Feedbacks on 10y of pentesting and DFIR
How to increase your detection capabilities

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GSDays, Paris

28 March 2017

INTRO

ABOUT ME

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Past 10 years
- *Security Researcher*
- *Security Architect*
- *Pentester and incident responder*

THIS TALK

No magic spell

- *Unfortunately what I present will not make you hackproof*
- *Still looking for the magic solution if anyone care to share ;)*

Yet, techniques learned from the other side

- *Before being fully on the incident detection side, we were mostly "creating them"*
- *Help to detect incidents faster*
- *Practical tips*

TODAY'S STATUS

Companies still got owned

- *No-one found this silver bullet, yet*

Mean time to discovery is still high

- *Could be up to 6 months, or even more*
- *Problem is that attackers can grab their loots or destroy your infrastructure in less than a week…*

Discovery is often not due to the company own detection capabilities

- *Ransom request or public leak*
- *Third party that detected something suspicious*

TODAY'S STATUS

"Yeah but it's those damn 0day! What could I do!"

- *Unfortunately it's not, stop blaming them*
- *Yet this could be a major PITA if the attack is targeted or event large scale 0day shopping*
  - *Struts2 CVE-2017-5638 at the beginning of this month*

But true that they can hit you

- *Worm using 0day to propagate*
- *Sometimes the patch is not existing yet*
  - *CVE-2017-0016*
- *Still, most of the time it uses a N-day that hasn't been patched yet*

MY VIEW

Dino A. Dai Zovi
@dinodaizovi

tl;dr: focus less on the exploitation of specific vulns and focus more on detecting the "breaking of the glass" indicative of an attack.

2 FIRST STEP DON'T FORGET PEOPLE

LEVERAGE PEOPLE

Before speaking about technical aspects

- *This part is often neglected and creates silos within the company*
- *Dev vs Ops vs Net, all against Sec ;)*

- *How to detect suspicious behavior in your business application if security never spoke with business people?*

LEVERAGE PEOPLE

Methods that help

- *Recruit security champions within teams as liaison-agents*

- *Join the DevOps/Agile movements and integrate security within all processes*
- *Easier said than done*

- *Also, use techniques advertised by DevOps movement*
  - *CD/CI*
  - *API and integrate your tools*

THE EXFILTRATION CASE

THE EXFILTRATION CASE

Attacker compromised company's infrastructure

- *Gain access from vulnerable server in the DMZ*
- *Pivoted a few times*
- *Gain access to internal infrastructure*

Their goal

- *Data extraction*
- *Created massive tarball with files to extract*

THE EXFILTRATION CASE

How attackers got detected?

- *Windows administrator created alerts for hard disks nearly full, which triggered*
- *Inspected the machine and found the large file*
- *Listed processes and schedule tasks*

>> Called the ghostbusters ;)

Morality

- *Use monitoring tools as a first easy line*

THE EXFILTRATION CASE

Next step : gain persistence

- *Multiple ways to do so like registry keys, services, or…*
- *In this case they used Scheduled Tasks*
- *Tasks ran RAT dropped and stored locally*

Services

- *Another way to gain persistence is through services*

THE EXFILTRATION CASE

From the blue team side of things this leaves plenty of traces!

Execution

- *Execution of* at.exe
- *Creation of tasks pointing to suspicious folders*

Logs

- *Creation of a scheduled task : eventID 106*
- *Creation of a new service : eventID 7045*
- *Traces of execution of the* at *command: eventID 4688*
  - *Since 7 / 2008r2, but you don't have any XP/2003 left yeah?*
  - *In the GPO : Process Tracking > Process Creation*
  - *Don't forget to enable command line traces*

THE EXFILTRATION CASE

Ok they got access and persistence now what?

- *Multiply, just like Gremlins!*
- *Meaning: look for other targets to pivot to on your infrastructure*

Techniques that can be used

- *Basic network scan for 135/tcp and 445/tcp*
- *RDP or SSH scanner and bruteforce*
- *Larger range of ports to scan (ex: nmap in powershell)*

"Advanced" attacker

- *List connections using* netstat *command ;)*

THE EXFILTRATION CASE

Again, back on the blue team side

Network probing implies

- *Connections to hosts that shouldn't be contacted*

Bruteforce implies

- *Plenty of failed authentication attempts*
- *If you enabled those…*

Good reason to use old friends that are quite hype lately

- *Honeypots*
- *Blackholes that accept everything and throw alerts*

THE EXFILTRATION CASE

Last step, they want access to files

- *Will issue searched for interesting files*
- *Based on name, metadata and content*

Probably not only on file shares but also on email accounts

- *Trying to gather more privileges and access administrative interfaces*

THE EXFILTRATION CASE

But the Blue team is still here watching!

Access to files can be detected

- *Monitor specific files and folders using Windows Audit (eventID 4663)*
- *Create fake accounts and or login interfaces*
  - *One reason why communication w/ business applications team is important*

Deploy files that callback once opened

- *Idea popularized by the OpenCanary project*

THE MALWARE CASE

THE MALWARE CASE

Several ways to infect a machine

- *What is considered "advanced" : exploit kits*
- *What is considered "low-tech" : social engineering*

Everyone thought that macros problem was solved…

- *Reality is we (security industry) spend too much time thinking about "advanced" vectors*
- *Way more fun than macros!*
- *Not really taking the problem to its core*

Analysis tools focused on binaries

- *Attackers switched to script languages*
- *Javascript and Powershell are all the rage lately*

THE MALWARE CASE

Detection on the network side is limited

- *IDS are like AV : based on signatures that can be bypassed*
- *But still really useful when properly tuned*

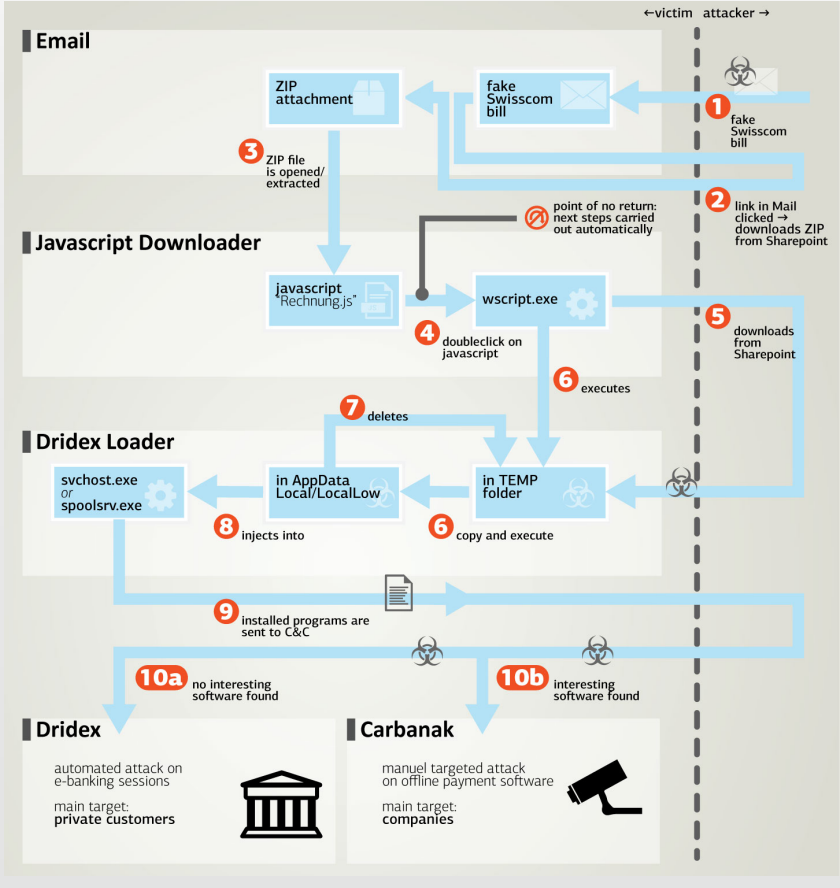
Recent cases have made it even more so

- *Let's Encrypt and certificates for everyone*
- *Dridex campaign hosted on Azure Sharepoint*
- *Cerber campaign hosted on Dropbox*

THE MALWARE CASE

A common schema lately

- *Credit: govcert.admin.ch*



THE MALWARE CASE

When attackers want to bypass UAC

- *Should be less of a problem in enterprises*
  - *You don't have users w/ administrative rights right?!?*
- *Social engineering still seems to be the most successful path*

Leveraging logic flaws in Windows signed binaries

- *Some executables from Microsoft allow to elevate privileges w/o UAC prompting*
- *Usually patched by Microsoft*

THE MALWARE CASE

From a Blue team perspective several scenarios

"We block all macros and Powershell scripts using it's execution policy"

- *Or for the more startup-ish: "we use only cloud-based editing suites ;)"*
- *Also possible to block activation of macros downloaded from the Internet through GPO*

Problem is that it is rarely deployed

- *Operation charge is too costly in most cases*
- *Business workflows requiring macros for example*
- *As for Powershell, it is possible to bypass execution policies*
  - *Up to v5*

THE MALWARE CASE

Taking a logs and detection approach

"Standard ops w/ wscript.exe *and* powershell.exe *processes ran from Word.exe?"*

- *Need to study the attacker (cyber-kill-)chain*
- *Start with easy rules based on parent process*
- *Add processes command line*

"ok, I will buy that EDR. <SecConfXYZ> had a floor full of them"

- *Not so fast, actually Microsoft got you covered in this area*
- *Out-of-the-box since 2008r2 and getting better since last year!*

THE MALWARE CASE

Audit processes creation from the GPO

- *EventID 4688*
- *Don't forget to enable command line from Server 2012r2*

SysInternals Sysmon

- *In short: Microsoft free EDR*
- *Well almost… only the reporting no analysis or correlation is made out-of-the-box*
  - *Except if using Defender Advanced Threat Protection*
  - *Sadly, it is cloud-only…*
- *Simple to configure*
- *Public large deployments documented to reassure you*

THE MALWARE CASE

The rest is up to you: create detection rules by knowing attacker's techniques

- *Suspicious parents for set of applications*
- *Suspicious children for set of applications*
- *Suspicious execution paths for applications*
  - *%APPDATA% for example*
- *…*

Powershell examples

- *Detect* "-Version 2" *in command line*
- *Argument that looks like base64 encoding*
- *Detect* "-EncodedCommand" *argument*
- *…*

http://www.gsdays.fr/wp-content/uploads/2011/09/RUFF-Se-proteger-contre-les-intrusions-gratuitement-0.2.pdf

THE MALWARE CASE

Audit what is executed on your infrastructure

- *And disable macros and executables ran from users writable folders*

THE PENTESTER CASE

THE PENTESTER CASE

Or if less lucky…

- *The APT case*
- *Only studying a few techniques for this talk due to time constraints*

Once they obtained administrative privileges (left as an exercise)

- *Trying to retrieve passwords from the memory*
- *Generate magical Kerberos tickets*

Persist, access data and be stealth

- *Adding themselves to specific groups (Domain Administrators, RnD, …)*
- *Erase logs to prevent analysis*

THE PENTESTER CASE

Even with more advances attackers, its possible to do something

- *Mimikatz has some specific execution patterns*
- *Access to* lsass.exe *process to 'ask nicely' for credentials*
- *…*

Sysmon logs

- *Access to* lsass.exe *w/* AccessGranted *set to 0x1410 or 0x1010 since last release*
- *…*

Microsoft Advanced Threat Analytics

- *Attacks such as Pass-the-Ticket and Skeleton keys have specific behavior*
- *Need logs and network view*
- *This tools from Microsoft automates the analysis* ☺

THE PENTESTER CASE

Watch out for events on specific objects from the Active Directory

- *Modifications in groups : eventID 4728*
- *Create filters based on your environment*

Logs cleared

- *Fortunately you have everything centralized in a SIEM*
- *EventID 1102*

https://speakerdeck.com/milkmix/import-module-incidentresponse

THE PENTESTER CASE

Plenty of other techniques can be used

- *Access to Linux hosts*
- *Exploitation of vulnerable services*
  - *Struts2*
- *Exploitation of misconfigured environments*
  - *JBoss anyone?*
- *…*

THE PENTESTER CASE

Same for the Blue team, plenty of interesting topics

- *Office documents analysis using* oletools, mraptor, …
- *Endpoints analysis using tools such as sysdig, GRR or osquery*
- *…*

Don't forget your cloud environments

- *Use logs provided by the platform*
  - *Ex: CloudTrail and CloudWatch on AWS*

Unfortunately, no time to cover everything in this talk

- *Available to discuss techniques and cases*
- *Don't hesitate to reach out*

https://speakerdeck.com/milkmix/elasticsearch-incident-detection-use-cases-and-security-best-practices

6 IN CONCLUSION

IN SHORT

Approach to follow?

IN SHORT

In fact, no need to log everything but better not miss things required afterward

Be smart and study attackers techniques

- *Have a lab to try them and study side-effects*
- *Review your pentest reports with your sysadmins*
- *Read detailed attacks analysis in specialized blogs and transform actions into logs*

Review Microsoft documentation and SysInternals tools

- *Really improved the last 10 years*
- *No need to buy shiny tools all the time*
- *Better use time to learn to use the provided tooling*

Choose security tools that can easily be integrated in larger workflow

IN SHORT

Approach to follow!

IN SHORT

Look at all recent security tools in the open source side of the fence

- *All provide API to better integrate with others !*
- *Standalone products are limited or you need the full package from $EDITOR*

As said in intro, integrate your tools

...

THANK YOU !
QUESTIONS ?

See you soon