

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

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INTRO



ABOUT ME

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Julien Bachmann

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Swiss security monitoring solution*

Guest lecturer @ Swiss schools on software exploitation and dfir

Past 10 years

- Security Researcher*
- Security Architect*
- Pentester and incident responder*

THIS TALK

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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

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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

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"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 even large scale 0day shopping*
 - *Struts2 CVE-2017-5638 at the beginning of this month*
 - *CVE-2017-7269*

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*



**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

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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*

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THE EXFILTRATION CASE

THE EXFILTRATION CASE

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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

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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

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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

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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*
- *RunAs generated by scheduled tasks 4648*
- *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

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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

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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

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Last step, they want access to files

- *Will issue searches 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

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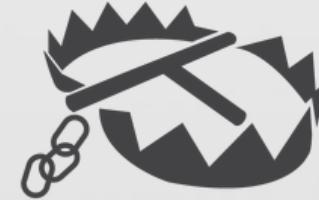
But the Blue team is still here watching!

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



OWASP, Geneva 24/04/2017



THE MALWARE CASE

(2)
6



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

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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*

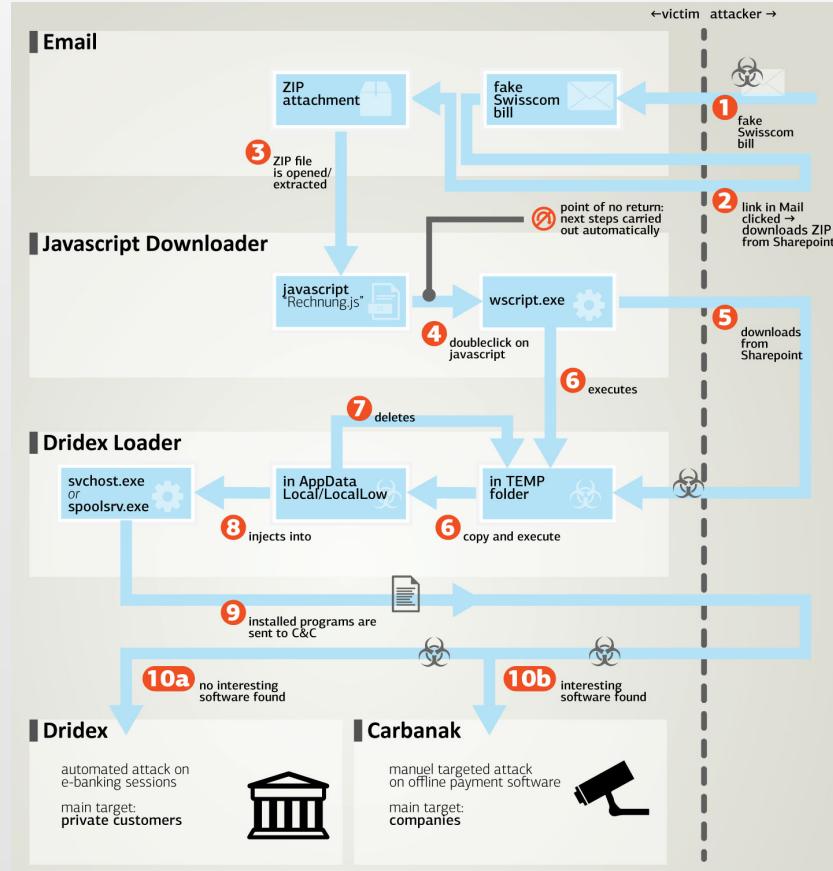


THE MALWARE CASE

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2

A common schema lately

- Credit: govcert.admin.ch



THE MALWARE CASE

2
3



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

(2)
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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

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5)



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

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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

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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

(2)
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Audit what is executed on your infrastructure

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





THE PENTESTER CASE

OWASP, Geneva 24/04/2017



THE PENTESTER CASE

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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

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Even with more advanced attackers, it's 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 tool 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

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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>



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IN CONCLUSION

Approach to follow?



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*

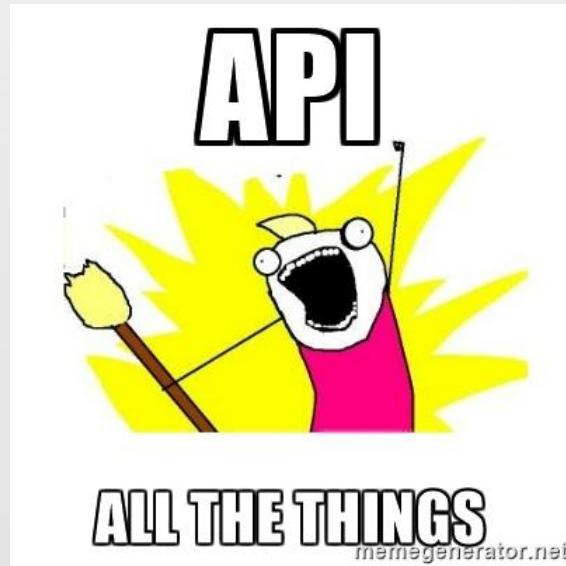
Review Microsoft documentation and SysInternals tools

- *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



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

