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Technical Note

# Characterising the online weapons trafficking on cryptomarkets

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ABSTRACT

Weapons related webpages from nine cryptomarkets were manually duplicated in February 2016. Information about the listings (i.e. sales proposals) and vendors' profiles were extracted to draw an overview of the actual online trafficking of weapons. Relationships between vendors were also inferred through the analysis of online digital traces and content similarities.

Weapons trafficking is mainly concentrated on two major cryptomarkets. Besides, it accounts for a very small proportion of the illicit trafficking on cryptomarkets compared to the illicit drugs trafficking. Among all weapon related listings (n = 386), firearms only account for approximately 25% of sales proposal since the proportion of non-lethal and melee weapons is important (around 46%). Based on the recorded pseudonyms, a total of 96 vendor profiles were highlighted. Some pseudonyms were encountered on several cryptomarkets, suggesting that some vendors may manage accounts on different markets. This hypothesis was strengthened by comparing pseudonyms to online traces such as PGP keys, images and profiles descriptions. Such a method allowed to estimate more accurately the number of vendors offering weapons across cryptomarkets. Finally, according to the gathered data, the extent of the weapons trafficking on the cryptomarkets appear to be limited compared to other illicit goods.



## 1. Introduction

Following the major development of the Internet, communication and information technology provided a broad range of opportunities to diversify illicit trafficking. Cryptomarkets – marketplaces on the Dark web hosting illegal trafficking activities – are among the examples of phenomenon that emerged a few years ago [1]. The first cryptomarket, Silk Road, was mainly dedicated to the trafficking of illicit drugs [2]. Ever since its closure in 2013, many other marketplaces were developed and other illicit goods such as counterfeit products, stolen data, counterfeit or falsified ID documents or firearms, are also offered for sale [3,4]. The media regularly points out the question of firearms trafficking online [5–8], sometimes implying that it accounts for an important part of online illicit trading. However illicit drugs are, by far, the most popular illicit goods proposed on cryptomarkets implying that academic research is essentially focused on the trafficking of this products on cryptomarkets (see for example [9–13]). Most of the research concerning weapons trafficking is about non-online markets [14,15]. Nevertheless, the relationship between weapons trafficking and online trading has been studied, but from very specific perspectives, such as the use of social media in Libya [16].

Thus, to the best of our knowledge, academic literature does not provide much information about weapons trafficking on the Dark web. The only scientific study conducted so far was published in a recent report by the RAND Corporation. It addresses questions such as the size and scope of market, the revenue generated as well as considering both vendor shops and cryptomarkets [17]. The Armory – a market closely related to Silk Road – was opened in 2012 and closed after a few months of activity since it was not generating a lot of transactions [2]. Since then, the pieces of information related to weapons trafficking on the Dark web mostly originate from online news or discussion websites. For example, it seems that the name "The Armory" is still in use, which leads to debates on forums since scam is apparently a common practice in the online firearms trading [18,19]. An interview of a so-called Armory administrator is also available [20], but information from such sources needs to be carefully considered. Indeed, the sensational media aspect of these sources may raise doubts about their reliability compared to properly documented and peer-reviewed academic resources. Despite the limited concrete research about weapons trafficking on the Dark web, their availability is regularly exposed, especially since the recent events in Europe [21].

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**Table 1**
Distribution of the weapons related listings.

| Category | Cryptomarket | | | | | | | | | Total | Example of items |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ALB | DMA | VAL | FRE | DDM | AFL | OUT | TRD | OAS | | |
| Non-lethal weapons | 47 | 32 | 22 | | 8 | | | | | 28.2% (n = 109) | Pepper sprays, telescopic batons, Taser, stun guns, tactical self-defence pen |
| Firearms | 66 | 14 | 1 | 5 | | 6 | 6 | | | 25.4% (n = 98) | Semi-automatic pistols, rifles |
| Melee weapons | 35 | 10 | 8 | 3 | 7 | | | | 1 | 16.6% (n = 64) | Knives, blades, shuriken, knuckles |
| Digital material | 15 | 10 | | 1 | 1 | 2 | | 5 | | 8.8% (n = 34) | URL, tutorials, manuals |
| Ammunition | 18 | 5 | | 9 | | | | | | 8.3% (n = 32) | Large variety of calibers from .22 LR to 12 Gauge |
| Custom listings | 1 | 21 | | | | | | | | 5.7% (n = 22) | Listings specifically created after a buyers' request |
| Explosives and CBRN | 17 | 3 | | | | | 1 | | | 5.4% (n = 21) | Firecrackers, flares, military explosives, explosives devices, CBRN substances |
| Others | 2 | 2 | 1 | | 1 | | | | | 1.6% (n = 6) | Ballistic vest |
| Total | 52.1% (n = 201) | 25.1% (n = 97) | 8.3% (n = 32) | 4.7% (n = 18) | 4.4% (n = 17) | 2.1% (n = 8) | 1.8% (n = 7) | 1.3% (n = 5) | <0.5% (n = 1) | N = 386 | |

The aim of this short communication is to explore the extent and the structure of weapons trafficking on the Dark web by drawing an overview of the weapons offered on cryptomarkets in early 2016 through the study of data extracted from these websites.

## 2. Methodology

Through different sources, a list of active cryptomarkets was established in February 2016. These sources include a bulletin by the NDARC [22], an independent researcher's website [23], the HiddenWiki platform [24] listing various .onion resources and the website DarkNet Stats [25] providing historical statistics about cryptomarket on the Dark web. Accounts were created on 22 marketplaces in order to access their respective listings (i.e. products listed for sale). Among them, 12 included a "Weapons" category and, since three of them had no listings in this category, we worked on a selection of nine cryptomarkets.[1] Each selected cryptomarket was accessible via The Onion Router (TOR) and a randomly assigned VPN connection was also established before browsing these websites. The entire webpage – along with its pictures – of each listing appearing in the selected cryptomarkets' "Weapons" category was manually duplicated. The same method was used to duplicate the profile pages of the vendors offering these listings. Each webpage was consulted to extract the relevant information from the listings and profile HTML source codes which constitute the digital traces [26]. For the most important cryptomarkets in terms of weapons related listings (i.e. AlphaBay and Dream Market), Python scripts were used to parse the listings and profile pages and structure the information.

Since the listings classification was not necessarily consistent between cryptomarkets, every listing was classified manually according to its title — and its description when necessary. The listings were distributed between eight categories: *Firearms*, *Ammunition*, *Non-lethal weapons*, *Melee weapons*, *Digital material*, *Explosives and CBRN*, as well as a category *Others* and a category *Custom listings* including the listings specifically requested by a buyer (see Table 1 for examples of product in each category). Listings not related to weapons – probably misclassified at the time of its publication by the vendor – were excluded from further analyses. Finally, possible relationships between vendors were then investigated, either manually by reading the description of the listings and the profile pages, or by using a dedicated software (i.e. IBM i2 Analyst's Notebook 8.9.7). When a public PGP key appeared on a vendor's profile page, it was extracted and imported into a certificate manager to obtain the username and e-mail address given when the key was generated.

## 3. Results

### 3.1. Overview of the market

Overall, a total of 425 listings were highlighted. However, 39 of them appeared to be misclassified since they were not belonging to any weapons related category. Table 1 shows the distribution of the 386 remaining listings.

Considering the 386 listings altogether, firearms are not the most frequently offered items on the studied cryptomarkets (around 25%). *Non-lethal weapons* and *melee weapons* also account for an important part of the offered items – around 45% altogether – despite the fact that they may not be so difficult to obtain in several countries. The term "custom" was included in 63 listings' title. For 22 of them, no indication about the offered item could be found in their title, nor in their description – hence their classification as *Custom listings*. However, the remaining 41 listings were classified more precisely. Interestingly, 39 of them were dedicated to the sale of firearms suggesting that this kind of items might be frequently traded on-demand.

Regarding the *Digital material* category, 15 listings advertised other dedicated websites on the Dark web, among which several links were free while others had to be bought. Three sale proposals were dedicated to compilations of 3D printing files designed for weapons. The eight remaining listings concerned various tutorials or manuals about weapons or bomb making.

Only 10 listings included feedbacks of buyers (6 for firearms, 2 for melee objects, 1 for a non-lethal weapon and 1 for digital material). This results contrast with the usual number of feedbacks left after transactions for other products – i.e. illegal drugs – which is particularly high for prolific vendors [27,10]. Considering the

[1] The selected markets are: Aflao marketplace (AFL), AlphaBay (ALB), Dr D's multinlingual market (DDM), Dream market (DMA), French Darknet (FRE), The Real Deal (TRD), Oasis (OAS), Outlaw market (OUT), Valhalla (aka Silkkitie) (VAL).