THREAT INTELLIGENCE

AUTOMATING THREAT DETECTION & RESPONSE

black hat®

TY MILLER

CEO, Threat Intelligence Pty Ltd
Evolve Security Automation

Black Hat Asia Review Board

CREST ANZ Board of Directors

Security Researcher, Presenter and Trainer

Black Hat Training	The Shellcode Lab
Black Hat Training	Practical Threat Intelligence
Black Hat Training	The Security Automation Lab
Black Hat Presentation	Reverse DNS Tunnelling Shellcode
Black Hat Presentation	The Active Directory Botnet
Black Hat Webcast	The Best Way to Catch a Thief
Black Hat Webcast	Intelligent Security Automation
Hack In The Box Training	Practical Threat Intelligence
Ruxcon Presentation	The Active Directory Botnet
Ruxcon Presentation	BeEF Bind Shellcode
Core Impact	DNS Channel Payload
Co-Author	Hacking Exposed Linux 3rd Edition
Presentation	Machine Learning and Modern Malware Mitigations
Presentation	Modern Threat Detection and Prevention
Presentation	Securing Your Startup to Secure Big Brands
Presentation	Can your application be breached?

… and many more

WHAT ARE WE DOING HERE?

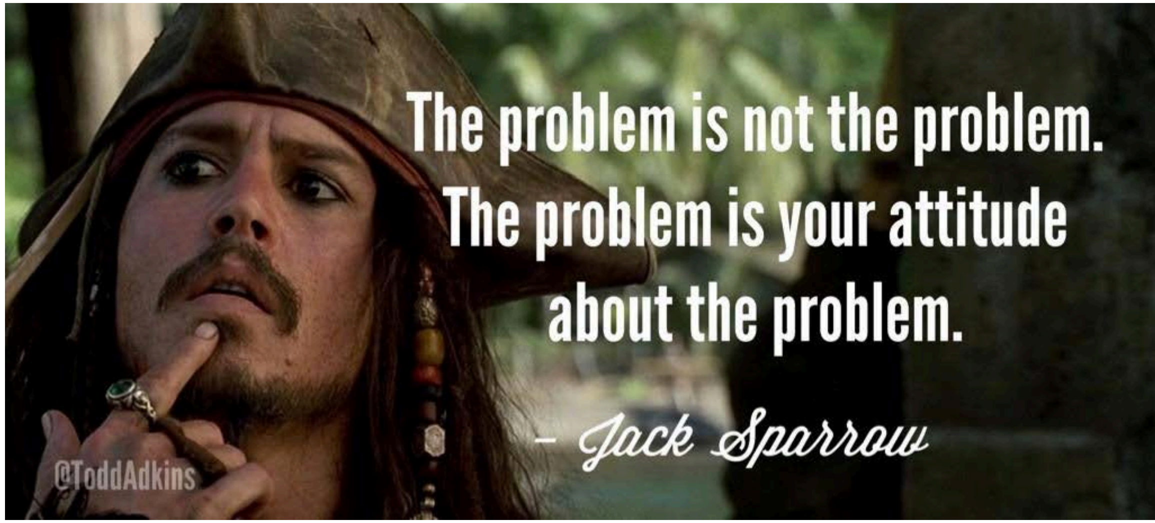
- The state of the industry and why automating incident response is so important
- Why the average cost of a major security breach is so high
- How to automate threat detection and response to reduce the cost of a security breach

WHAT IS THE PROBLEM?

- We surveyed 120 Black Hat students across our Black Hat USA and Europe training courses …

- *“Not a single security professional in the training had the in-depth knowledge or skills to effectively carry out an incident response investigation from end-to-end to contain a breach of their organization”*

- This reflects closely on the current state of the IT security industry



ATTACKER MOTIVATION

$1T

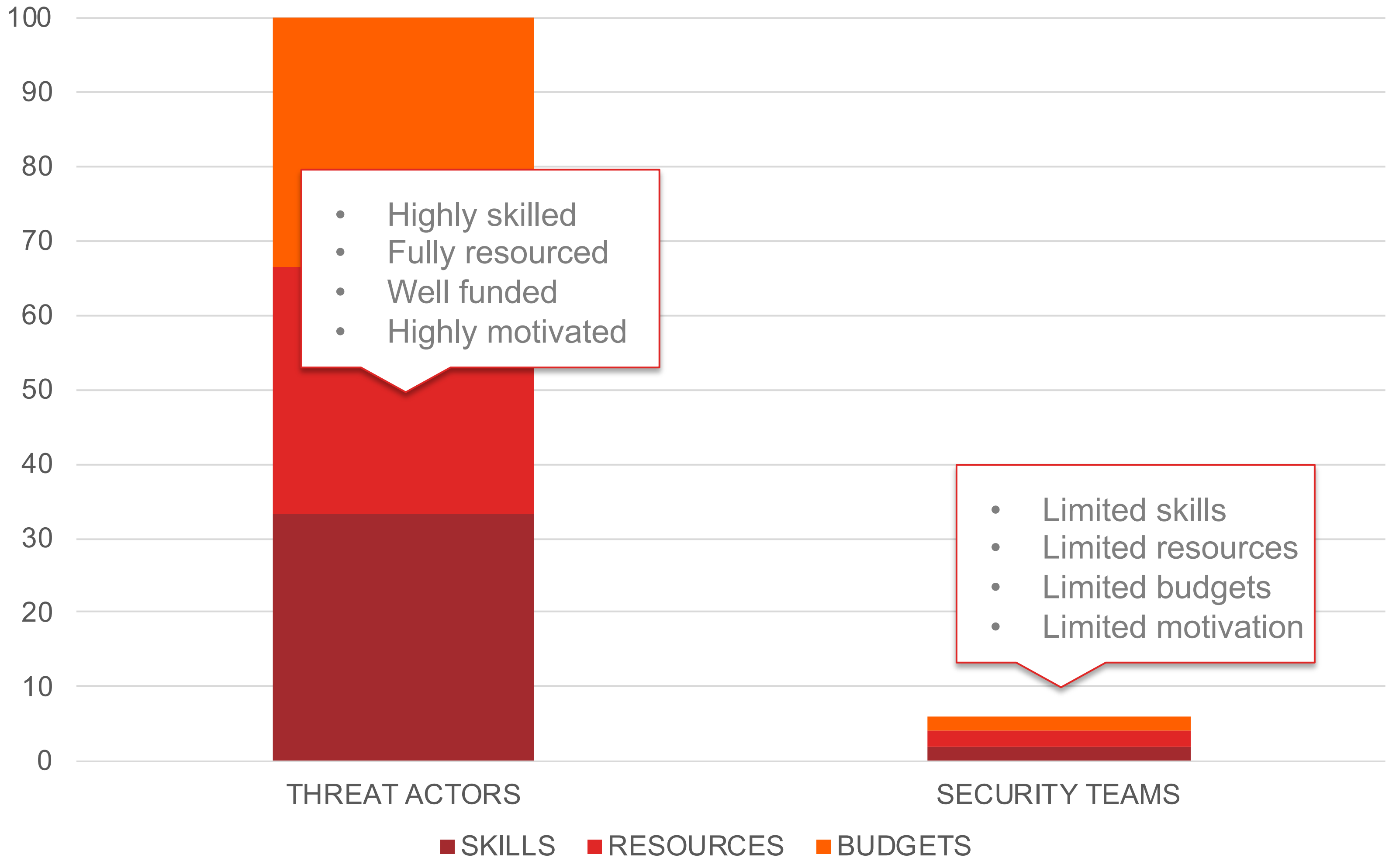
In 2009, revenues from cyber-crime exceeded drug trafficking as the most lucrative illegal global business, estimated at profits of over $1 Trillion annually.

In 2018, according to the UN, $800 billion - $2 trillion is laundered annually, mainly through crypto-currencies with an increase via in-game purchases.

$2T

ATTACKERS VS. DEFENDERS

THREATiNTELLiGENCE

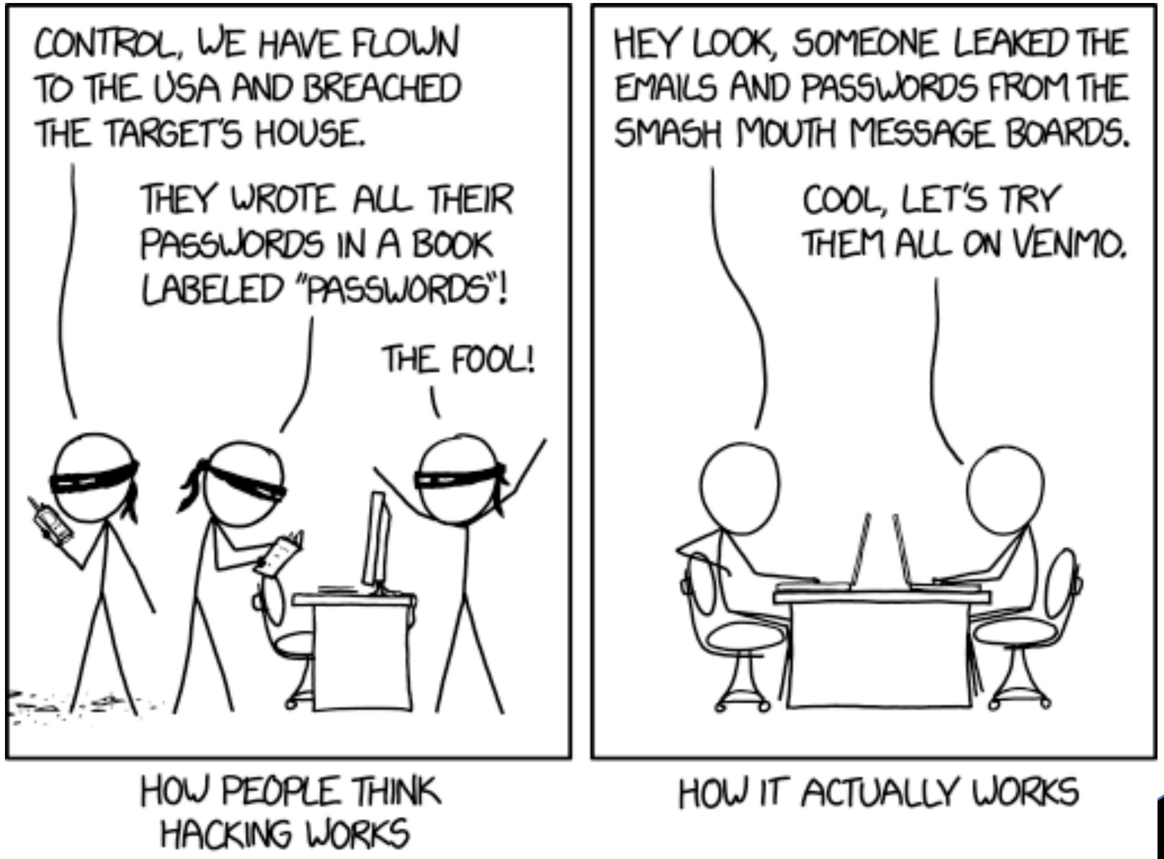


- Highly skilled
- Fully resourced
- Well funded
- Highly motivated

- Limited skills
- Limited resources
- Limited budgets
- Limited motivation

WAR STORY

- Two threat actors aggressively infiltrating company
- Not detected by security team – limited skills, resources and budgets
- Hundreds of different backdoors found
- Redesign and implementation of security architecture to assume backdoored systems
- Overall breach cost estimated at $15M


CONTROL, WE HAVE FLOWN TO THE USA AND BREACHED THE TARGET'S HOUSE.
THEY WROTE ALL THEIR PASSWORDS IN A BOOK LABELED "PASSWORDS"!
THE FOOL!
HOW PEOPLE THINK HACKING WORKS
HEY LOOK, SOMEONE LEAKED THE EMAILS AND PASSWORDS FROM THE SMASH MOUTH MESSAGE BOARDS.
COOL, LET'S TRY THEM ALL ON VENMO.
HOW IT ACTUALLY WORKS

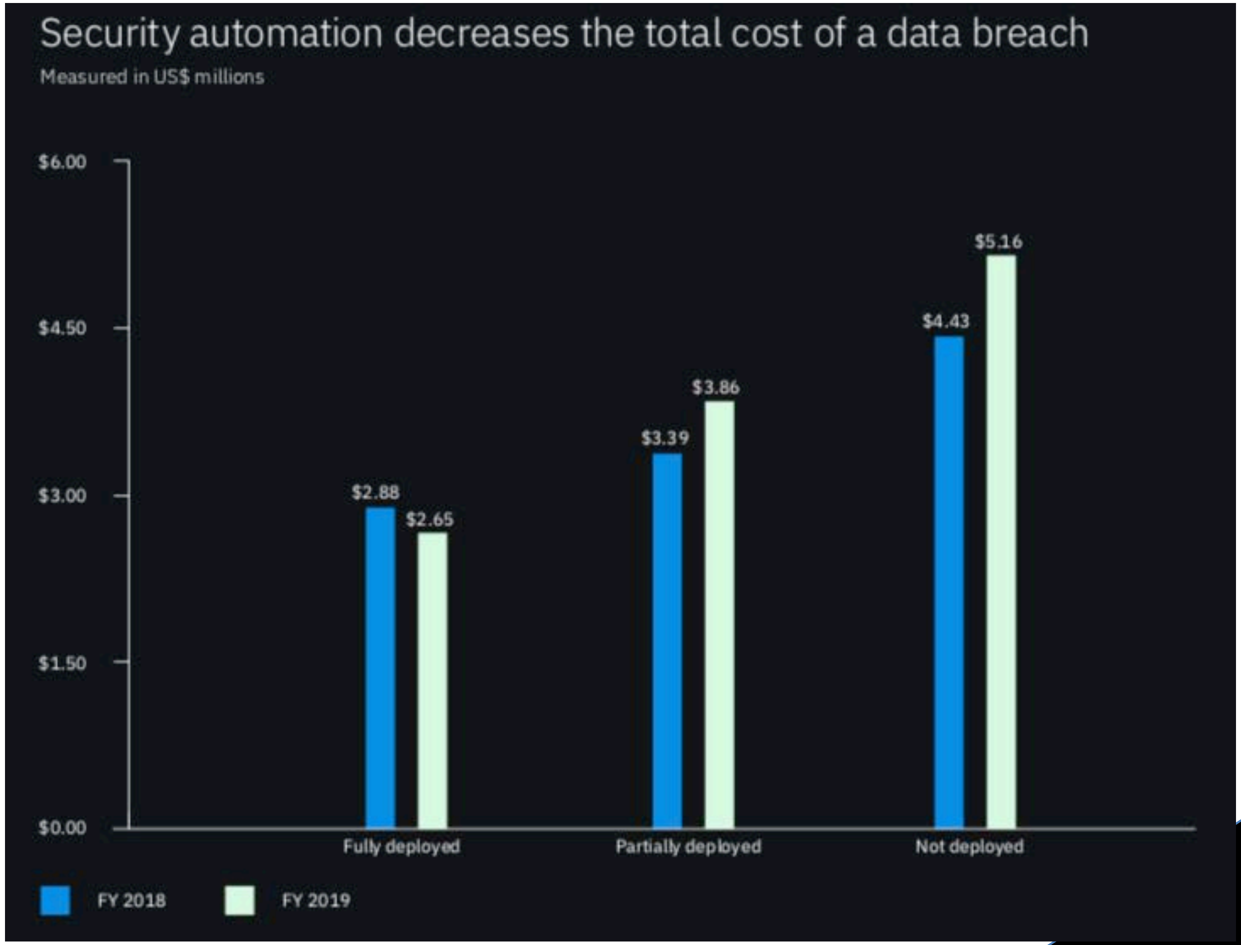
SECURITY BREACH IMPACT

- Average total cost of a data breach in 2019:

Australia	$2.13M
ASEAN	$2.62M
Europe	$4.33M
USA	$8.19M

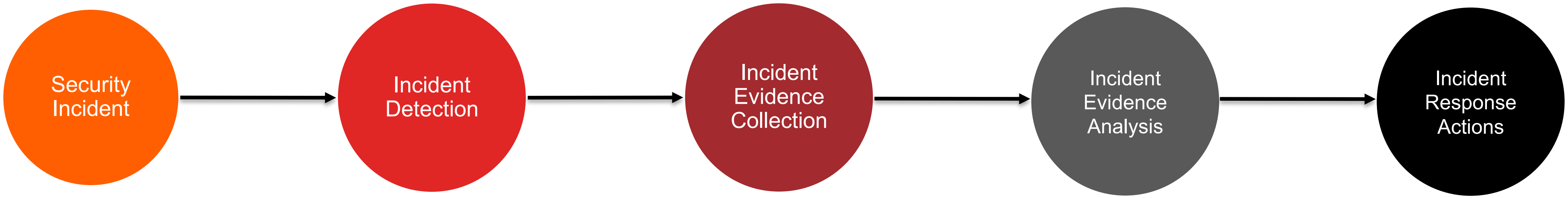
- How do we go from a user clicking a malicious link to suffering $8M in losses?
    - Investigation Costs
    - Loss of Revenue
    - Compliance Fines
    - Knock-on Costs
    - Increased Security Controls

- Cost of a breach is 95% higher in companies not using security automation
    - Average breach containment is 279 days



** IBM Cost of a Data Breach Report 2019*

INCIDENT RESPONSE PHASES



Security Incident → Incident Detection → Incident Evidence Collection → Incident Evidence Analysis → Incident Response Actions

- System is breached / Incident occurs

- Internal and external incident detection techniques used to detect the security incident

- Evidence collection performed to capture the security incident data from the victim system

- Evidence is analysed to define indicators of compromise and confirm whether a breach has occurred

- Incident response actions performed on breached systems and accounts

How do we automate this process (as much as possible) to reduce time to containment, and therefore, reduce breach costs?

AUTOMATED INCIDENT DETECTION

Cyber Threat Intelligence – OSINT Examples:

- Ransomware and C2 Intelligence
http://osint.bambenekconsulting.com/feeds/c2-ipmasterlist.txt
http://osint.bambenekconsulting.com/feeds/c2-dommasterlist.txt
http://list.iblocklist.com/?list=ydxerpxkpcfqjaybcssw

- Spam and Phishing Intelligence
https://www.spamhaus.org/drop/drop.txt
https://www.spamhaus.org/drop/edrop.txt
https://www.spamhaus.org/drop/dropv6.txt

- TOR and Open Proxy Intelligence
https://check.torproject.org/exit-addresses
http://spys.me/proxy.txt
http://list.iblocklist.com/?list=xoebmbyexwuiogmbyprb

- Attacks and Brute-Force Intelligence
http://list.iblocklist.com/?list=ghlzqtqxnzctvvajwwag

- DDoS Intelligence
https://www.badips.com/get/list/ddos/

Integrate with NextGen FW, DNS Sinkhole, Threat Intel Gateway, SIEM

** IBM Cost of a Data Breach Report 2019*

AUTOMATED INCIDENT DETECTION

- NextGen Firewalls / IPS / Proxy Content Filter / HoneyPots / Honey Tokens
  - Anomalous internal network traffic

- Endpoint Security Software
  - Malware Detection
  - Exploit Detection
  - Privilege Escalation / Credential Dump / Process Migration
  - Persistence / Service Creation / Account Creation

- File Integrity Software / Application Whitelisting
  - Unexpected filesystem changes

- SIEM
  - Anomalous system access (eg, local admin logins)
  - Security log analysis
  - Outbound data exfiltration
  - Aggregation of all of the above

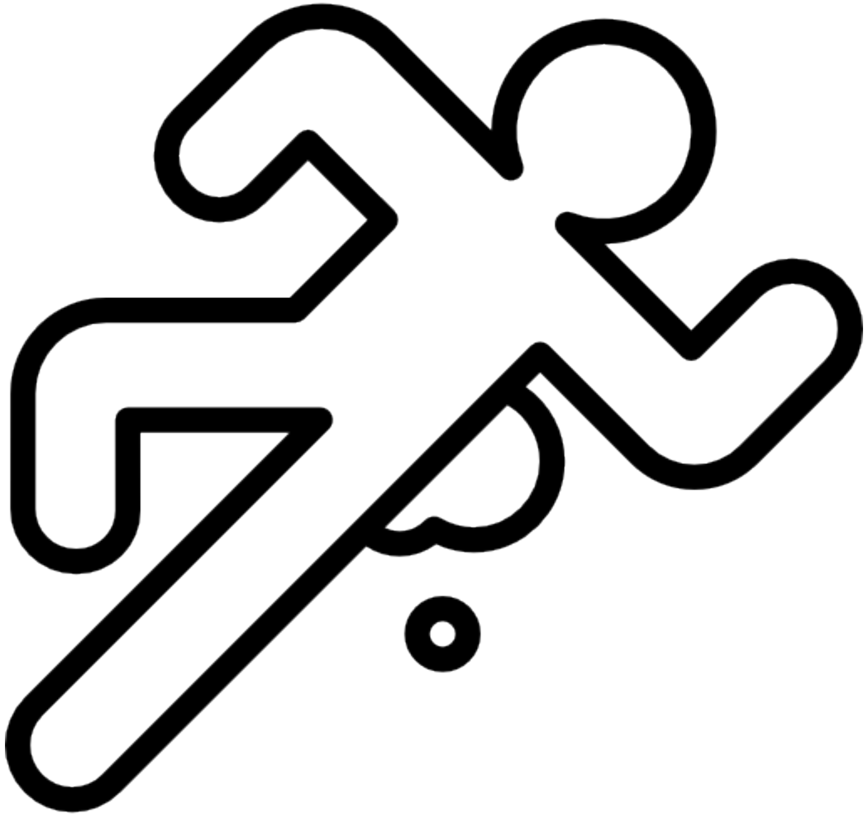
** IBM Cost of a Data Breach Report 2019*

AUTOMATED EVIDENCE COLLECTION

What evidence needs to be collected for a security breach?

- Memory dump
- Disk image
- Running processes
- Network connections
- Registry hive
- Latest changed files
- User account list
- Local host file
- DNS Cache

- Swap files
- Hibernation files
- Startup scripts
- System and security logs
- Kernel and program hooks
- Web server modules list
- Driver list
- Network traffic



AUTOMATED EVIDENCE COLLECTION

What tools can be used for automating evidence collection?

- Memory dump
  - https://github.com/google/rekall/tree/master/tools/windows/winpmem
  - https://github.com/NateBrune/fmem + dd
- Disk Image / Swap Files / Hibernation Files / Locked Files / Master File Table
  - https://ad-zip.s3.amazonaws.com/FTKImager.3.1.1_win32.zip
  - https://github.com/jschicht/RawCopy
  - dd
- Built-in Operating System Tools
  - Running processes
  - Network connections
  - Registry hive
  - User account list
  - Local host file
  - Latest changed files
  - Startup scripts
  - System and security logs
  - Kernel and program hooks
  - Web server modules list
  - Driver list
  - Network traffic

AUTOMATED EVIDENCE ANALYSIS

What incident response analysis needs to be performed?

- Rootkit detection
- Malware detection
- Code injection detection
- Extract processes and drivers
- Command history extraction
- Hidden or deleted files
- Rogue processes
- Rogue network connections
- Rogue DNS requests
- Malicious registry entries
- Malware/Sandbox analysis on files
- Vulnerability and exploit identification
- Newly created user accounts
- Newly created or backdoored services
- Modified local host file
- Newly created or modified startup scripts
- Log file analysis typically for authentication or crash identification
- Rogue kernel and program hooks
- Rogue web server modules list
- Rogue driver list
- Network traffic analysis
- Intelligence IOC search
- Event timeline

AUTOMATED EVIDENCE ANALYSIS

What tools can be used for automating evidence analysis?

- Memory Analysis

Volatility	https://www.volatilityfoundation.org/releases
Rekall	https://github.com/google/rekall/

- Malware and Bootkit detection
- Rogue and hidden processes, DLLs, drivers and services
- Rogue kernel and program hooks
- Code injection detection
- Command history extraction
- Extract network connections and sockets
- Malicious registry entries
- Master File Table analysis
- Timeline creation

AUTOMATED EVIDENCE ANALYSIS

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What tools can be used for automating evidence analysis?

- Cyber Threat Intelligence
  - Map network connections to known bad IPs
  - Map DNS requests to known bad domains
  - Search file system for known bad IOCs

    https://github.com/Yara-Rules/rules
    yara command line tool

- Malware/Sandbox Analysis on executables / files
  - Anti-Virus / Endpoint Security Software
  - VirusTotal API

- Network traffic analysis
  - tcpdump / wireshark command line tools
    https://github.com/MITRECND/yaraprocessor
    https://github.com/MITRECND/chopshop

AUTOMATED RESPONSE ACTIONS

Incident response actions can be performed:

- Raise ticket to notify IR team of the breach
- Feed bad IP addresses in firewall block lists
- Feed bad domains / URLs in Proxy block lists
- Feed malicious domains into DNS sinkholes
- Feed malicious IPs and domains into IPS
- Send events to a SIEM
- Disable compromised / malicious accounts
- Terminate auto-scaled cloud system
- Terminate processes
- Quarantine malicious files
- Share threat intelligence data with peers
- Yara scans across internal machines
- Shut down victim hosts to contain the breach

AUTOMATION MANAGEMENT

How do we centrally manage automated incident response?

- Open Source IT Automation Software

Ansible	https://github.com/ansible/ansible Develop Ansible playbooks to automate your incident response
Pro:	No required investment in commercial software Good for non-existent or small budgets
Con:	Requires a lot of time to develop, test and maintain Requires human security resources, skills and experience

- Commercial Security Automation Platforms

Pro:	Minimal time to implement for fast security capabilities Minimal human security resources, skills or experience
Con:	Requires budget for commercial software or platform

THANK YOU FOR ATTENDING

TY MILLER
CEO, THREAT INTELLIGENCE

ty.miller@threatintelligence.com
https://www.threatintelligence.com
https://evolve.threatintelligence.com

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