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Ethical issues in research using datasets of illicit origin

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Think before using data of illicit origin¹

- ▶ Include an ethics section
- ▶ “humans” not “human participants” or “human subjects”
- ▶ Talk to your Research Ethics Board (REB) (IRB / Ethics committee)

¹Daniel R. Thomas, Sergio Pastrana, Alice Hutchings, Richard Clayton, and Alastair R. Beresford. 2017. Ethical issues in research using datasets of illicit origin. In *Proceedings of the Internet Measurement Conference (IMC)*. ACM. London, UK, (Nov. 2017) .

We had questions about ethics in our research²

- ▶ UDP honeypot DDoS sensors
- ▶ Developed statistical method for estimating coverage
- ▶ Verified using leaked booter databases...

²Daniel R. Thomas, Richard Clayton, and Alastair R. Beresford. 2017. 1000 days of UDP amplification DDoS attacks. In *APWG Symposium on Electronic Crime Research (eCrime)*. IEEE, Scottsdale, AZ, USA.

Case studies

- ▶ Malware & exploitation (Carna, ...)
- ▶ Password dumps
- ▶ Leaked databases (Booters, Patreon, ...)
- ▶ Classified materials (Snowdon, Manning)
- ▶ Financial data (Panama papers)

We drew out common justifications, safeguards, potential harms, and benefits.

Ethics are norms of conduct

- ▶ Distinguish between acceptable and unacceptable behaviour
- ▶ Guidance in Menlo Report³
- ▶ Enforced by REBs and Program Committees (e.g. IMC⁴)
- ▶ Minimise harm, maximise benefit.

³David Dittrich, Michael Bailey, and Erin Kenneally. 2013. Applying ethical principles to information and communication technology research: A companion to the Menlo Report. Tech. rep. U.S. Department of Homeland Security, (Oct. 2013) .

⁴Mark Allman and Vern Paxson. 2007. Issues and etiquette concerning use of shared measurement data. In *Proceedings of the 7th ACM SIGCOMM conference on Internet measurement*. ACM, 135–140.

We should consider these ethical issues

- ▶ Identification of stakeholders
- ▶ Informed consent (where possible)
- ▶ Identify harms
- ▶ Safeguards
- ▶ Justice
- ▶ Public interest

Leaked databases: Ethical issues

Sources	Ref	Year	Identify stakeholders	Identify harms	Safeguards	Justice	Public interest
6 underground forums	[8]	2011	✓	✓	✗	✓	✓
3 carding forums	[14]	2013	✗	✗	✗	✓	✓
TwBooter	[6]	2013	✓	✓	✓	✗	✗
TwBooter, 14 others	[11]	2013	✓	✓	✓	✓	✓
Asylum, Lizard, Vdos	[7]	2015	✓	✓	✓	✓	✓
Patreon	[9]	2016	✓	✓	✓	✓	✓
Vdos, CMDBooter	[12]	2017	✓	✓	✓	✓	✓
4 underground forums	[10]	2017	✓	✗	✗	✓	✓

Summary of the ethical issues and the identified by the authors for each paper. ✓ means the issue was discussed, ✗ means it was not.

Legal issues may arise

- ▶ Computer misuse
- ▶ Copyright
- ▶ Data privacy (e.g. GDPR)
- ▶ Terrorism
- ▶ Indecent images
- ▶ National security
- ▶ Contracts

IANAL. Just pointers: not even the beginning of advice.

AT&T iPad users database breach

- ▶ “Researchers” from Goatse Security found vulnerability in AT&T website
- ▶ Obtained email addresses for 114 000 iPad users
- ▶ Shared vulnerability, exploit, and email addresses with third parties
- ▶ Did not report vulnerability to AT&T
- ▶ Went to jail

Unethical and illegal.

Illegal but ethical research?

- ▶ *Mens rea*: lack of criminal intent
- ▶ Not in the public interest to prosecute (perhaps ask the prosecutor first)
- ▶ REB approval! REB protection?
- ▶ Get the law fixed

Bad and good justifications

Bad:

- ▶ Not the first
- ▶ Public data

Good:

- ▶ No additional harm
- ▶ Fight malicious use
- ▶ Necessary data

Leaked databases: Justifications and oversight

Sources	Ref	Year	Not the first Public data	No additional harm Fight malicious use Necessary data	Ethics section REB approval			
6 underground forums	[8]	2011	✗	✓	✓	✗	✗	✗
3 carding forums	[14]	2013	✗	✗	✗	✗	✗	✗
TwBooter	[6]	2013	✓	✓	✓	✗	✗	✓
TwBooter, 14 others	[11]	2013	✓	✓	✓	✗	✗	✓
Asylum, Lizard, Vdos	[7]	2015	✓	✗	✓	✗	✗	✓
Patreon	[9]	2016	✗	✓	●	✗	✓	✓
Vdos, CMDBooter	[12]	2017	✗	✗	✓	✗	✓	✓
4 underground forums	[10]	2017	✗	✗	✗	✗	✗	✗

● means that the authors decided that the work could not be justified.

∅ means not applicable and E means exempt.

Patreon database leak⁵

- ▶ Researching crowdfunding on Patreon by scraping the website (complete scrape?)
- ▶ Patreon is compromised and full database + source code leaked
- ▶ Authors decided there would be additional harm
 - ▶ Private vs. public data
 - ▶ Legitimize criminal activity
 - ▶ Violate privacy

⁵Nathaniel Poor and Roei Davidson. 2016. The ethics of using hacked data: Patreon's data hack and academic data standards. *Data and society*. Tech. rep. Council for big data, ethics and society, (Mar. 2016), 1–7. Retrieved Sept. 28, 2017 from <http://bdes.datasociety.net/council-output/case-study-the-ethics-of-using-hacked-data-patreons-data-hack-and-academic-data-standards/>.

Safeguards against potential harm

SS Secure storage

P Privacy

CS Controlled sharing

Potential harms

I Illicit measurement

PA Potential Abuse

DA DeAnonymisation

SI Sensitive Information

BC Behavioural Change

RH Researcher Harm

RH: Researcher Harm

- ▶ Researchers are participants
- ▶ Ethics also protects researchers
- ▶ Maltese journalist Daphne Caruana Galizia killed by car bomb used Panama Papers data also used by researchers⁶
- ▶ Kenichiro Okamoto cybersecurity expert was killed by an Internet troll⁷

⁶Joseph Borg. 2017. Daphne Caruana Galizia obituary. *The Guardian*, (Nov. 21, 2017). Retrieved July 10, 2018 from <http://www.theguardian.com/media/2017/nov/21/daphne-caruana-galizia-obituary>.

⁷Jake Adelstein. 2018. A cyber-security expert trolled the trolls. Then one killed him. *The daily beast. World*, (June 29, 2018). Retrieved June 29, 2018 from <https://www.thedailybeast.com/a-cyber-security-expert-trolled-the-trolls-then-one-killed-him>.

Benefits provided

R Reproducibility

U Uniqueness

DM Defence Mechanisms

AT Anthropology & Transparency

Leaked databases: Safeguards, harms and benefits

Sources	Ref	Year	Safeguards	Harms	Benefits
6 underground forums	[8]	2011			U,DM,AT
3 carding forums	[14]	2013			DM,AT
TwBooter	[6]	2013	P	SI	
TwBooter, 14 others	[11]	2013	P	SI	
Asylum, Lizard, Vdos	[7]	2015	P	SI	
Patreon	[9]	2016		SI,RH	U,AT
Vdos, CMDBooter	[12]	2017	P,CS	SI,BC	U,AT
4 underground forums	[10]	2017			R,DM,AT

Safeguards: SS Secure Storage, P Privacy, CS Controlled Sharing.

Harms: I Illicit measurement, PA Potential Abuse, DA De-Anonymization, SI Sensitive Information, RH Researcher Harm, BC Behavioural Change.

Benefits: R Reproducibility, U Uniqueness, DM Defence Mechanisms, AT Anthropology and Transparency.

Safeguards, harms, and benefits⁸

Safeguards:

Privacy: No individuals identified

Controlled Sharing: Under legal agreement

Potential harms:

Sensitive Information: Names, email addresses, criminal activity

Behavioural Change: Don't advertise (working) booters

Benefits:

Uniqueness: Ground truth on booter activity

Anthropology & Transparency: Real behaviour of booters

⁸Daniel R. Thomas, Richard Clayton, and Alastair R. Beresford. 2017. 1000 days of UDP amplification DDoS attacks. In *APWG Symposium on Electronic Crime Research (eCrime)*. IEEE, Scottsdale, AZ, USA.

Lets do ethical research

- ▶ Explain why our work is ethical
- ▶ Learn from each other
- ▶ Improve REB process
- ▶ CfP: Big Data Ethics. Deadline 31 August <https://www.frontiersin.org/research-topics/7202/big-data-ethics>

Thank you! Questions?

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