Who Am I?

• Cybersecurity Researcher at GoSecure
• Background in Criminology and Economics
• CA member of NorthSec
What are we going to talk about today?

Embark in a criminology and economics journey.
Outline

1. The state of the AlphaBay marketplace as of June 2017
2. Are drug vendors rich on AlphaBay?
3. AlphaBay’s self-governance
4. AlphaBay: an international market?
5. The obvious limits of online illicit marketplaces

DataCrypto Tool (Décary-Hétu, Aldridge 2016) & Flared.io Startup (Lavoie, Hallé, Décary-Hétu)
Beating the Disinformation Drift

• “[...] he [Alexandre Cazes] was the creator and administrator of AlphaBay, a website with 40,000 vendors and more than 200,000 customers.” (CBC, July, 2017)

• “The site accused of allowing hundreds of thousands of people to buy and sell drugs, firearms, computer hacking tools and other illicit goods.” (CBC, July, 2017)

• “FBI acting director Andrew McCabe said AlphaBay was 10 times as large as Silk Road, a dark website the agency shut down in 2013.” (CBC, July, 2017)
• “The drug trade is moving from the street to online cryptomarkets.” (The Economist, 2016)

• “In the World you created over time, democracy didn’t exist. You were captain of the ship, the Dread Pirate Roberts [...].”(Judge Forrest, Federal District Court, 2014)
The Story

December 2015

[Image of a webpage from AlphaBay Market showing search results for cannabis and related items.]
The Story

June 2017
The Story

July 2017

Notice

THIS HIDDEN SITE HAS BEEN SEIZED
and controlled since June 20

By the Dutch National Police in conjunction with the Bundeskriminalamt, Lietuvas Policija, Federal Bureau of Investigation and Europol, under the authority of the Dutch National Prosecutor’s Office and the Attorney General’s office of the Federal State of Hessen (Germany).

The Dutch National Police have located Hansa Market and taken over control of this marketplace since June 20, 2017. We have modified the source code, which allowed us to capture passwords, PGP-encrypted order information, IP-addresses, Bitcoins and other relevant information that may help law enforcement agencies worldwide to identify users of this marketplace. For more information about this operation, please consult our hidden service at alphaBayOnionService.

This seizure was part of Operation Reine, which includes the takeover of Hansa Market by the National Police of the Netherlands on June 20, 2017, and the takeovers of AlphaBay Market by the Federal Bureau of Investigation of the United States of America on July 4, 2017.

THIS HIDDEN SITE HAS BEEN SEIZED
Since July 4, 2017

As a part of a law enforcement operation by the Federal Bureau of Investigation, the Drug Enforcement Administration, and European law enforcement agencies acting through Europol in accordance with the law of European Union member states and obtained pursuant to a forfeiture order by the United States Attorney’s Office for the Eastern District of California and the U.S. Department of Justice’s Computer Crime & Intellectual Property Section.

This seizure was part of Operation Reine, which includes the takeover of Hansa Market by the National Police of the Netherlands on June 20, 2017, and the takeovers of AlphaBay Market by the Federal Bureau of Investigation of the United States of America on July 4, 2017.
July 2017

pimp_alex_91@hotmail.com
The state of AlphaBay as of June 2016
“[...] he [Alexandre Cazes] was the creator and administrator of AlphaBay, a website with 40,000 vendors and more than 200,000 customers.” (CBC, July, 2017)
The state of AlphaBay as of June 2016

June 2017: 4,664 vendors
The state of AlphaBay as of June 2016

“McCabe said AlphaBay was 10 times as large as Silk Road, a dark website the agency shut down in 2013.” (CBC, July, 2017)

**ALPHABAY (2015-2017)**
- 4,464 vendors
- 46,651 listings
- 1,304,382 feedbacks

**SILK ROAD (2011-2013)**
- 1,087 vendors (4X)
- 26,209 listings (2X)
- 338,543 feedbacks (4X)

DataCrypto Tool (Décary-Hétu, Aldridge 2016) & Flared.io Startup (Lavoie, Hallé, Décary-Hétu)
What was sold on AlphaBay?

Based on all listings posted in 2015 and 2016

<table>
<thead>
<tr>
<th>Product</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecstasy, Prescription Pills</td>
<td>28%</td>
</tr>
<tr>
<td>Cannabis</td>
<td>21%</td>
</tr>
<tr>
<td>Ebooks</td>
<td>13%</td>
</tr>
<tr>
<td>Stimulants (cocaine)</td>
<td>9%</td>
</tr>
<tr>
<td>Others</td>
<td>8%</td>
</tr>
<tr>
<td>Fraud</td>
<td>7%</td>
</tr>
<tr>
<td>Psychedelics</td>
<td>7%</td>
</tr>
<tr>
<td>Counterfeit products</td>
<td>4%</td>
</tr>
<tr>
<td>Software</td>
<td>2%</td>
</tr>
<tr>
<td>Digital information</td>
<td>1%</td>
</tr>
<tr>
<td>Weapons</td>
<td>1%</td>
</tr>
</tbody>
</table>

DataCrypto Tool (Décary-Hétu, Aldridge 2016) & Flared.io Startup (Lavoie, Hallé, Décary-Hétu)
The state of AlphaBay as of June 2016

AlphaBay VS the Global Drug Trade

Global Drug Trade

Alphabay

Are drug vendors rich on AlphaBay?
“The drug trade is moving from the street to online cryptomarkets.” (The Economist, 2016)
Are drug vendors rich on AlphaBay?

Assess competition on the market

## Dataset

<table>
<thead>
<tr>
<th>Month of data collection</th>
<th>Number of Vendors</th>
<th>Number of Listings</th>
<th>Number of Feedbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2015</td>
<td>692</td>
<td>6,923</td>
<td>21,749</td>
</tr>
<tr>
<td>October 2015</td>
<td>813</td>
<td>10,734</td>
<td>34,303</td>
</tr>
<tr>
<td>November 2015</td>
<td>1,210</td>
<td>16,139</td>
<td>51,972</td>
</tr>
<tr>
<td>December 2015</td>
<td>1,369</td>
<td>20,112</td>
<td>87,616</td>
</tr>
<tr>
<td>January 2016</td>
<td>1,416</td>
<td>22,040</td>
<td>121,708</td>
</tr>
<tr>
<td>February 2016</td>
<td>1,582</td>
<td>25,395</td>
<td>153,331</td>
</tr>
</tbody>
</table>
Method

Distribution and concentration of market shares

\[ Market \ share_i = \left( \frac{TS_i}{TMS} \right) \times 100 \]

Based on the number of feedbacks left two weeks prior to data collection.
Concentration of market shares

Herfindhal Hirshmann Index (HHI)

\[ HHI = \sum_{i=1}^{n} (MS_i)^2 \]
## Concentration of market shares

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of vendors</th>
<th>Total market feedbacks</th>
<th>HHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2015</td>
<td>692</td>
<td>2,176</td>
<td>0.006614</td>
</tr>
<tr>
<td>October 2015</td>
<td>813</td>
<td>3,462</td>
<td>0.007397</td>
</tr>
<tr>
<td>November 2015</td>
<td>1,210</td>
<td>5,356</td>
<td>0.004366</td>
</tr>
<tr>
<td>December 2015</td>
<td>1,369</td>
<td>4,389</td>
<td>0.001832</td>
</tr>
<tr>
<td>January 2016</td>
<td>1,416</td>
<td>7,312</td>
<td>0.001871</td>
</tr>
<tr>
<td>February 2016</td>
<td>1,582</td>
<td>6,134</td>
<td>0.001343</td>
</tr>
</tbody>
</table>
Distribution of market shares

Distribution of market shares

![Graph showing distribution of market shares over different months (September, October, November, December, January, February). Y-axis: Cumulative Market Shares of Feedbacks (%). X-axis: Cumulative Population (%). Each month is represented by a different line style and marker.](image)
What do we find...

Highly competitive setting ✔

But...

Lots of vendors making little to no sale(s)
Long-term success of each drug vendor

Group-Based Trajectory Modeling

See if similar market share trajectories emerge among vendors
The hotel we have made reservations at for the speakers is the Mercure Antigone.

Group-based trajectory modeling

![Graph showing market shares over time for different groups: The Failed (90.0%), The Fringe (9.0%), and The Established (1.0%)]
Alphabay’s self-governance
“In the World you created over time, democracy didn’t exist. You were captain of the ship, the Dread Pirate Roberts [...].” (Judge Forrest, Federal District Court, 2014)
Conflict managements

• Evaluated the “Rules and Conditions” of 10 markets

• Read and analyzed more than 200 conflict threads on AlphaBay forums

The hotel we have made reservations at for the speakers is the Mercure Antigone.

Rules and conditions

9/10 marketplaces → prohibited particular products and services (such as child pornography, assassination services, and banned weapons) to be listed on the market for sale.
Rules and conditions

Information  AlphaBay Market rules  (self.AlphaBayMarket)
submitted 1 year ago by [deleted]

Please remember the following key points when registering on the marketplace:

The following rules apply for trading:

- When you place an order, you can't cancel it, unless you come to a mutual agreement with the seller.
- When the order is Finalized, the funds are released to the vendor and there is nothing else we can do.
- Do not send funds outside of Escrow. If you do so, it is entirely at your own risk.
- Do not finalize the order if you did not receive the product, no matter what the vendor says.
- Anything related to prostitution, child pornography, and murder / assassination is prohibited on the marketplace.
- Orders that are not marked as shipped within 72 hours are automatically declined and refunded.
Conflict resolution strategies

Most common conflict → Transaction failures or scams

Tolerance

“wait a little more” or “be a little more patient and report back.”
“I understand your frustration but take it from me, he is not a scammer. I have been doing business with [vendor name] since he started and he has delivered 100%”

Avoidance

“IS ANYBODY LISTENING HERE?”

Ostracism

“Believe what you like, but this fucking bastard [vendor name] scammed me”
“[vendor name] IS A SCAMMER, NO QUESTION!”
“Do not do business with [vendor name]. He is a selective scammer.”
Conflict resolution strategies

Third-Party Intervention

“Scamwatch, can you talk to him please?”
ScamWatch response: “Please add me to those conversations that you’re having with the vendor. If allegations are confirmed, I’ll fuck the vendor up”

Negociation

“I’m not calling scam here, but want to discuss my options since [vendor name] hasn’t yet responded to me”
“I don’t want to dispute, but I haven’t received my package. Can anyone advise? I don’t want to name the vendor.”

Threat

“If [vendor name] doesn’t address this, I won’t finalise so he doesn’t get paid AND will leave bad feedback.”
“I WILL KILL YOU MY FRIEND. DON’T WORRY, THE WORLD IS A SMALL PLACE, AND YOU DON’T KNOW WHO I AM:).”
Conflict resolution strategies

- Public nature of conflicts
- Participants’ duty: reporting problems
Alphabay: an international market?
The study looked at the extent to which online drug vendors undertook risks when selling at the international level.

“Packages have a higher chance of being inspected internationally, and therefore higher probability of seizure”

“The worst thing about international sales is that buyers can more easily claim they did not receive the package”

The hotel we have made reservations at for the speakers is the Mercure Antigone.

**Table 2: Hierarchical generalized linear model predicting if a listing ships internationally (1) or not (0)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Odds ratio</th>
<th>95% Confidence interval</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1 – Listings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (logged)</td>
<td>-0.315</td>
<td>0.969</td>
<td>0.946-0.993</td>
<td>0.010</td>
</tr>
<tr>
<td>Competitive advantage (logged)</td>
<td>-0.024</td>
<td>0.975</td>
<td>0.939-1.014</td>
<td>0.207</td>
</tr>
<tr>
<td><strong>Level 2 – Vendors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly revenues (logged)</td>
<td>-0.020</td>
<td>0.980</td>
<td>0.934-1.028</td>
<td>0.413</td>
</tr>
<tr>
<td>Vendor rating</td>
<td>-0.314</td>
<td>0.730</td>
<td>0.611-0.873</td>
<td>0.000</td>
</tr>
<tr>
<td>Product diversity</td>
<td>-0.011</td>
<td>0.989</td>
<td>0.927-1.055</td>
<td>0.728</td>
</tr>
<tr>
<td>Number of listings</td>
<td>0.389</td>
<td>1.476</td>
<td>1.221-1.785</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Level 3 – Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National drug expenditure (logged)</td>
<td>-2.115</td>
<td>0.121</td>
<td>0.052-0.281</td>
<td>0.000</td>
</tr>
<tr>
<td>Perceived effectiveness of law enforcement</td>
<td>-16.712</td>
<td>0.001</td>
<td>0.000-0.009</td>
<td>0.008</td>
</tr>
<tr>
<td>GDP per capita (logged)</td>
<td>-3.358</td>
<td>0.035</td>
<td>0.012-0.102</td>
<td>0.000</td>
</tr>
<tr>
<td>Domestic competition per 1,000,000 inhabitants (logged)</td>
<td>-0.029</td>
<td>1.029</td>
<td>0.756-1.401</td>
<td>0.849</td>
</tr>
</tbody>
</table>

*Results are with robust standard error estimates and are extracted from the population-average model. The population average model is better suited for the aims of this study because it relates to the overall chance of an event occurring in a population (Wooldridge 2011, p. 53). For more information on these specifications, see Bound et al.*
The obvious limits of illicit online marketplaces
The obvious limits of illicit online marketplaces

- **Offline**
  - Production
  - Buying from other dealers

- **Online**
  - Advertising
  - Selling activities

- **Offline**
  - Packaging
  - Shipping
The obvious limits of illicit online marketplaces

Vendor’s reputation matters
The obvious limits of illicit online marketplaces

Anonymous online transactions are risky
The obvious limits of illicit online marketplaces

Anyone can sell on these markets!

Yet, there are high barriers to sales
What’s up now?

“We are facing a DDoS attack atm [at the moment] and I guess many other markets as well,” a Reddit moderator for the site dubbed Wall Street, one of the affected marketplaces, told The Daily Beast. A DDoS, or distributed-denial-of-service attack, is when someone bombards a website with so many requests that it becomes overwhelmed, and stops letting in its usual users.
Thank you!
@masarahclouston
References


