

DRUGS AND THE INTERNET

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To date the availability of illicit drugs 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’ (marketplaces operating on the ‘darknet’ are known as ‘cryptomarkets’), 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 et al, 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 cryptomarkets.

This bulletin is the ninth in a series and provides analysis of trends over time in the availability and type of substances sold via the internet on the darknet. The focus of this analysis is on cryptomarkets that operate internationally, and are only accessible via The Onion Router (TOR), software that enables anonymous communication. The data largely provide information about vendors and substance availability and little about consumers who are buying drugs on cryptomarkets. In 2017 the Australian Ecstasy and related Drugs Reporting System (EDRS) reported 22% of people surveyed had purchased an illicit drug online in their lifetime, with 16% reporting they had done so in the past 12 months (these figures were 18% and 14% respectively in the 2016 survey) (Uporova et al, in press; Stafford et al, 2016). The vast majority (93%) of those surveyed for the 2017 EDRS reported having knowledge of these markets. Findings from the 2016 Global Drug Survey (GDS) show that 9% of Australian respondents reported purchasing drugs from cryptomarkets in the preceding 12 months and this figure has remained relatively unchanged over the past 3 years (personal communication, Monica Barratt, Global Drug Survey).

The current bulletin reports for the time period January 2017 to June 2017.

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KEY FINDINGS

- **Fourteen marketplaces** were actively monitored during the time period.
- **AlphaBay and Hansa** were shut down by a joint international law enforcement operation in July 2017.
- **Alphabay** (up until closure) **and Dream Market** continued to be the largest marketplaces at the end of the monitoring period, recording the largest number of unique vendors during this time.
- **Hansa** (up until closure) was the third largest marketplace monitored during this period.
- **Substantial downtime** was recorded across the remaining marketplaces (including Dream Market) following the law enforcement seizures.
- Across these marketplaces, **cannabis, pharmaceuticals, MDMA, cocaine and methamphetamine** were the five most commonly sold substances, followed by new psychoactive substances.
- At the time of writing, **eleven of the fourteen marketplaces actively being monitored had closed**, either as a result of suspected exit scams, security breaches, or law enforcement seizures. This represents an **unprecedented number of market closures** in such a short time, reinforcing the volatility of these marketplaces.
- **Illicit opioid analgesics (particularly illicit fentanyl preparations and U-47700)** continued to rank in the top 10 new psychoactive substances most commonly being sold by vendors. It should be noted however that the number of vendors selling these substances accounted for less than 5% of all vendors across the larger marketplaces.

METHODS

Cryptomarket Monitoring

Cryptomarkets were accessed weekly using a dedicated user account. New marketplaces are identified through the website deepdotweb.com that is accessible on the internet. The website provides education about cryptomarkets on a readily accessible internet page. Marketplaces were excluded from monitoring if they had less than one hundred listings for sale, or only one vendor operating on the marketplace. Non-English language marketplaces were also excluded.

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 in Appendix A for a detailed description of the categories of substances available on cryptomarkets.

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 a marketplace is inaccessible or only partially accessible for whatever reason, the data are treated as missing. Partial snapshots are not entered into the dataset. A marketplace

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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 are made to access it at the next time point.

RESULTS

Escrow Systems

Although the cryptomarkets 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 more than half of the markets operating on a multi-signature escrow system, and the remainder operating on a centralised escrow 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. The multi-signature escrow system protects both the consumers and vendors from the risks of marketplace moderators closing the market and removing funds held in centralised escrow. The system also offers enhanced protection for consumers in the instance where goods are not received.

Marketplaces Monitored

Marketplaces that were monitored over the current reporting period, from January 2017 to June 2017, 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
<i>Active at Final Time Point</i>				
Dream Market	Centralised	30/10/2014	Ongoing	Active
Tochka	Centralised	16/07/2015	Ongoing	Active
Zion	Multisignature	16/02/2017	Ongoing	Active

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Closed During Monitoring Period

Alphabay	Multisignature	12/02/2015	29/06/2017	SEIZED Law Enforcement closure
Hansa	Multisignature	13/08/2015	20/07/2017	SEIZED Law Enforcement closure
Apple Market	Multisignature	2/06/2016	13/07/2017	CLOSED Down for unknown reason
Valhalla (formerly Silkkitie)	Centralised	30/10/2014	03/08/2017	REMOVED Suspected scam market (deepdotweb.com)
Cryptomarket	Centralised	23/04/2015	30/03/2017	CLOSED Down for unknown reason
Outlaw	Multisignature	29/05/2014	11/05/2017	CLOSED Claimed hacked Suspected exit scam (deepdotweb.com)
Darknet Heroes League	Centralised	9/10/2015	03/08/2017	CLOSED Hacked and IP address exposed (deepdotweb.com)
Acropolis	Multisignature	4/02/2016	22/06/2017	CLOSED "Shut down gracefully" after finalising orders (deepdotweb.com)
House of Lions	Centralised	20/06/2016	27/07/2017	CLOSED Down for unknown reason
Minerva	Multisignature	28/07/2016	01/06/2017	CLOSED Down for unknown reason
The Trade Route	Multisignature	09/08/2016	05/10/2017	CLOSED Exit scammed after security leak (deepdotweb.com)

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

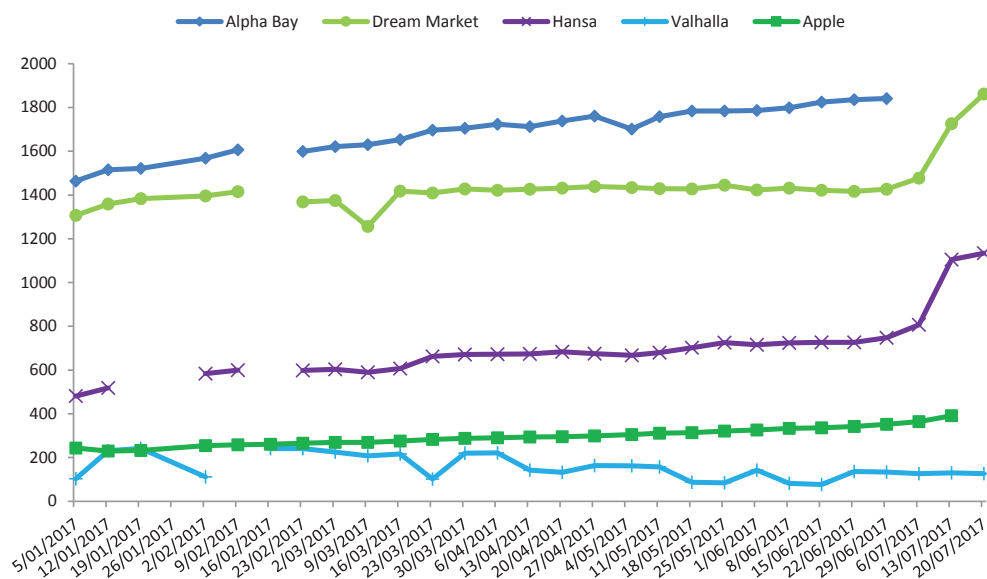
During the period January to June 2017, a total of 14 marketplaces actively monitored. Of these, 11 were closed for various reasons (Table 1). Most notably, two of the larger markets (Alphabay and Hansa) were seized by a joint international law enforcement operation in July 2017 (<https://www.wired.com/story/alphabay-hansa-takedown-dark-web-trap/> accessed August 2017). It should be noted that there were several smaller markets (with fewer than 100 listings at most time points) identified during this period that subsequently closed (e.g. The Open Road, Infinite, Pyramid, Horizon). We have not presented data on these markets due to the limited number of time points (<10) where there was greater than 100 listings. At the end of the monitoring period, the largest marketplace remaining was Dream Market, operating at 1,426 vendors on the 29th June 2017. Dream Market is the longest running of the current active markets (Table 1). At the time that Alphabay

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and Hansa were seized, there were 1,841 and 1,134 unique vendors (at last access date) respectively. The number of vendors increased on Dream Market and Hansa (by 30% and 51% respectively), in the weeks following Alphabay going offline in July (Figure 1).

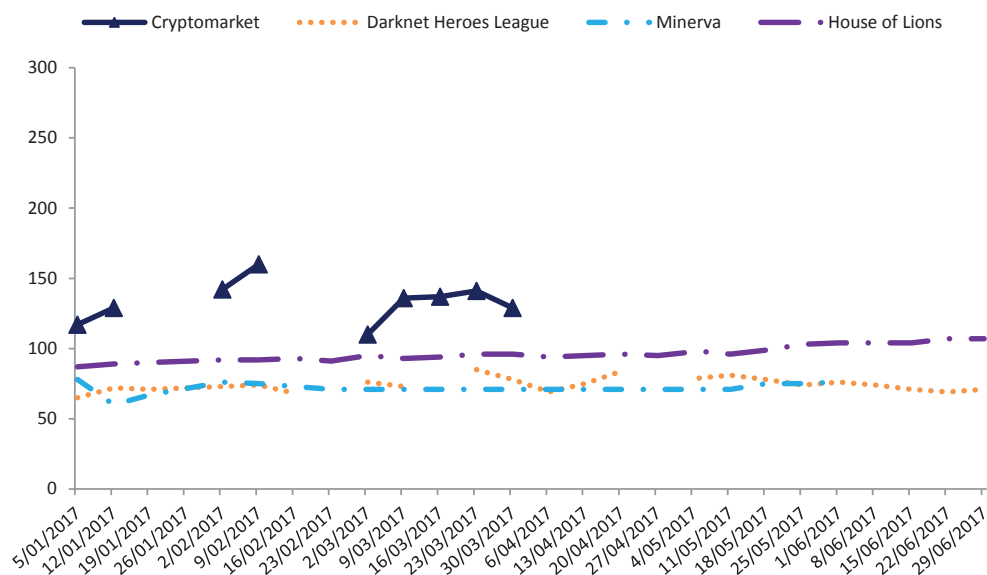
For further detail of data dating back to June 2014, please see Appendix B.

Figure 1: Number of vendors across the five largest marketplaces by time point, January to July 2017



NB: missing data points indicate temporary marketplace outages or incomplete snapshots.

Figure 2: Number of vendors across smaller marketplaces by time point, January to June 2017



NB: missing data points indicate temporary marketplace outages or incomplete snapshots. At the time of publication, all four markets had closed.

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SUBSTANCES FOR SALE

Substance Availability

Table 2 outlines the substances available from the four leading marketplaces ranked by the number of unique vendors identified selling each substance. Consistent with previous findings (Roxburgh, et al, 2017), 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 four marketplaces by substance type

Substance	Alphabay*		Dream Market		Hansa*		Apple*	
	n	%	n	%	n	%	n	%
Cannabis	1152	40	1669	46	850	60	220	53
Pharmaceuticals	866	30	1167	32	537	38	258	62
MDMA	810	28	1060	29	478	34	94	22
Cocaine	802	27	1009	28	411	29	76	18
Methamphetamine	491	17	737	20	299	21	69	16
NPS	544	19	558	15	192	14	67	16
LSD	317	11	383	11	197	14	32	8
Illicit Opioids	268	9	325	9	104	7	42	10
Ketamine	215	7	327	9	111	8	33	8
Magic Mushrooms	113	4	190	5	109	8	13	3
PIEDs	170	6	149	4	64	5	42	10
GHB	52	2	65	2	23	2	3	<1
Synthetic Cannabinoids	37	1	40	1	13	1	6	1
Precursors	19	<1	11	<1	9	<1	4	1
Total Unique Vendors	2866		3605		1415		419	

NB: NPS = New Psychoactive Substances; PIEDs = Performance and Image Enhancing Drugs; As vendors often sell multiple substance classes, percentages do not add up to 100%. For further clarification of the categories used in the above table, please see Appendix A. *At the time of publication, these markets had closed.

NPS Availability

Table 3 details the ten most commonly sold NPS on the top four 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 et al, 2012). 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 category, DMT and etizolam (a benzodiazepine analogue) were the most commonly sold NPS across all marketplaces, with some variation across the markets. The ranking of the top 10 most commonly sold NPS across all markets has changed from previous bulletins. Three NPS appeared for the first time in the top 10 most commonly

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sold NPS this period: etizolam (ranked 3rd on average across all markets), illicit fentanyl preparations (ranked 4th across all markets), and ethylphenidate (ranked 5th across all markets). U-47700, an opioid analgesic analogue, remained in the top 10 for a second time.

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

Substance	Alphabay		Dream Market		Hansa		Apple	
	n	%^	n	%^	n	%^	n	%^
2C-x	89	3	164	5	44	3	12	3
DMT	69	2	137	4	40	3	13	3
Etizolam	66	2	112	3	1	<1	0	0
Illicit Fentanyl*	74	2	98	3	14	1	16	4
Ethylphenidate	53	2	53	1	3	<1	4	1
NBOMe	51	2	61	2	10	1	6	2
U-47700	53	2	55	2	10	1	4	1
Mephedrone	41	1	40	1	11	1	7	2
α-PVP	41	1	35	1	10	1	6	2
Synthetic Cannabinoids	37	1	40	1	11	1	6	2
Total	544	19	558	15	192	14	67	16

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

*Illicit Fentanyl listings relate to those where fentanyl is being sold in a form (e.g. fentanyl powder) that is not available pharmaceutically. It does not relate to specific fentanyl analogues (e.g. furanyl fentanyl) which are categorised separately.

^Represents the percentage of all vendors across all substances (refer Table 2)

SUMMARY

- The largest marketplace still operating at the time of publication was Dream Market.
- Substances sold across all marketplaces appeared to be consistent with previous bulletins, with cannabis, pharmaceuticals and MDMA most commonly sold.
- The number of vendors selling traditional illicit substances (including those above and cocaine) outnumbered numbers selling NPS.
- The top ten most commonly sold NPS across cryptomarkets has changed slightly, with an increase in number of vendors selling illicit fentanyl preparations, etizolam and ethylphenidate.
- Vendors selling illicit fentanyl preparations, etizolam and ethylphenidate however, comprised less than 5% of all vendors across marketplaces.

IMPLICATIONS

The current monitoring period is notable in that Alphabay (the dominant marketplace in terms of greatest number of unique vendors and longevity) and Hansa (a growing marketplace), were both seized by international law enforcement efforts. Dutch authorities took covert control of Hansa mid-June, prior to the shutdown of Alphabay, in

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order to monitor the potential influx of vendors from Alphabay to Hansa (<https://www.theguardian.com/technology/2017/jul/20/dark-web-marketplaces-alphabay-hansa-shut-down>). The number of unique vendors on Dream Market and Hansa increased markedly in the weeks following the shutdown of Alphabay, by 30% and 51% respectively. The seizure of Alphabay and Hansa caused major disruptions across all of the remaining marketplaces, with many going offline in the months following, reports of DDOS attacks targeting the remaining markets, as well as some permanently closing. Most of the markets that closed after the law enforcement seizures were smaller in size, and appeared to have little impact on the larger marketplaces. As at time of publication, Dream Market continues to operate as the dominant marketplace. Should Dream Market close, an impact on smaller markets, with rapid increases in vendor numbers, is likely.

Substance availability across markets also appeared consistent with previous monitoring periods. However, opioid analgesic analogues (U-47700) and illicit forms of fentanyl are now appearing in the top ten NPS being sold. Opioid analgesic analogues are documented as being substantially more potent than morphine, which clearly increases the risk of fatal overdose (Mohr et al, 2016). Indeed there have been increasing numbers of fatal opioid overdoses recorded in relation to opioid analogues over the past few years (acetylfentanyl in Europe, EMCDDA, 2016; and butyryl fentanyl, furanyl fentanyl and U-47700 in the USA, Mohr et al, 2016; <https://www.theguardian.com/world/2016/apr/11/synthetic-opiates-drug-laws-w-18-fentanyl>).

While the U-47700 and illicit fentanyl listings were largely confined to international vendors (very few Australian vendors had these products listed), ongoing monitoring of the emergence of opioid analogues on cryptomarkets is important, particularly within the context of the recent seizures of potent opioid analogues (carfentanil and furanylfentanyl) at the Australian border (<http://www.abc.net.au/news/2017-02-17/lethal-drug-carfentanil-found-brisbane-mail-centre-qld/8280790>; <http://www.news.com.au/national/breaking-news/nt-police-warn-against-fatal-new-drug/news-story/47ecccf3dbdb1fc6c015e4930ca3c11>).

Etizolam and ethylphenidate, both analogues of pharmaceutical (benzodiazepine and stimulant) preparations, appeared in the top ten NPS for the first time.

With the exception of the increase on Dream Market and Hansa following the shutdown of Alphabay, vendor numbers don't appear to be rising as rapidly as they did post Operation Onymous (Van Buskirk et al, 2017). These markets continue to be under threat from law enforcement, exit scams, denial of service attacks and extortionist attempts, reinforcing the volatile nature of cryptomarket trading.

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

Table A1: Chemical classification of mentioned NPS

NPS	Category	Subcategory
2C-x	Phenethylamine	Psychedelic
α-PVP	Other Stimulant	Norepinephrine-Dopamine Reuptake Inhibitor
DMT	Tryptamine	Psychedelic
DOx	Phenethylamine	Psychedelic Amphetamine
Ephedrine	Phenethylamine	Amphetamine Type Stimulant/ Methamphetamine precursor
Ethylphenidate	Stimulant	Stimulant Analogue
Etizolam	Benzodiazepine	Benzodiazepine Analogue
FuranylFentanyl	Opioid Analgesic	Fentanyl Analogue
MDA	Phenylpropylamine	Substituted methylenedioxyphenethylamine (MDxx)
Mephedrone	Substituted cathinone	Amphetamine Type Stimulant
Methylone	Phenylpropylamine	Substituted methylenedioxyphenethylamine (MDxx)
NBOMe Family	Phenethylamine	Psychedelic
U-47700	Opioid Analgesic	Opioid

Table A2: 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 July 2017

