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OODA Security

Taking back the advantage!

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About Me

- Kevin Fiscus
- Owner – Cyber Defense Advisors
- 24 Years in IT
- 13 Years in security
- SANS Certified Instructor
- GIAC Security Expert
- Cyber Guardian Red/Blue Team

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The Bad News

- The average company finds out about a breach from a third party
- The average company has been breached for a year before detection
- Those are averages, meaning roughly half of companies are breached for more than a year before detection
- That is a problem!

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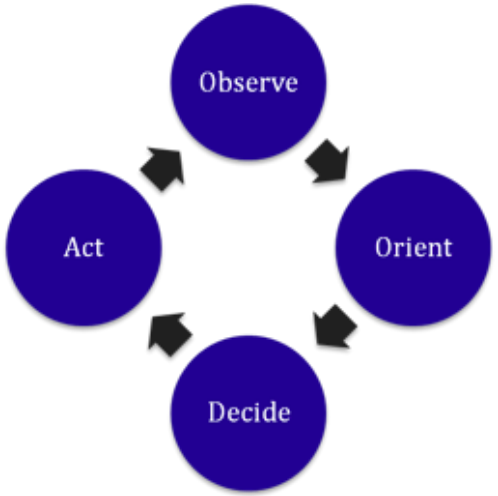
First - OODA

- Concept developed by USAF Colonel John Boyd for fighter pilots
  - Observe
  - Orient
  - Decide
  - Act



- Complete the loop first and fly home
- Complete the loop last, take a short trip down

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Information Security?

- What do fighter pilot concepts have to do with information security?

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Let's Change the Venue

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- Close your eyes
- Think about your home
- It's night and a sound wakes you
- Think about all of the normal sounds
  - Your furnace, the steam heat, your cat
- Assume it is NOT normal
  - How quickly would you be able to determine what and where

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It's a Bad Guy

- OK, so it's a bad guy in your house
- You know your house, he doesn't
- You know where to hide, or where he could be hiding
- You know how to get out
- You know where your phone (gun) is
- Assuming minimal preparedness, chances are that you win because you complete OODA first

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Another Situation

- You get home late at night
- You walk in your house
- There are lights on you turned off
- Things have been moved
- Someone has gone through your “stuff”
- Things are missing
- Obvious, right?

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The Point?

- In familiar environments, we have the OODA loop advantage
- Why is it then, that most organizations only find out about a breach via a 3rd party?
- Why is the average company breached for a year before detection?
- Why do we fail to complete the OODA loop?

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Attackers Are Super Sneaky

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- Ah, no! Not really
- Attackers do not behave like legitimate users
  - They attempt to learn the environment
- Legitimate users (and often admins) know where they need to go and go only there (for the most part)

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Standard Attack Methodology

- Reconnaissance
- Scanning
- Gaining Access
- Maintaining Access
- Covering Tracks

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Sneaky Bits

- Gaining Access can be difficult to detect
  - IDS/IPS may detect exploit
  - Application logs may show crashes or service restart
- Covering Tracks is meant to be difficult to detect
- Recon often never touches the target
- But what about scanning?

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Scanning is EASY to Detect

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- Every firewall log is filled with scanning
- External IDS/IPS systems constantly alerting to scanning
- The problem is not detecting scanning but rather filtering through the noise
- As a result, detecting scanning at the network perimeter is not usually reasonable
- Maybe there is a better way…

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Users are Predictable

- Users don’t need to understand the network
- They know what buttons to push to do their jobs
  - Sending email, accessing corporate applications, storing files on the “S” drive (whatever that is)
- Almost all traffic is from end user computer to some servers or from server to server
- Virtually no traffic from end user system to other end user systems

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Attackers are Blind

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- Imagine you walk into a new house blind
- You learn the environment by bumping into things
  Most attackers do the same things
  - Gain access inside the network
  - Ping sweep, port scan, DNS recon, vul scanning
  - Not activities of normal users and easy to spot, if we are looking

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But Monitoring is HARD

- HARD = expensive, time consuming, resource intensive, etc.
  - Deploying a NIDS or NIPS to cover your entire internal network
  - Deploying HIPS or HIDS throughout your entire environment
  - Purchasing SIEM solutions and configuring logging everywhere
- Difficulty is relative to size
  - Large organizations may have budget but massive complexity
  - Small organizations have simple environments but no budget

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There is an Easier Way

- Let us start very simply - netcat

  nc –l –p 80

- Assume this is run on your laptop
- Should anyone be connecting to your laptop on port 80?
- Check the listener, if it's not running, someone did something unexpected and your OODA loop starts

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Getting A Little More Complex

- How about this:

  nc –l –p 80; date >> trigger.txt

- Now you know when the connection happened
- Using the “-L” option on Windows or a loop in Linux establishes a persistent listener

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Even Cooler

- ```
  [root@lOCM ~]#while [ 1 ]; echo
  "started”; do IP=`nc -v -l -p
  2222 2>&1 1>/dev/null | grep
  from | cut -d[ -f 3 | cut -d] -f
  1`; iptables -A INPUT -p tcp -s
  ${IP} -j DROP; done
  ```

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  ```

Let's Expand the Coverage

- Egress filtering on the firewall
  - Allow anything required for business but block everything else
  - Log all blocked traffic
- Not perfect
  - Attackers will often use common ports (80, 53, 443, etc.)
  - Good egress filtering is uncommon so often attacker will use FTP, TFTP or other ports to download their tools
  - Attackers will often use one victim to scan for others
  - Don't forget about malware

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Even Better

- Break your network into VLANs
  - Does require a managed switch
- VLANs should largely mirror the business
- Allow all necessary traffic between VLANs
- Block and log all else
  - Any blocked traffic is an attacker, a user doing something wrong, a misconfiguration or a bad block rule (all are things you want to know about)

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But That Is Difficult!!!

- Yes, and no
- Depends on the level of granularity
- Consider 2 VLANs; servers and users
- Expand to 3 VLANs; servers, standard users and IT users
- Incremental steps are perfect

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Other OODA Accelerators

- Create common but unlinked pages on web sites
- Rename the “Administrator” account then create a fake account named “Administrator”
- Create fake but sensitive sounding documents
- Log access to all of the above
- Creativity leads to more ideas – this is not an exhaustive list

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Benefits

- Easy to set up
- Fairly low maintenance
- Fairly low false positives
- Accelerates out OODA loop
- If done carefully, difficult for an attacker to detect

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How?

- First, understand what is normal
  - Required to define what needs to be allowed
  - Necessary because detecting abnormal is extremely difficult if you don't know normal
- Consider the difficulties of configuring NIDS
  - They are designed to detect bad, not deviations from good
  - Require a LOT of tuning
  - Basically, blacklisting technology so difficult to managed

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Limitations

- OODA acceleration is not designed to be 100% effective
- Based on the fact that the vast majority of attackers walk around your network “blind” and thus run into a lot
- That is OK because the attackers only need to trip one “sensor”

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Not All or Nothing

- Designed to improve over existing controls
- Incremental improvements are wonderful
- A single NetCat listener can make the difference between detection and undetected compromise
- Ideas can scale from the largest environments to the smallest – but those in the middle will benefit the most

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Questions

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