

DRUGS AND THE INTERNET

Issue 7, October 2016

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To date the availability of illicit drugs in Australia has largely been examined through; household surveys and interviews with people who use drugs, indicators such as drug seizures and arrests, and analyses of hospital admissions and drug-related deaths. Over the past decade there has been an increasing awareness and interest in online marketplaces as a source for discussion about and purchase of drugs (Walsh, 2011). The advent of the Silk Road in 2011, an online marketplace operating on the 'darknet', broadened the availability of new psychoactive substances (NPS) and other more conventional illicit substances (such as cannabis and MDMA). After the closure of the Silk Road in October 2013, multiple new marketplaces emerged to take its place (Van Buskirk, Roxburgh, Farrell, & Burns, 2014). The closure of Silk Road 2.0 and a large international law enforcement operation in November 2014 (dubbed Operation Onymous) have seen major changes in remaining darknet marketplaces. In addition to this, threats such as hacking attacks and exit scams (whereby markets close down taking any bitcoins held in escrow) continue to cause disarray in darknet markets.

This bulletin is the seventh in a series by Drug Trends that provides analysis of trends over time in the availability and type of substances sold via the internet on the darknet. The current bulletin reports for the time period January 2016 to June 2016.

KEY FINDINGS

- **Sixteen marketplaces** were actively monitored during the time period, **one** of which was first identified during this time.
- The second largest marketplace identified in the previous bulletin, Nucleus, **went offline in March 2016, apparently due to an exit scam.**
- Despite downtime across smaller markets, there was notable **consistency in both uptime and the rate of increase in vendor numbers across larger markets.**
- **Alphabay and Dream Market** were the largest marketplaces at the end of the monitoring period, recording the largest number of unique vendors.
- Across these marketplaces, **cannabis, pharmaceuticals, MDMA, cocaine and methamphetamine** were the five most commonly sold substances, with NPS popularity slightly declining.
- By December 2015, **two of the sixteen marketplaces being monitored had closed**, either as a result of scams, or various other reasons, reinforcing the volatility of these marketplaces.

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METHODS

Surface Web Monitoring

While previous bulletins have reported on the number of the vendors operating on the surface web, it was decided to discontinue this monitoring in the current period. This was due to an increasing diversification of surface web retailing, across many different platforms including traditional webstores, forums, manufacturing laboratories, dating apps, and others, with effective monitoring beyond the capacity of the current project. In addition, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA, 2016) monitors surface web NPS availability with a higher precision and capacity than DNeT is currently able to offer. Readers interested in surface web NPS availability are advised to consult the EMCDDA website (<http://www.emcdda.europa.eu/>) for the most current reports.

Darknet Marketplace ('Darknet') Monitoring

Darknet marketplaces were accessed weekly using a dedicated domestic user account. Exhaustive snapshots of each accessible marketplace were taken, including information on vendor name, listing description and, where possible, country of origin. Substance listings were placed into one of sixteen mutually exclusive categories – cannabis, cocaine, GHB, illicit opioids, ketamine, LSD (lysergic acid diethylamide), magic mushrooms, MDMA (3,4-methylenedioxy-methamphetamine), methamphetamine, NPS (new psychoactive substances), pharmaceuticals, PIEDs (performance and image enhancing drugs), precursors, synthetic cannabinoids, tobacco and weight loss. See Table 5 in Appendix A for a detailed description of the categories of substances available on darknet marketplaces.

The monitoring methods employed aim to replicate consumer access to these marketplaces. That is, repeated attempts are made to access a marketplace across the monitoring day, but if that marketplace cannot be accessed, i.e. is 'down', it will not be accessed on the following day. In addition, partial snapshots are not entered into the dataset. If a marketplace is inaccessible, or only partially accessible for whatever reason, it will be treated as missing data. A marketplace may be down for multiple reasons, including server outages, distributed denial of service attacks (DDoS; in which multiple sources are used to generate a large amount of traffic to an online service, thereby overwhelming its servers), law enforcement seizures, exit scams and hacking attacks. If a marketplace is down at one time point, unless there is reason to believe it will not return (in the case of seizures or exit scams), attempts will be made to access it at the next time point.

Marketplaces were excluded from monitoring if they had less than one hundred listings for sale, or only one vendor operating on the marketplace. Marketplaces that were language and country specific were also excluded as most did not ship to Australia.

RESULTS

Escrow Systems

Although the Darknet marketplaces identified in this bulletin sold largely comparable products in terms of illicit substances and NPS, many offered additional products such as erotica, hacking tools, drug paraphernalia and occasionally firearms. In addition, these marketplaces varied in transaction processes, with around 45% operating on a multi-signature escrow system, and the remainder operating on a centralised escrow

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system. Escrow is the process of holding funds for a transaction until that transaction is completed and the product delivered, at which point the funds are released (Christin, 2012). In a centralised escrow system, funds are released when the buyer indicates that the product was received, with funds being stored in the marketplace itself. Therefore, if a marketplace's security is compromised, so too are the funds held in escrow. With multi-signature escrow, multiple signatures (encrypted 'keys' used to access funds) are required to release the funds. Two out of three participants in the sale (i.e. the buyer, the seller and the marketplace) must provide their specific keys for the funds to be released. This means that even when a marketplace's security is compromised, funds will not be released without the approval of two of the three involved parties.

Marketplaces Monitored

The 16 marketplaces that were monitored over the current reporting period, from January to June 2016, along with their current status and transaction process, are outlined in **Table 1**.

Table 1: Classification and status of marketplaces active during monitoring period

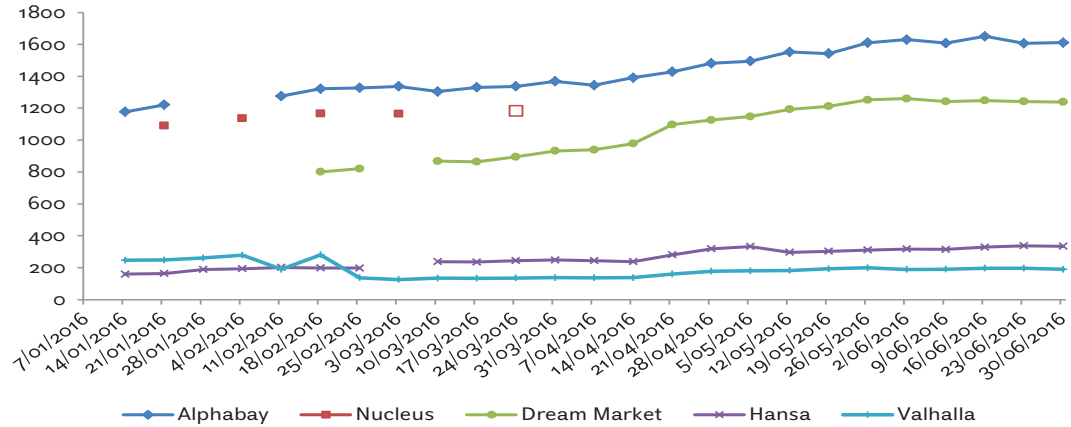
Marketplace	Escrow System	First Monitored	Last Monitored	Current Status
Active at Final Time Point				
Outlaw	Centralised	29/05/2014	Ongoing	Active
Dream Market	Centralised	30/10/2014	Ongoing	Active
Valhalla (formerly Silkkitie)	Centralised	30/10/2014	Ongoing	Active
Alphabay	Multisignature	12/02/2015	Ongoing	Active
Cryptomarket (now Silk Road 3.0)	Centralised	23/04/2015	Ongoing	Active
The Real Deal	Multisignature	14/05/2015	Ongoing	Active
Tochka	Centralised	16/07/2015	Ongoing	Active
Python	Multisignature	23/07/2015	Ongoing	Active
Hansa	Multisignature	13/08/2015	Ongoing	Active
Darknet Heroes League	Centralised	9/10/2015	Ongoing	Active
Oasis	Multisignature	21/01/2016	Ongoing	Active
Acropolis	Multisignature	4/02/2016	Ongoing	Active
Detox	Multisignature	14/04/2016	Ongoing	Active
Apple	Multisignature	2/06/2016	Ongoing	Active
Closed During Monitoring Period				
Nucleus	Centralised	30/10/2014	24/03/2016	Suspected Exit Scam
Mr Nice Guy (Dr D.)	Centralised	19/03/2015	9/06/2016	Down for Unknown Reason

Number of Vendors on Darknet Marketplaces

The total number of vendors on each marketplace at each time point for all monitored cryptomarkets is shown in **Figure 1** and **Figure 2**.

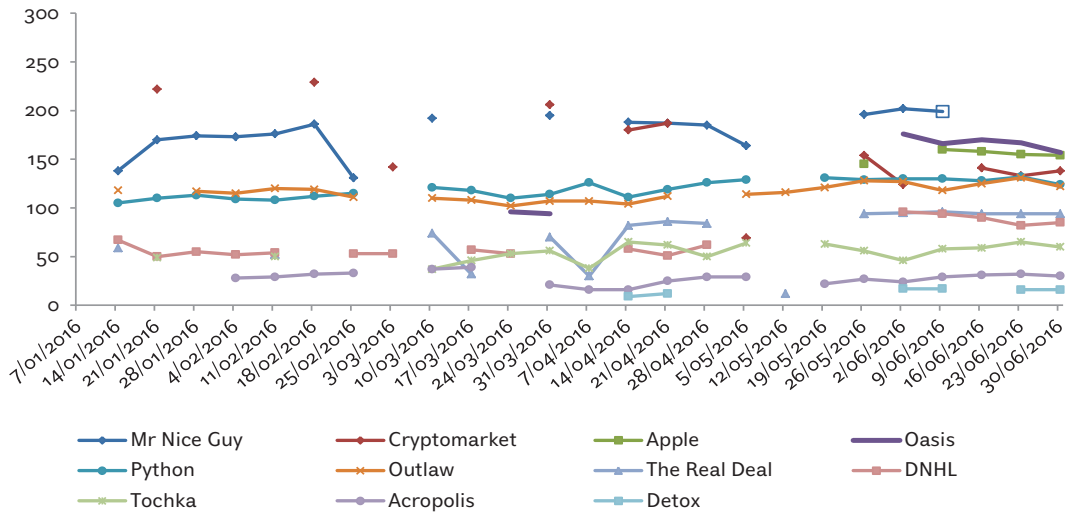
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Figure 1: Number of vendors across the largest five marketplaces by time point.



NB: missing data points indicate temporary marketplace outages or incomplete snapshots. Empty markers indicate permanent closure of marketplace.

Figure 2: Number of vendors across smaller marketplaces by time point.



NB: missing data points indicate temporary marketplace outages. Empty markers indicate permanent closure of marketplace.

During the period January to June 2016, only one new marketplace was identified, and a total of 16 marketplaces actively monitored during this time. Of these, two were closed, one (Nucleus) due to an apparent exit scam, and the other (Mr Nice Guy) due to unknown reasons. Despite widely believed to be an exit scam, there has not, to date, been any major withdrawal of funds from the Nucleus market bitcoin wallet, leaving open the possibility of its return (WalletExplorer, 2016). Nucleus is also of special interest due to its status as the second largest market at the time of its closure. Prior to going offline, considerable downtime was observed on this market, with roughly only 50% of possible snapshots of the market completed in the monitoring period. This

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led many forum users to suspect an exit scam, though this has not been confirmed to date. At the end of the monitoring period, the two main marketplaces remaining were Alhabay and Dream Market, operating at 1611 vendors and 1239 vendors, respectively. The number of vendors for Alhabay is notable in that it exceeds the previous record set by Evolution of 1512 vendor aliases just prior to closing in an exit scam in March 2015 (Van Buskirk, Naicker, Roxburgh, Bruno, & Burns, 2016). For further detail, please see Appendix B for an extended version of Figure 1, with monthly time points dating back to June 2014.

SUBSTANCES FOR SALE

Total Substances Available

Table 2 outlines the substances available from the five largest marketplaces ranked by the number of unique vendors identified selling each substance. Consistent with previous findings (Van Buskirk, Roxburgh, Bruno, & Burns, 2014), the top three available substances sold across marketplaces were cannabis, pharmaceuticals and MDMA. This was followed by cocaine, methamphetamine and NPS. Rankings of substances on the remaining marketplaces being monitored (data not shown) did not differ substantially.

Table 2: Number of vendors on the top six marketplaces with proportions of total vendors indicated, in order of unique vendor count by substance type

Substance	Alhabay		Nucleus*		Dream Market		Hansa		Valhalla	
	n	%	n	%	n	%	n	%	n	%
Cannabis	1389	43%	651	44%	983	46%	296	48%	283	50%
Pharmaceuticals	1263	39%	531	36%	778	36%	181	30%	160	28%
MDMA	918	28%	436	30%	601	28%	155	25%	180	32%
Cocaine	815	25%	321	22%	539	25%	124	20%	154	27%
Methamphetamine	600	18%	270	18%	429	20%	106	17%	125	22%
NPS	447	14%	203	14%	312	15%	77	13%	90	16%
LSD	337	10%	179	12%	246	11%	79	13%	93	16%
Illicit Opioids	328	10%	128	9%	233	11%	43	7%	61	11%
Ketamine	225	7%	98	7%	154	7%	30	5%	45	8%
Magic Mushrooms	176	5%	76	5%	121	6%	43	7%	26	5%
PIEDs	175	5%	54	4%	78	4%	20	3%	22	4%
GHB	60	2%	17	1%	34	2%	4	1%	6	1%
Weight Loss	51	2%	12	1%	30	1%	13	2%	3	1%
Synthetic Cannabinoids	28	1%	7	0%	16	1%	2	0%	6	1%
Total Unique	3245		1476		2144		613		566	

NB: NPS = New Psychoactive Substances; PIEDs = Performance and Image Enhancing Drugs; Asterisks denote marketplaces that were closed during the monitoring period. As vendors often sell multiple substance classes, percentages do not add up to 100%. For a further clarification of the categories used in the above table, please see Appendix B.

NPS Available

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New Psychoactive Substances (NPS) accounted for 5-10% of listings across marketplaces, and 10-16% of vendors across markets had them for sale. However, these substances are of special interest given the pace of change in new types of NPS available. In addition, the types of NPS being sold on dark net marketplaces appear to more accurately reflect consumer preferences for NPS, as indicated by other monitoring systems such as the Ecstasy and related Drugs Reporting System (EDRS) (Stafford, Breen & Burns, 2016).

Table 3 details the ten most commonly sold NPS on the top six marketplaces (ranked by unique vendors selling NPS). The categories of 2C-x and NBOMe family were used for clarity as many of the drugs in these categories (e.g. 2C-B, 2C-I, 2C-E in the 2C-x category) are sold in the same form, and are advertised as having similar effects. Synthetic Cannabinoids were collapsed into one category given the large number of variations that exist (Ammann, McLaren, Gerostamoulos, & Beyer, 2012). Additionally, synthetic cannabinoids were often sold as blends, consisting of different combinations of many chemicals, making classification more complex. Although forum discussions reveal preferences among users for a number of specific substances, collapsing synthetic cannabinoids provides the most accurate estimation of their popularity on these marketplaces

Drugs from the 2C-x, DMT, mephedrone and NBOMe categories were the most commonly sold, with some variation across marketplaces. This represents a slight increase in popularity of mephedrone from previous findings in which DMT or NBOMe were most commonly sold. In this monitoring period, there was a slight increase in the number of vendors selling ephedrine. This has been included in the NPS category despite its likely use as a precursor in the manufacture of methamphetamine. The ranking of NPS as a category overall among vendors appeared stable.

Table 3: Number of vendors from the top five marketplaces selling the ten most common NPS by average rank across all marketplaces

Substance	Alphabay		Nucleus		Dream Market		Hansa		Valhalla	
	n	%	n	%	n	%	n	%	n	%
2C-x	83	19%	53	26%	67	21%	17	22%	22	24%
DMT	70	16%	35	17%	51	16%	14	18%	14	16%
Mephedrone	61	14%	24	12%	45	14%	8	10%	9	10%
NBOMe	52	12%	22	11%	29	9%	9	12%	7	8%
Ephedrine	26	6%	8	4%	21	7%	5	6%	6	7%
DOx	31	7%	6	3%	16	5%	8	10%	6	7%
MDA	35	8%	12	6%	19	6%	3	4%	2	2%
Methylone	20	4%	6	3%	15	5%	4	5%	5	6%
Synthetic Cannabinoids	28	6%	7	3%	16	5%	2	3%	6	7%
A-PVP	19	4%	4	2%	21	7%	4	5%	4	4%
Total	447		205		314		77		90	

NB: Percentages indicate proportion of unique NPS vendors on the listed marketplace, while the final row percentage denotes proportion of all unique vendors on that marketplace. For further information on the substances and categories listed, please see Appendices A and B.



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SUMMARY

- The two largest marketplaces still operating at the end of the monitoring period were Alphabay and Dream Market, with Alphabay recording the highest number of unique vendors seen on any one market since the monitoring project began in September 2012.
- In April 2016, Nucleus shut down, and customer funds are still being held in the market's bitcoin wallet. While an exit scam appears likely, this situation will continue to be monitored.
- Vendor numbers across markets, both large and small, were remarkably consistent across the monitoring period, in stark contrast to the previous monitoring period in which considerable downtime was observed across markets.
- Substances sold across all marketplaces appeared to be consistent with previous bulletins, with cannabis, pharmaceuticals and MDMA most commonly sold.
- The specific types of NPS sold across darknet marketplaces were largely consistent with those observed in earlier bulletins, with an increase in vendors selling ephedrine.
- Consistent with previous findings, the most commonly available substances on these marketplaces are largely traditional illicit substances, rather than NPS, reflecting findings from surveys on people who use drugs.

It is not possible from these results to determine how often, and in what amounts, illicit and new psychoactive substances are being purchased online in Australia. In 2016 the Australian Ecstasy and related Drugs Reporting System (EDRS) reported 18% of surveyed regular psychostimulant users had purchased an illicit drug online in their lifetime, with 14% reporting that they had done so in the past 12 months (Stafford, Breen, & Burns, 2016). In comparison, 10% of Australian respondents in the 2015 Global Drug Survey indicated that they had purchased from the darknet in their lifetime, with 7% having done so in the preceding 12 months (Winstock, 2015).

IMPLICATIONS

The current monitoring period is notable in that it saw a return to stability across larger marketplaces after previous periods of volatility. The DDoS attacks observed across markets in the wake of the closure and exit scam of Evolution appear to have diminished, with full snapshots collected fairly consistently across the five larger markets. Though downtime was observed on smaller markets, this was often due to internal problems with the sites themselves, in which many pages did not fully load, and this precluded full snapshots. Nucleus closed due to an apparent exit scam in March 2016, however, unlike the circumstances surrounding the closure of Evolution, there did not appear to be a large increase in vendors on alternative markets. Exit scams and closures appear to be occurring with increasing frequency, and are coming to be accepted as an unavoidable risk of cryptomarket trading.

It could be that activity on the dark net is becoming increasingly cautious overall, and thus better able to continue in the wake of disruptions. Previous bulletins have observed rapid increases in vendor numbers on remaining markets following the



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closure of a large market. However, no similar increase was observed on remaining markets following the closure of Nucleus. While the reason for this is not apparent with the current data, it may reflect vendors proactively diversifying trade across markets, avoiding the need to disperse to other markets in the event of closures. Though this analysis was not specifically done in the current bulletin, prior research has indicated that vendors often trade across multiple markets under the same or similar aliases (Soska & Christin, 2015), and future research will aim to assess if this diversification has increased over time.

Of note is the fact that Alphabay exceeded the previous record of 1512 unique vendors on one market at a given time point set by Evolution in 2015. On the 16th of June Alphabay recorded 1650 unique vendor aliases, and finished the monitoring period with 1611, making it the largest market monitored to date. This also exceeds the maximum number of vendors operating on the original Silk Road of around 1500 identified (Soska & Christin, 2015). Growth of Alphabay will be closely monitored for the next bulletin. Larger markets in the current monitoring period were consistently accessible, with steady increases in vendor numbers, albeit at slower rates than seen in previous periods, indicating a return to stability in market operations. With the exception of the closure of Nucleus, no significant disruptions were observed across the current monitoring period.

Future bulletins in this series will continue to provide timely and accurate updates on growth and changes in cryptomarkets over time.

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Appendix A: Chemical classification of substances and explanation of categories used in this bulletin

Table 4: Chemical classification of mentioned NPS

NPS	Category	Subcategory
2C-x	Phenethylamine	Psychedelic
-PVP	Other Stimulant	Norepinephrine-Dopamine Reuptake Inhibitor
DMT	Tryptamine	Psychedelic
DOx	Phenethylamine	Psychedelic Amphetamine
Ephedrine	Phenethylamine	Amphetamine Type Stimulant/ Methamphetamine precursor
MDA	Phenylpropylamine	Substituted methylenedioxyphenethylamine (MDxx)
Mephedrone	Substituted cathinone	Amphetamine Type Stimulant
Methylone	Phenylpropylamine	Substituted methylenedioxyphenethylamine (MDxx)
NBOMe Family	Phenethylamine	Psychedelic

Table 5: Glossary of categories and abbreviations used in bulletin

Category	Commonly Available Examples
2C-x	2C-B, 2C-E, 2C-I
Cannabis	Marijuana, hash, edibles (THC infused foods)
DOx	DOI, DOM, DOC
Illicit Opioids	Heroin, Opium
MDMA	MDMA powder, 'Ecstasy' pills
Methamphetamine	Powder (Speed), crystal (Ice)
NBOMe Family	25C-NBOMe, 25I-NBOMe, 25E-NBOMe
Pharmaceuticals	Pharmaceutical Opioids, Benzodiazepines, Sildenafil (Viagra)
PIEDs	Performance and Image Enhancing Drugs, eg. Clenbuterol, Nordicor, Biogen
Synthetic Cannabinoids	JWH Family, AM2201, UR144, AB-PINACA

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Appendix B: Number of unique vendors across larger darknet marketplaces June 2014 to December 2015

