as advancements in mobile technology will see an increasing number of youth and adults connected to the internet every day. The current generation often referred to as the iGeneration is tech savvy, connected, increasingly socialises through virtual networks and relies on the internet for a wide range of everyday transactions. As a result, online shopping in Australia has markedly increased with nearly two-thirds of internet users over the age of 15 regularly making purchases online[30].

With drug use remaining popular in Australia it is inevitable that users will turn to the internet not just for information but also for the purchase, sale and supply of illicit substances. Silk Road was not the first website to sell illicit substances online with a spate of websites selling synthetic substances such as cannabis mimic 'Kronic' under the premise of being plant fertilizers however Silk Road was unique and appealing to many because of the anonymity it promised and the types of substances available.

Methodology

This paper aims to provide an insight into the Silk Road marketplace during its period of operation and the factors that may have contributed to its increasing popularity post its launch in 2011. The aim being to provide an insight from an Australian perspective into how Silk Road worked what items were available on Silk Road and which were the most popular, focussing on the internal and external factors that have shaped the websites growth.

The Silk Road was chosen as, at the time writing, as it was the only anonymous marketplace that specialised in the sale of illicit drugs. Silk Road presented a unique case study as it was a completely new method of illicit drug sale and supply in Australia and therefore had the potential to dramatically influence the isolated drug market in Australia.

This research project involved three phases of research; a literature review, data collection and statistical analysis. The literature review occurred over a 12 month period and was somewhat difficult, as Silk Road was still relatively unknown. Despite gaining some media attention throughout the 12 month research period, very little was published on the website. At the time of writing only 2 peer reviewed journals had been published solely on Silk Road. Several interviews were conducted with experts in the field however due to confidentiality restrictions very little from those interviews was included.

The data collection phase occurred simultaneously with the literature review. Data was collected from open source publications and sites (such as Google Insights) to form an understanding of Silk Roads popularity and reach in the Australian market as well as external factors which were likely to impact on the then popularity of Silk Road. To collect data from Silk Road a 'user profile' was created by the one of the researchers and this provided a platform to make observations and collect data on users, products, the marketplace and forums, over a 12 month period. This data was analysed in the third phase of research and some excerpts of this are displayed within this paper.

Conclusions will be drawn from my analysis to show that Silk Road had increased in popularity until it was closed down by law enforcement.

It will also show that the format of Silk Road was appealing to Australian users for a broad range of reasons and that if Silk Road had been allowed to continue to grow at an exponential rate, it may have a significant impact on the drug market in Australia.

It is foreseen that it is only a matter of time and a substitute will emerge, therefore there are lessons that can be learnt from Silk Road. The positive factors will also identify why it is envisaged one will emerge again and why. The important question though is, will there be greater anonymity in a future venture and will it be launched from a developing country that lack the technology to locate and bring it down?

Accessing Silk Road

Accessing Silk Road was not as simple as opening an internet browser such as Google and typing in the search term 'Silk Road'. The website operated as a TOR hidden service in the deep web. As the internet has progressed, information has been divided into areas known as the surface web and the deep web. Information in the surface web can be searched and accessed from any search engine which uses algorithms to search for files such as '.pdf' and '.doc' files and for key search terms which are linked to static HTML pages. Not all websites, however, want to be so easily found and bury information in databases, that cannot be located by search engines. As current search engines cannot crawl[31] databases the information stored here remains largely hidden from internet users, thus the term the deep web. Whilst the number of sites or amount of information hidden in the deep web is largely unknown it is estimated to consist of more than 1 trillion pages[32] and to be in excess of 500 times larger than the surface web.[33]

TOR hidden services are websites or databases embedded within the deep web that can only be accessed using an anonymising program called "The Onion Router" or TOR. The program, created by a non-profit company called TOR Project Inc, as previously discussed, was created

[28] Silk Road Anonymous Marketplace, 2012, viewed on 14 September 2012 www.youtube.com/watch?v=kT8bDyGexww.

[29] Data taken from the Digital Education Revolution website *http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/Pages/default.aspx*.

[30] Statistics taken from the Australian Bureau of Statistics website, *http://www.abs.gov.au/*.

[31] B He & M Patel, 'Accessing the Deep Web', *Communications of the ACM*, Vol. 50, No. 5, 2007, p. 95.

[32] M Zillman, 'Deep Web Research 2012', *Virtual Private Library*, 2012, viewed on 14 September 2012, http://DeepWeb.us/.
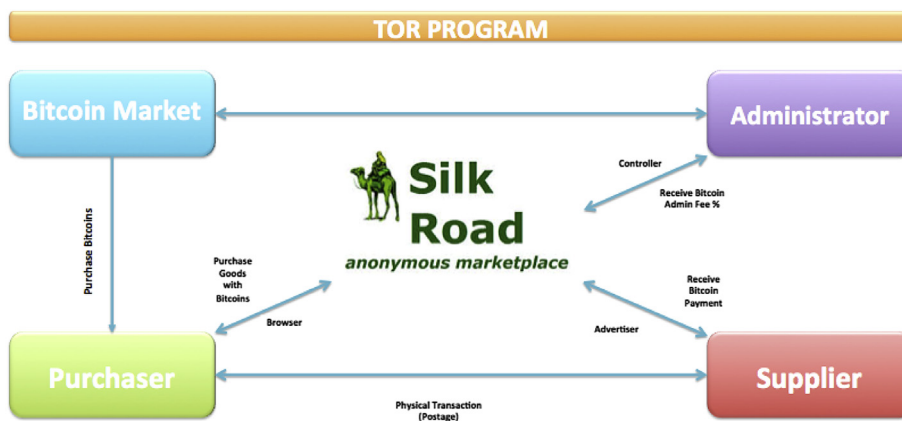
[33] He & Patel, op. cit, p. 96.

Image 1. Outline of the Silk Road Business Model.

to allow users to navigate the internet anonymously. In the surface web, browsers such as Google record a user's IP address and can legally record what each user searches for and the websites they visit.

The technology was initially designed by the Centre for High Assurance Computer Systems at the U.S. Naval Research Laboratory and according to one of the creators was essential for protecting government employee's anonymity in matters of national security.[34] Once TOR has been installed on a user's computer, the program contacts a list of volunteer computers throughout the world and the connection bounces from one computer to the next, to disguise the computers location. Whilst not the only software available that supports anonymous browsing TOR is one of the most popular as it offers an easy to use interface and relatively quick browsing speeds.

Silk Road analysis

Silk Road was often described in the media as an 'eBay for drugs',[35] however the website was not set up as such. In a message welcoming users to the website, Silk Road moderators explained the websites name and beginnings:

> "The original Silk Road was an old world trade network that connected Asia, Africa and Europe. It played a huge role in connecting the economies and cultures of those continents and promoted peace and prosperity through trade agreements. It is my hope that this modern Silk Road can do the same thing, by providing a framework for trading partners to come together for mutual gain in a safe and secure way".[36]

Although vague, the message encapsulates the Agorist ideologies gauged from the few statements Dread Pirate Roberts had given. Similar to libertarian theory Agorism advocates a free market and the term Agorism is derived from the Latin word *Agora*, meaning open marketplace. As

with the ancient Silk Road, people came to a market to find things and where supply meet demand. More aligned with counter-economics and anarchist perspectives Agorists' also promoted the power of the people and undermined the perceived moral authority and power of the state and encouraged the creation of an 'underground economy' or black market.

It is with these beliefs that Dread Pirate Roberts created Silk Road, a black market that up until the 2 October 2013 had evaded law enforcement. Technically, the website was not a shop, it was a marketplace which provided an online platform for buyers and sellers to meet and conduct transactions. The website creators did not offer any products and did not manage any stock-instead allowed sellers to advertise products and received a commission for the sites transactions (similar to other online marketplaces such as eBay or Amazon Marketplace). An outline of the Silk Road business model is listed in Image 1:

Analysis of the items available on Silk Road (as at September 2012) showed a total of 28 Categories with approximately 4500 items for sale. Approximately 65% of all listings were for illicit drugs or drug related paraphernalia. So what was available in Australia and were the products illegal?

Silk Road did not publicly make available the frequency of transactions and it was therefore difficult to determine the total turnover on the website. There are however two indicators which can be used to estimate number of transactions:

Seller transactions

Each seller had a profile that outlined their popularity with buyers, a description of products, product listings and other information to encourage buyers to purchase their listings. Included in the profile was the approximate number of products the seller had sold through the Silk Road escrow system.[37]

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[34] P Syverson, *Op. Cit.*
[35] M Barratt, Op. Cit.
[36] Silk Road, 'State of the Road Address', 2012, viewed on 5 October 2012, http://silkroadvb5piz3r.onion/index.php/silkroad/home.

[37] It is strongly encouraged all sellers use escrow however this is rarely adhered to.

Table 1
Top 20 categories of items available worldwide on Silk Road.[a]

Category	#. Items	Pct.
Weed	3338	13.7%
Drugs	2207	9.0%
Prescription	1784	7.3%
Benzos	1193	4.9%
Books	955	3.9%
Cannabis	880	3.6%
Hash	821	3.4%
Cocaine	633	2.6%
Pills	473	1.9%
Blotter	441	1.8%
Money	406	1.7%
MDMA (ecstasy)	393	1.6%
Erotica	385	1.6%
Steroids, PEDs	376	1.5%
Seeds	375	1.5%
Heroin	370	1.5%
Opioids	344	1.4%
DMT	343	1.4%
Stimulants	292	1.2%
Digital goods	261	1.1%

[a] This table is being displayed with the permission of its author, Nicolas Christin.

Feedback frequency

Each buyer was encouraged to provide feedback when making a purchase which could then be seen by other buyers who might have been considering purchasing the same item.

To understand the potential impact of Silk Road on the Australian illicit drug market the international success of Silk Road needed to be considered. A study out of Carnegie Mellon University in the United States by researcher Nicolas Cristin[38] gathered data from Silk Road over a period of 8 months. The study found that Silk Road offered items in 220 categories whilst the most popular listings were all drug related. The top 20 categories, in terms of items available are represented in Table 1.

The report found that the number of sellers fluctuated and in total 1397 seller profiles existed on Silk Road over the eight month period with a total of 24,422 items available for purchase.[39] It was also observed that the number of sellers and number of products both increased dramatically throughout the same period. The analysis revealed through these observations of the marketplace that transaction volumes from approximately 8000 Bitcoins daily to nearly 15,000 Bitcoins daily, a clear indication of the rise in Silk Roads popularity during it period of operation. Furthermore, it was found that the monthly turnover of Silk Road was USD $1.9 million per month, adding up to more than USD $22 million per year showing that Silk Road was clearly one of the largest drug suppliers in the world.

User analysis

User activity was also monitored during the project and a selection of sellers profile data, for Australia was collected, whilst the Silk Road was still accessible. Some of this data is displayed in Appendix 1, the Usernames have been modified to mask the originally captured detail.

An audit of Silk Road sellers listed as based in Australia[40] in July 2012 identified 27 sellers with 191 combined listings. Analysis of the 191 items found that all items were listed in Schedule 1 of the Drug Misuse and Trafficking Act 1985 and therefore illegal to sell in Australia. A detailed list of all sellers in Australia is listed in (Table 2).

Silk Road does not publicly make available the frequency of transactions and it is therefore difficult to determine the total turnover on the website. There are however two indicators which can be used to estimate number of transactions:

Features of Silk Road

The marketplace had been created as a community with various features tailored towards creating a community feel that would keep members of the marketplace using the website.

On gaining access users are presented with a home page with links to the various subpages, pages on the user's requirements. (Image 2).

Navigating beyond the home page, users will encounter many other features, some of these features include[41]:

SILC chatroom

The SILC chatroom was a forum for Silk Road members to meet and discuss a broad range of topics anonymously, including Silk Road, sellers, Bitcoins, TOR, illicit drugs and any other topic that might have been of interest. The chatroom enabled friendships to be formed through conversations and contributed to the community feel of Silk Road.

Escrow

Escrow was a service offered by Silk Road administrators, to protect sellers and buyers from fraud. The service allowed the Bitcoins to be stored by Silk Road, until the buyer had received their product and given feedback to the seller. Escrow contributed to the community of Silk Road, as it offered all users a level of security in their transactions.

Feedback score

Each seller would have a list of feedback they had received on their profile, which was available for review by members of Silk Road. The feedback was broken down into

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[38] N Cristin, 'Traveling the Silk Road: A measurement analysis of a large anonymous online marketplace', Carnegie Mellon University working paper, 2012, p. 8.

[39] N Cristin, 2012, p. 11.

[40] Sellers do not have to state where they are based and international sellers also ship to Australia.

[41] Each of these features were analysed from accessing Silk Road and making observational enquiries, no previous published research was relied upon for these observations.

Table 2
Analysis of Silk Road sellers listed based in Australia.

Seller name	Month joined	Feedback rating	Transactions	Fans	Total listings
theweedman	Jan-12	100%	300	284	10
EnterTheMatrix	Sep-11	98.80%	300	494	24
Helpinghand	Jun-12	99.90%	167	70	9
Moveitaussie	Mar-12	97.60%	155	162	6
Canamo	May-12	99.60%	300	108	7
Halfbaked	Jun-12	99.40%	101	46	9
Asdf345	Oct-11	100%	84	51	3
OzzyDealsDirect	Jun-12	100%	94	53	7
rastamanAUS	Dec-11	100%	288	54	5
Budsdownunder	Jan-12	95.80%	134	44	7
elk	May-12	100%	49	38	8
BudZilla	Jun-12	100%	30	20	7
ThomasTheTripEngine	Jun-12	100%	28	35	1
Digitalpunk	Jun-12	100%	14	42	2
Thomastankengine	Jun-12	94.60%	15	16	2
Popeye Trading	Jun-12	99.60%	52	29	8
Chopperos	Dec-11	100%	110	80	17
BakinBrownies	Jun-12	100%	14	16	8
MetaSphere	Jun-12	100%	20	30	11
1dboladay	Jun-12	100%	20	50	15
aussiedrugman	Jun-12	100%	9	12	4
Gold Tops	Jul-12	100%	6	17	5
Thesaladdoger	Jun-12	100%	24	21	8
OzBud	May-12	100%	1	6	2
TheDexFactor	Jul-12	0%	0	6	1
DiscoTreatsAUS	Jun-12	95.70%	28	12	1
Thegiftman	Dec-11	100%	130	57	4

written feedback as well as a numbered score. The score contributed to an overall score ranked as a percentage out of 100, which was then included in the sellers name. The feedback score contributed to the community feel of Silk Road, as it offered buyers security in being able to buy from reputable sellers and it allowed reputable sellers the opportunity to thrive in the community.

Hero status

Silk Road offered members to become heroes through their contribution and commitment to Silk Road. This came from a high volume of sales, positive feedback, helping other Silk Road users, contribution to the Chatroom and posts on the forums. Some of the Heroes had also been offered the opportunity to become administrators on Silk Road, due to the significant contributions they had made in keeping Silk Road a positive environment.

Silk Road Wiki

The Silk Road Wiki was a page created under the hidden wiki service, which offered users advice on how to use Silk Road from a technical perspective. It also assisted users with understanding the basic principles of anonymity including TOR, encryption and privacy.

Image 2. Silk Road front page, accessible by all members of Silk Road.
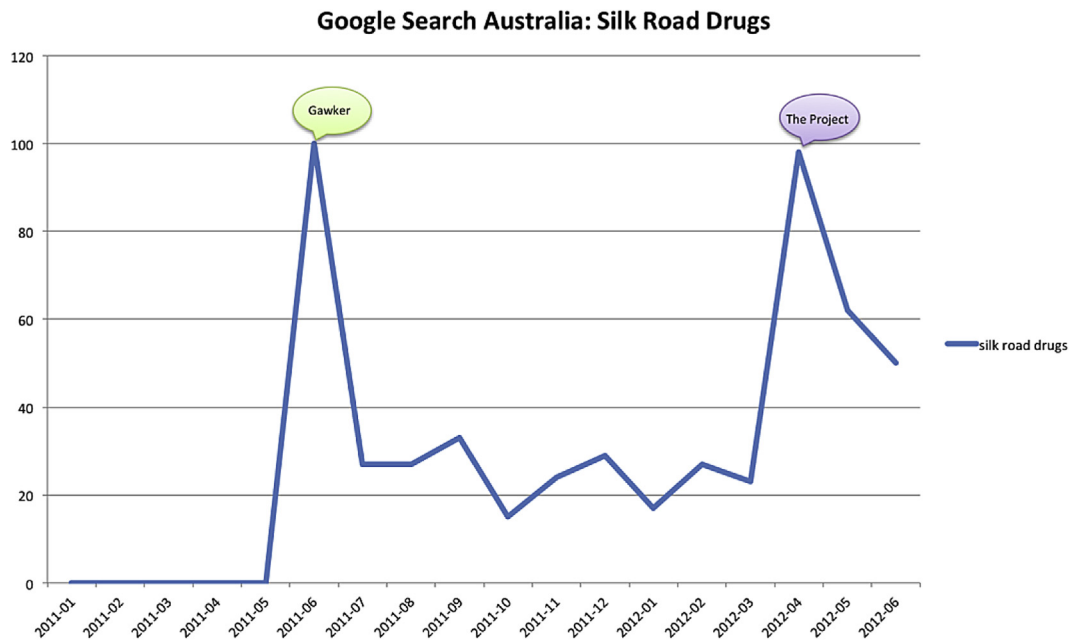
Google Search Australia: Silk Road Drugs

Chart 1. Search results from Google Insights; 'Silk Road Drugs' on www.google.com.au.

Forums

The Forums acted similar to the SILC Chatroom however threads were created by a user and could be responded to by any member in the forum. The forum covered topics including how to use Silk Road, the dangers of taking illicit drugs and anonymity. The forum further contributed to the community feel of Silk Road, by offering users advice, topics of interest to discuss and information sharing avenues.

Culture of Silk Road

Within Silk Road existed a very distinct culture that focused aside from the common interest in illicit drugs, primarily on the importance of anonymity in what users perceived as an increasingly controlled environment. Many users referred in forum posts indirectly or sometimes directly to Agorist and Anarchist ideals and anonymity and the freedom of speech on the internet all of which are key themes that attract users to the deep web.

The popular sellers on Silk Road, those who truly embrace the ethos of anonymity and the deep web, provided insights into the culture underpinning the website.

Analysing these forum posts provided an understanding of the mindset behind the culture that had been created within the Silk Road forums and the culture underpinning the website itself.

Popularity drivers

Influence of the media

Popularity of Silk Road could be gauged by looking at the number of users as well as transactions since the marketplace was launched in February 2011. Unfortunately, Silk Road did not publicly advertise the number of buyers or sellers to protect anonymity for the sites users and creators. A study from Carnegie Mellon University found that the number of sellers on Silk Road increased from 220 in November 2011 to 564 in July2012.[42] There are three main factors which were driving the growth of Silk Road users and these were the influence of the media, word of mouth on the web and Silk Road promotions, all of which will be briefly discussed here.

Media

Through media attention, awareness to the Silk Road had been gained as a result an increase in searches on the term had occurred. From reviewing some of the forum posts within the Silk Road, further supported this. The search term "Silk Road Google" when plotted against the specific media events clearly indicated the influence of the media as seen in Chart 1.

In June 2011 the online publication Gawker released its first article on Silk Road describing the marketplace as being like "Amazon, if Amazon sold mind-altering chemicals". That month the search term 'Silk Road Drugs' became a popular search term on Google in Australia for the first time. In April 2012 the popular television show 'The Project" featured a story on Silk Road including information on how to use the website, Tor and Bitcoins. As a result of the segment the search term 'Silk Road Drugs' again spiked on Google.

Interestingly, when looking at the spiked interest of search results for Silk Road with the number of sellers and new sellers on Silk Road, the increased media attention also lead to an increase in the number of sellers as can be seen in Chart 2.

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[42] N Cristin, Op. Cit, P 12.

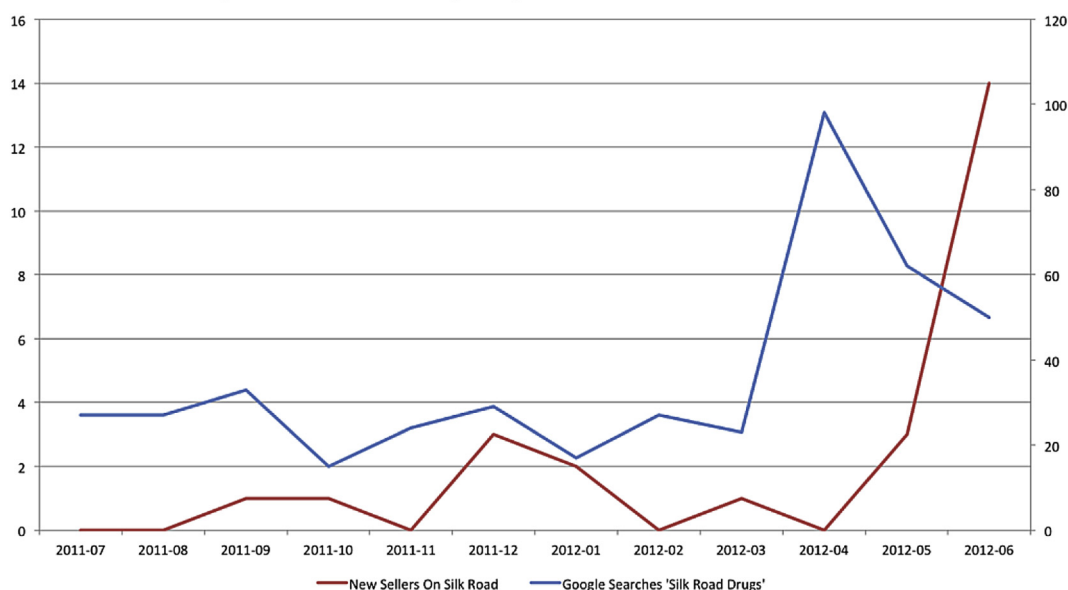**Google Searches inversely compared with new sellers to Silk Road**

Chart 2. Search results from Google Insights in Chart 1, inversely plotted against the number of new Australian sellers registered on Silk Road monthly.

Word of mouth on the Web

Online word of mouth is a term used to describe people making recommendations online and is usually generated through blogs, chat rooms and forums. Silk Road had a very strong presence online with various blogs providing instruction on how to access the website and offering insights into their experiences on using Silk Road. A popular video sharing website also featured videos on users advice and perspectives of Silk Road. Popular social media websites such as Facebook had brought together users or followers of Silk Road with a group on Facebook called "The Silk Road Anonymous Marketplace". The popular information sharing website Wikipedia also features a page on Silk Road. Together all of the websites, social media platforms, blogs, opinion pieces and articles combined to create a very strong presence for Silk Road on the internet.

Increase in internet usage and online shopping in Australia

"In recent years, the volume of illicit sales of narcotic drugs and psychotropic substances through websites has risen, making the internet a major source of drugs for drug abusers"[43]

Internet usage in Australia has increased approximately 55% in 3 years with the number of broadband subscribers increasing from 5.6 million in 2008 to 10.3 million in 2011.[44] More and more Australians are relying on the internet for everyday transactions such as banking, social

networking and shopping and statistics from the ABS show Australians of all ages are becoming increasingly reliant on the internet, especially those aged 15 to 54 as can be seen in Chart 3.

The 2011 ACMA report on the e-commerce marketplace in Australia, listed the following: Online shopping states that; "the majority of Australians, going online is the norm for everyday social and economic interactions".[45] The report found that 59% of adults went online several times a day for purposes not related to work. A large proportion of internet users in Australia are online shoppers, with 62% of adult users purchasing goods or services online.

Whilst Silk Road focused primarily for the sale of illicit drugs which would not be recorded in statistics by ACMA, the upward trend of persons using the internet can be used as a predictor of the likely success of websites like Silk Road. (Chart 4).

With the drug market in Australia growing and internet use becoming entrenched in everyday life, it is not surprising that the internet has become an enabler for drug related crimes, the internet is becoming an enabler for the sale and purchase, as well as a research tool for assisting with the manufacture of synthetic substances.

Role of the internet

A search on Google for 'Legal Highs' will return more than 106,000 search results from Australian websites.[46]

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[43] The international Narcotics Control Board quoted in submission to the parliamentary joint select committee on cyber-safety by ACBPS, July 2010.
[44] Australian Bureau of Statistics, 2011, Internet Activity Australia, cat. no. 8153.0, viewed 2 October 2012, http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/8153.0Chapter3Dec%202011.

[45] ACMA, Communications report 2010 to 2011 Series, *Report 1: E-Commerce marketplace in Australia: Online Shopping*, 2011, p. 16.
[46] http://www.google.com.au/#q=legal+highs&hl=en&prmd=imvns&source=lnt&tbs=ctr:countryAU&cr=countryAU&sa=X&ei=HO-YUOv3OobsiAeVqYGwCA&ved=0CBcQpwUoAQ&bav=on.2,or.r_gc.r_pw.r_qf.&fp=a3172285415346e8&bpcl=37189454&biw=1280&bih=627.

One of the first results is a website called 'Aussie Herbal Highs', a website specialising in the sale of substances that mimic the effects of drugs such as Marijuana, however as they are synthetically manufactured they are not yet deemed an illicit substances by the Australian Government. The website offers a mobile optimised version, allowing users to order products from their smartphone at any time.[47] Whilst the products are technically legal, they offer users the same effects as illicit substances.

In the United States, a website was launched in 2007 called 'The Farmers Market'. Between 2007 and 2009 the website sold products including LSD, Ecstasy and Marijuana to over 3000 people in approximately 35 countries.[48] According to an indictment released by the Drug Enforcement Agency in the United States,[49] the website processed in excess of 5000 orders worth more than USD $1 million.

The internet however enables further drug activities than just the buying and selling of illicit drugs. The popularity in Australia of manufactured drugs such as Ecstasy known as Amphetamine Type Substances (ATS), has driven the need for importation of precursors required for the manufacture of such substances. The internet is being increasingly used in Australia to import precursors as well as manufacturing equipment[50] and law enforcement have been accused of not having the adequate technology to keep up with the issue.[51] The internet also provides an avenue for information dissemination of manufacturing processes, including recipes and types of precursors to use for the production of ATS, complete with advice being dispersed via internet chat rooms and websites.[52]

Risks of Silk Road

Despite the factors which appealed to Silk Road users that had driven the marketplaces popularity, there were naturally risks to the website. Whilst the risks of taking illicit drugs cannot be covered by the limitations in this research paper, it is a well-known fact that illicit drug use can cause serious harm or death.

One of the obvious dangers of the internet and anonymity is the lack of accountability. In May 2012 a Silk Road seller allegedly took orders as a part of the 420 sale and immediately cancelled their account allowing them to steal all of the money they had received. The seller is reported to have stolen $250,000 worth of customers funds, without supplying the agreed upon products, which naturally caused concern in the Silk Road community.[53]

More alarmingly was the lack of control on the website users who were not asked to provide their age and theoretically a 10 year old could have logged on to purchase any type of illicit substance. The wealth of information available on the website could assist even a young teenager, in making purchases through the marketplace.

As has been shown, the anonymity offered by Silk Road had increased its popularity and it is for the same reasons a person with little to no experience with using illicit drugs might feel comfortable purchasing from Silk Road. Inexperience in this area could lead to health problems, risk of overdose and at the most extreme end of the scale, death.

Users of Silk Road also faced very few challenges in buying illicit drugs as opposed to buying on the street, where they may be caught by law enforcement, get into an altercation with the dealer or numerous other mitigating factors. The real world scenario may dissuade a person from making a transaction because it is too difficult, whereas the ease of Silk Road purchases, did not offer any of the same challenges. That being said, law enforcement in Australia did not turn a blind eye to Silk Road with the Australian Federal Police and the Australian Customs and Border Protection Service working together to combat the problem. They warned Silk Road users their anonymity would not always be protected and when caught they would be prosecuted.[54]

The risks to Australian's that used Silk Road were no doubt more exhaustive than the examples listed above. It is too exhaustive to be covered in this research paper and further research is required to gain insight into the risks of online anonymity and its true impact potential on the drug market in Australia.

Conclusion

This research paper has presented a case study of the online marketplace Silk Road, which until its shutdown in October 2013, was popular amongst drug users in Australia and throughout the world. As the website was relatively new and had received a significant amount of media attention, very little scholarly research had been conducted on Silk Road, this paper aimed to provide an insight into why Silk Road gained popularity within Australia.

This paper showed that:

Silk Road grew in popularity in Australia and at the time of writing had 27 sellers with more than 190 listings.

Whilst the turnover and number of drugs being purchased from Silk could not be accurately calculated, it was estimated that sellers ranged from 10 to 100 transactions per month, which averaged to more than 3 sales per day.

A study from the United States successfully crawled the Silk Road website for a period of 8 months and found that the turnover was approximately USD $1.9 million per month, which equates to more than USD $22 million dollars each year. This study gives a true understanding of the size and popularity of Silk Road.

Internet use is increasing in Australia with the number of broadband subscribers more than doubling in the last

[47] Aussie Herbal Highs, 2012, viewed on 4 November 2012, https://aussieherbalhighs.com.au/magento/.

[48] The Farmers Market, viewed on 14 September 2012, http://www.digitaltrends.com/web/feds-bust-farmers-market-an-online-illegal-drug-ring-hidden-by-tor/.

[49] United States District Court, 'Indictment Plaintiff V. Willems', November 29 2011, pp 1–66.

[50] N Phair, 'The online environment: a precursor to illicit synthetic drug law enforcement', NDLERF Research Proposal, 2012.

[51] N Phair, 2012.

[52] N Phair, 2012.

[53] http://www.smh.com.au/technology/technology-news/the-new-underbelly-20120531-1zktt.html.

[54] A Moses, 'Dark Net drug deals boom on cyber Silk Road', 2012, viewed on 10 August 2012, http://smh.com.au/action/printArticle?id=3541159.

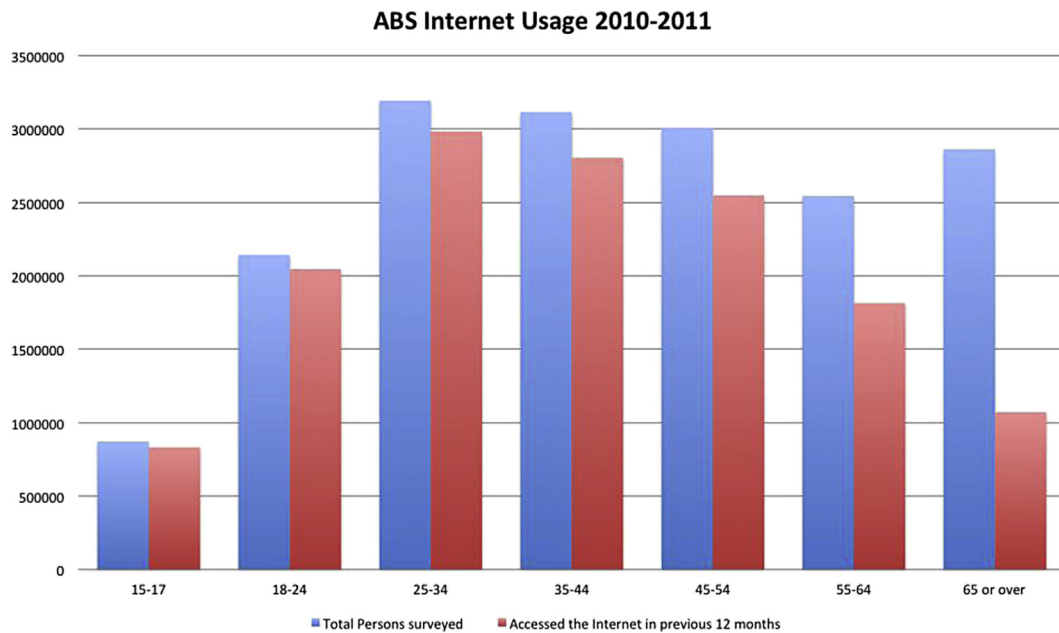## ABS Internet Usage 2010-2011

Chart 3. Australian Bureau of Statistics data for internet usage in 2010/2011.

three years, to 10.3 million. 69% of adult internet users were using the internet to purchase goods and services online and this figure is increasing annually. Reasons offered for shopping online were that it is cheaper, more convenient and the internet offers a better range of goods/ services.

Analysis of these factors provides insight into Silk Road's popularity:

- Australians like using the internet.
- Like shopping online.
- Websites such as Silk Road offered a simplified and anonymous service appealing to drug users.
- Provided an alternative to purchasing drugs from more traditional methods such as from a street dealer.
- The variety of products available on Silk Road combined with lower prices and the potential to buy more

Reasons for Australians choosing to shop online

Chart 4. Australian Communications and Media Authority data for reasons for internet use.

'reliable' or pure products also contributed to Silk Roads popularity.

This was especially true in Australia where the street value of drugs such as Cocaine, is amongst the highest in the world. Whilst further research is required to understand, the changing dynamic of drug supply over the internet, based on this case study it is highly probable that Silk Road would have continued to grow in popularity. Due to this it will no doubt lead to the creation of further websites, offering similar services which will greatly impact on the way illicit drugs are sold and supplied in Australia.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.diin.2014.08.001.

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