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From Identification to Automated Response – Threat Profiling, Investigation and Mitigation in Today's Landscape

6 June 2018

U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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#whoami

- Mike

Sandia National Laboratories

#whoami

- John

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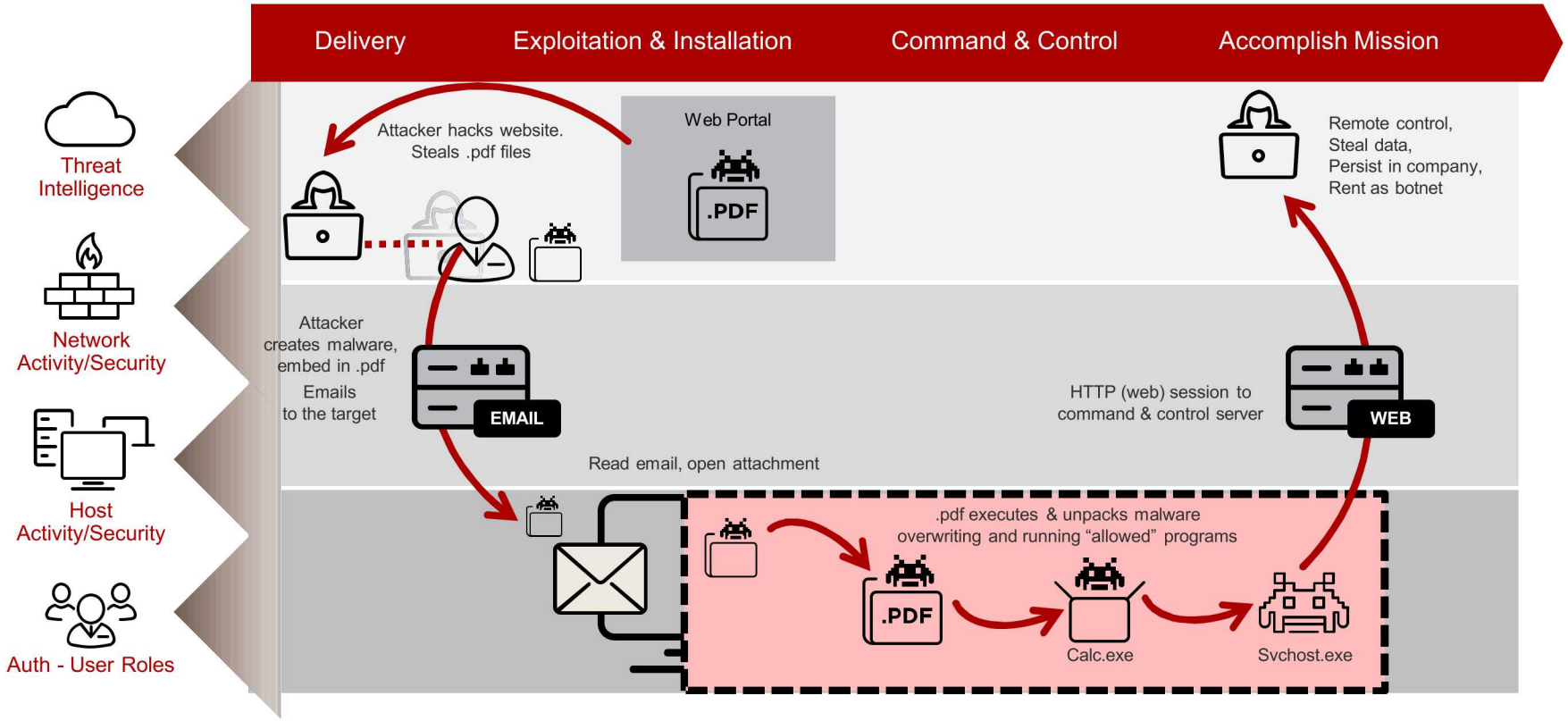
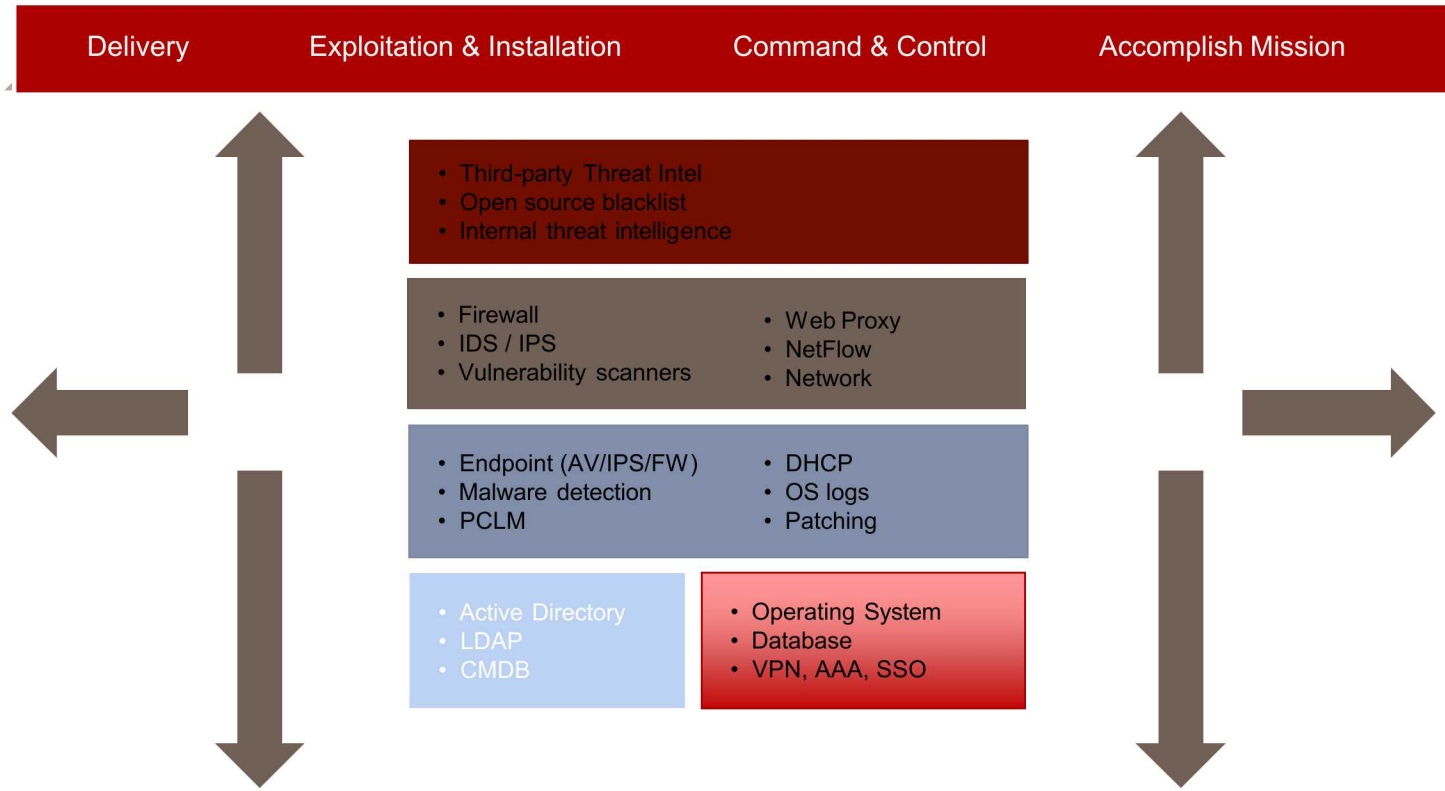
Threat hunters focus their search on adversaries...and who are already within the networks and systems of the threat hunters' organization"

SANS - The Who, What, Where, When, Why and How of Effective Threat Hunting

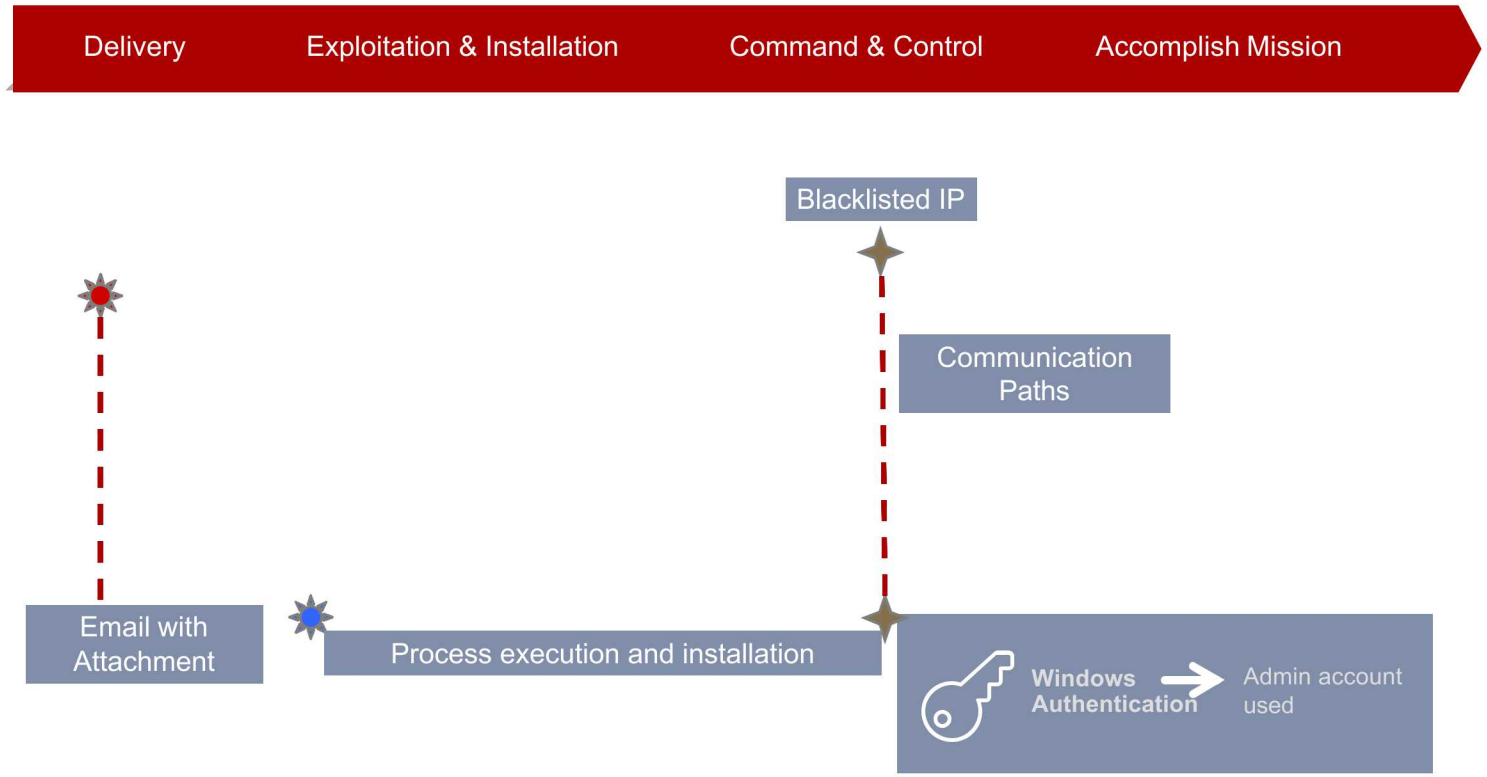
Example of an Advanced Threat



Data Sources Needed



Insights from Events Collected



Threat Hunting and Incident Response

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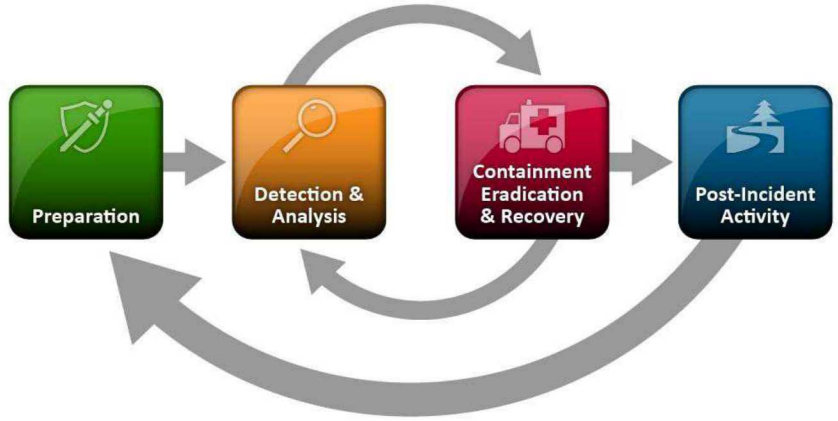
Threat Hunting

Incident Response

Incident Response

- Classic activity that is performed when something ”bad” happens
- Think about it from an investigation perspective
  - Who, what, where, when, why, how?
- Security Operations deals with this all day long
- Focus on containment and recovery
- Work with other teams to eradicate

- Hunting can still be performed!!!



NIST SP800-61

Why Do We Hunt?

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Hunting Occurs In The Past and Present

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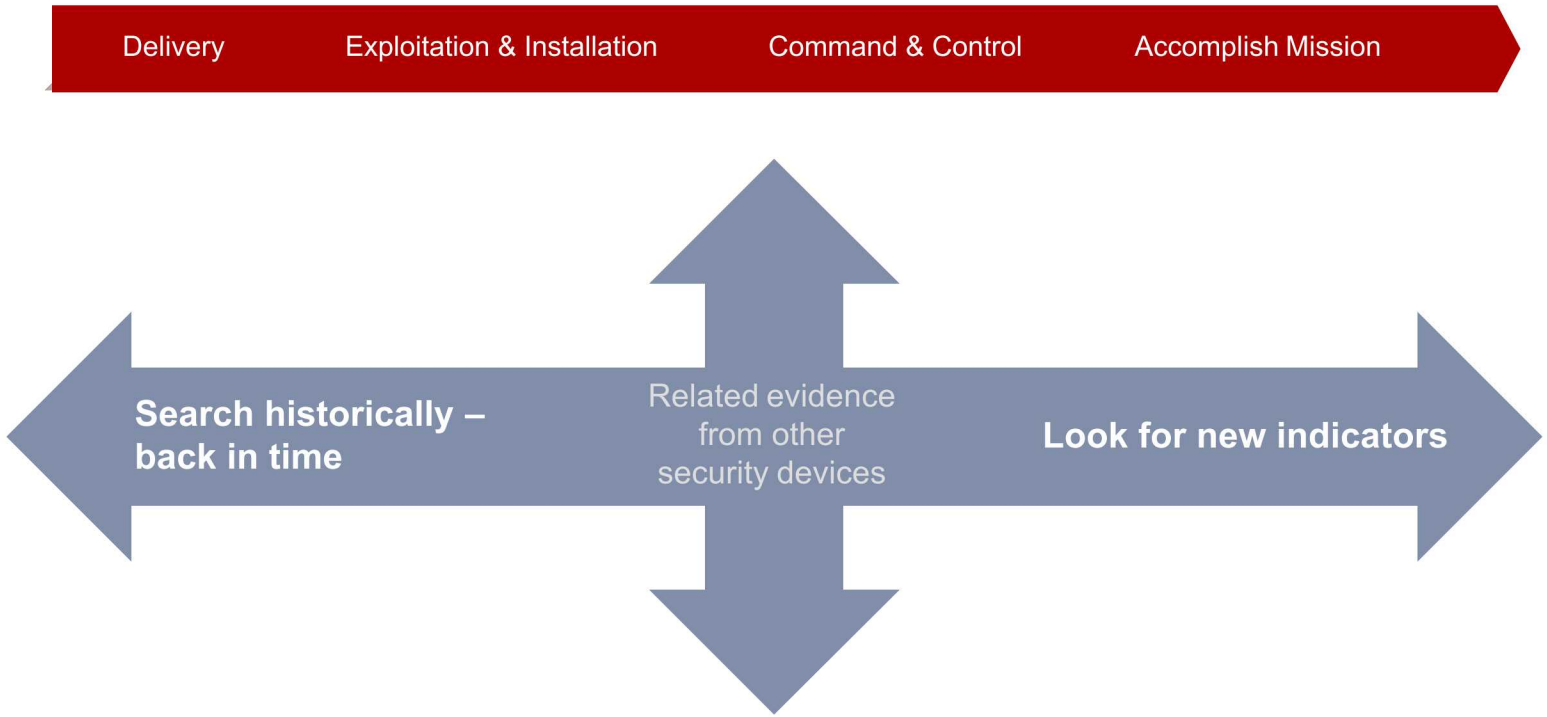

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"To people outside the security team, hunting looks like lucky guessing, but it's far from that. Hunting is based on a combination of instinct, experience, and good intelligence."

Intelligence-Driven Incident Response: Outwitting the Adversary

Scott J. Roberts and Rebekah Brown

Where to start?

Lead Development

Think about taking an indicator and pulling on the string

Brainstorming

- Past Performance May Not Be Indicative Of Future Results, but Previous Security Events/Incidents May Be Used To Identify Trends
  - Have past attackers commonly used spearphishing for delivery?
  - Did you read about SSL Certificates being a technique to identify attacker infrastructure?
- Activities considered to be out of the norm
    - Data Volumes, Directionality, Destinations, Sources, Apps, Time
- Testing Results
  - Why are adversary teams targeting systems?
  - If internal teams are targeting, maybe adversaries are too!

Lockheed Martin Kill Chain

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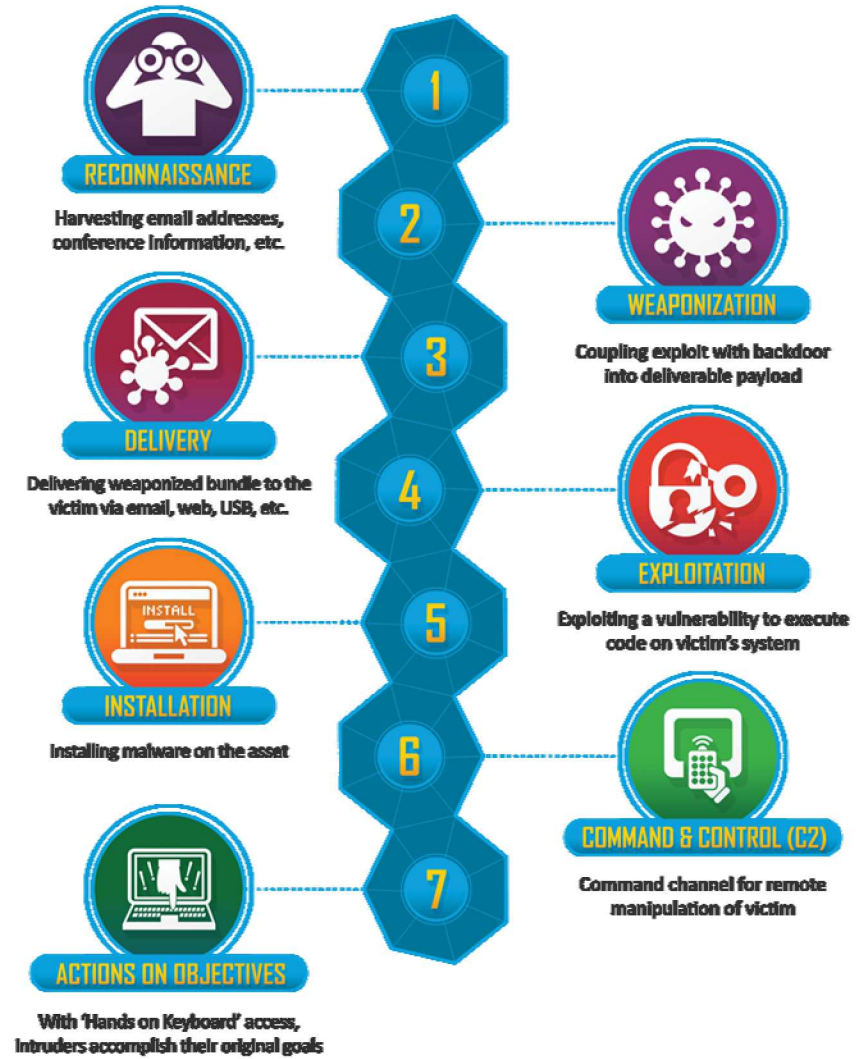
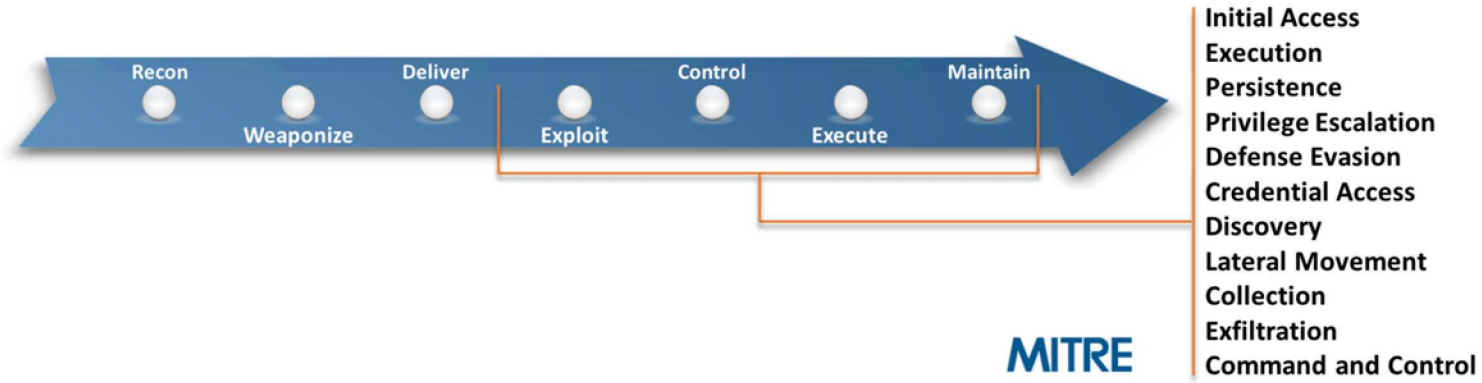
- If one artifact (IP, host, process, etc) can be identified, a defender can move in either direction along the kill chain to disrupt a current operation or learn more to prevent future attacks



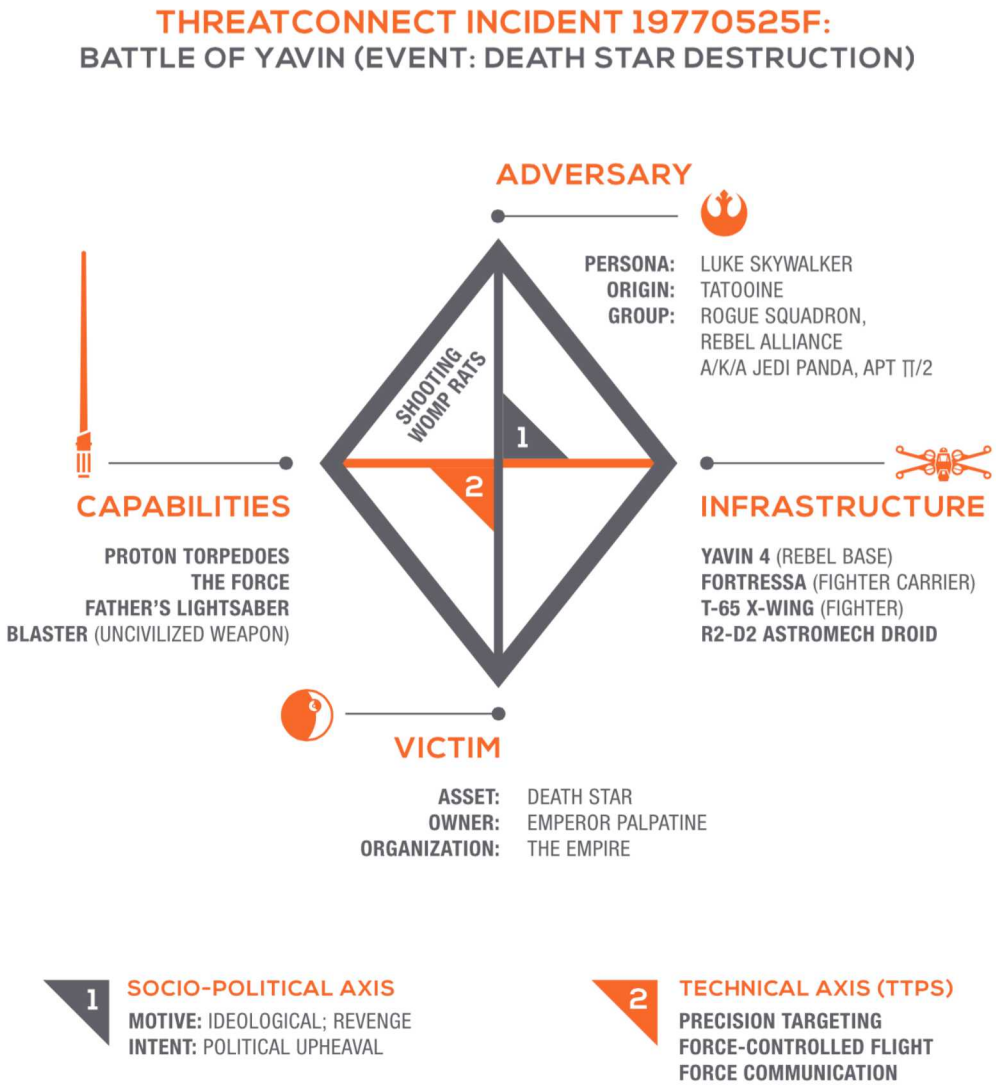
MITRE ATT&CK

- Adversarial Tactics, Techniques, and Common Knowledge
- Builds on Lockheed Martin's Kill Chain but focuses on tactics and techniques that occur during exploit and activity occurring post exploit

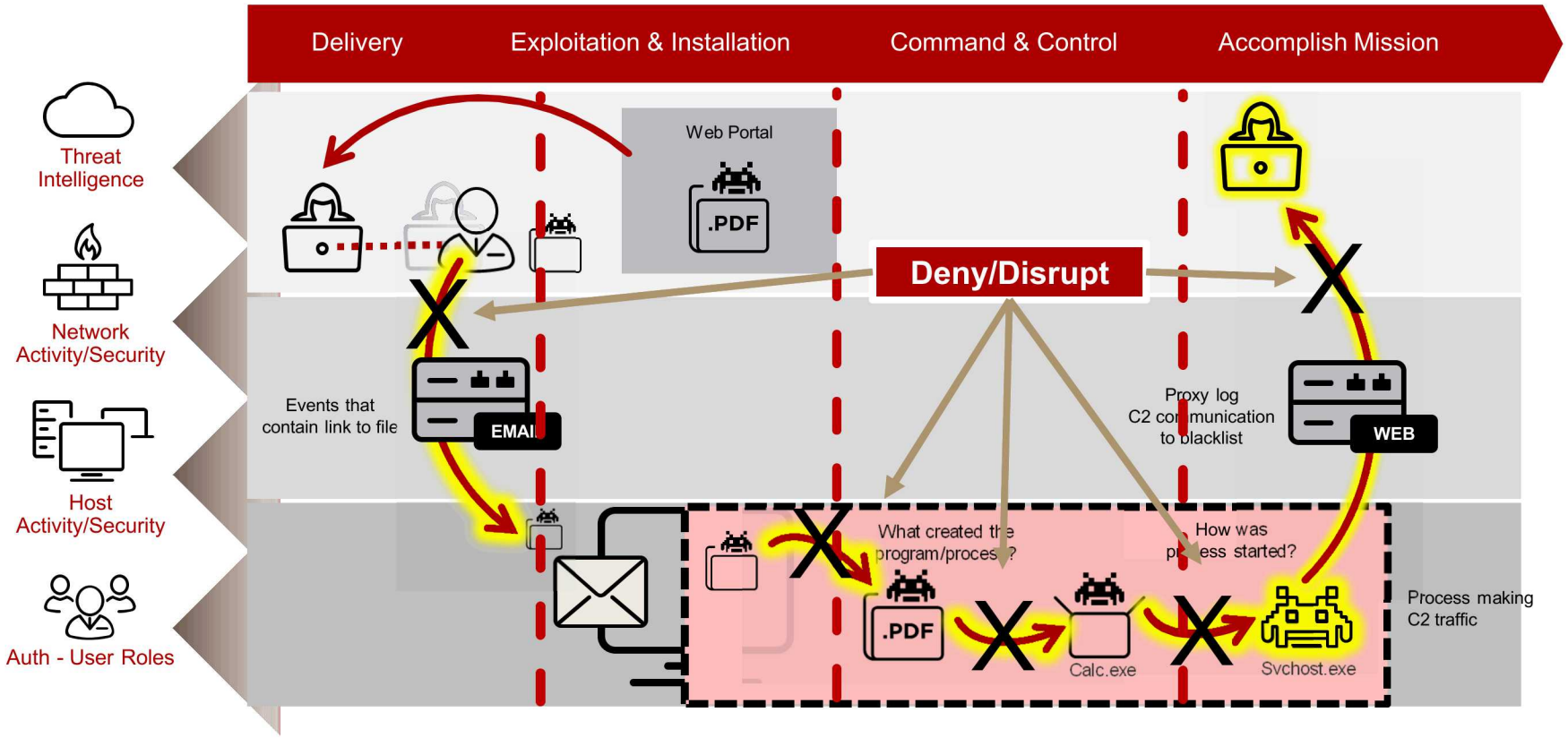


Diamond Model

- More often used within Threat Intelligence, but has a place as part of Threat Hunting
- Used for contextualizing threat intelligence that is found during hunting
- Sergio Caltagirone, Andrew Pendergast, Christopher Betz
  - http://www.dtic.mil/dtic/tr/fulltext/u2/a586960.pdf
  - https://threatconnect.com/blog/diamond-model-threat-intelligence-star-wars/



What Are We Trying To Accomplish?



How to detect bad people doing bad things

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- Current Methods
  - Tools
  - Information Sharing
  - Threat Feeds
  - Indicators of Compromise
    - File Names
    - Hashes
    - Registry Keys
    - Domains
    - IP Addresses
- Problems
  - Expensive
  - Slow
  - False Positives
  - Not everyone shares
  - Quality of the intel
  - Time sensitive
  - Reactive instead of Proactive
  - Breaks IA Principles, safety is only guaranteed by confidentiality
  - Tools can make you more vulnerable

How we should detect bad people doing bad things

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- Think more like attackers
- Embrace automation
- Train your tools to detect actions threat actors do, instead of looking for IOC's
- Validate your tools
- Encourage information sharing
- Don't punish the good guys

Why we do adversary emulation

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- Train the tools
- Test the tools
- Profile our attackers
- Enrich our data
- Extrapolate our data to fill in missing gaps
- Scope the threat landscape

Profiling your Attacker

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- Collect Data
  - Threat Reports
  - Conferences
  - Twitter
  - Blogs
  - Malware Activity
  - Information Sharing
  - CVE’s
  - Incident Response and Forensics
- Enrich your data
  - Building target environments
  - Building sample attacks based on threat actor actions
  - Correlate events to activities and actors

Enablers for APT3 Emulation

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- https://attack.mitre.org/wiki/Group/G0022
- https://www.fireeye.com/blog/threat-research/2015/06/operation-clandestine-wolf-adobe-flash-zero-day.html
- https://www.theverge.com/2015/7/8/8911077/adobe-flash-hacking-team-vulnerability
- https://www.sisainfosec.com/blogs/adobe-flash-zero-day-vulnerability-operation-clandestine-wolf-by-fireeye/
- https://www2.fireeye.com/Webinar-FAAS-Clandestine-Wolf_LP.html

Attack Walkthrough

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Summary: An attacker sets up a malicious webserver and a victim browses to the website. The website allows the attacker to take the control of the victim and gain access to other machines on the network.

Attack Emulation - Demo

Attack Emulation

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Detailed Attack Flow:

- The attacker uses Metasploit to stage an attack on a webserver
- The webserver hosts an exploit for Adobe Flash discovered by HackingTeam (CVE-2015-5119)
- When the exploit is successful, a beacon phones home to the attacker
- The victim browses to the website and the attacker silently takes control of their machine.
- The attacker migrates to an x64 process (explorer.exe) and gains system level privileges
- The attacker uploads kiwi and steals passwords from memory
- The attacker uploads met.exe a binary that will phone home when ran
- The attacker uploads two batch scripts and runs them
  - (persistence.bat) Which creates a backdoor scheduled task that runs at boot
  - (collect.bat) Which creates a list of .txt files on the machine and a list of running processes
- The attacker then uses credentials stolen from memory with kiwi to launch psexec to spread to other machines in the environment.
- The attacker repeats the post exploitation steps on the newly compromised machine

Leveraging Emulation to Enhance Detection

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- By building a variety of attacks and attack environments we are able to:
  - Fine tune tools
  - Evaluate our tools
  - Expect more than IOC's
  - Ability to develop new IOC's
  - Detect technique usage

Automation Goals

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- Minimally
  - Detection
  - Containment
  - Fixing the issue
- Ideally
  - Active Defenses
  - Deception
  - Forensic Collection
  - IOC development
  - Information Sharing
  - Closing the hole elsewhere

Automating Threat Intel Gathering

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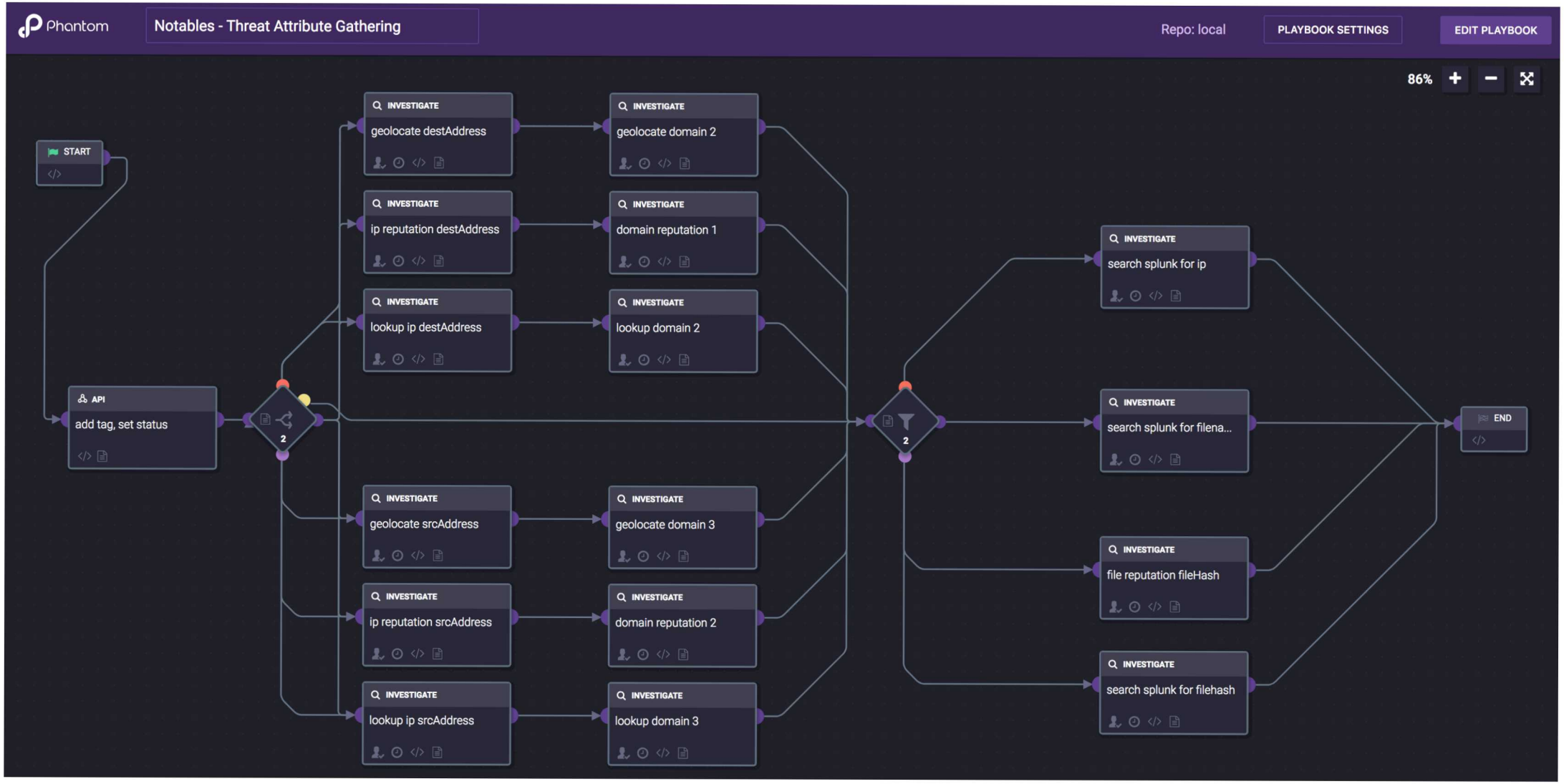
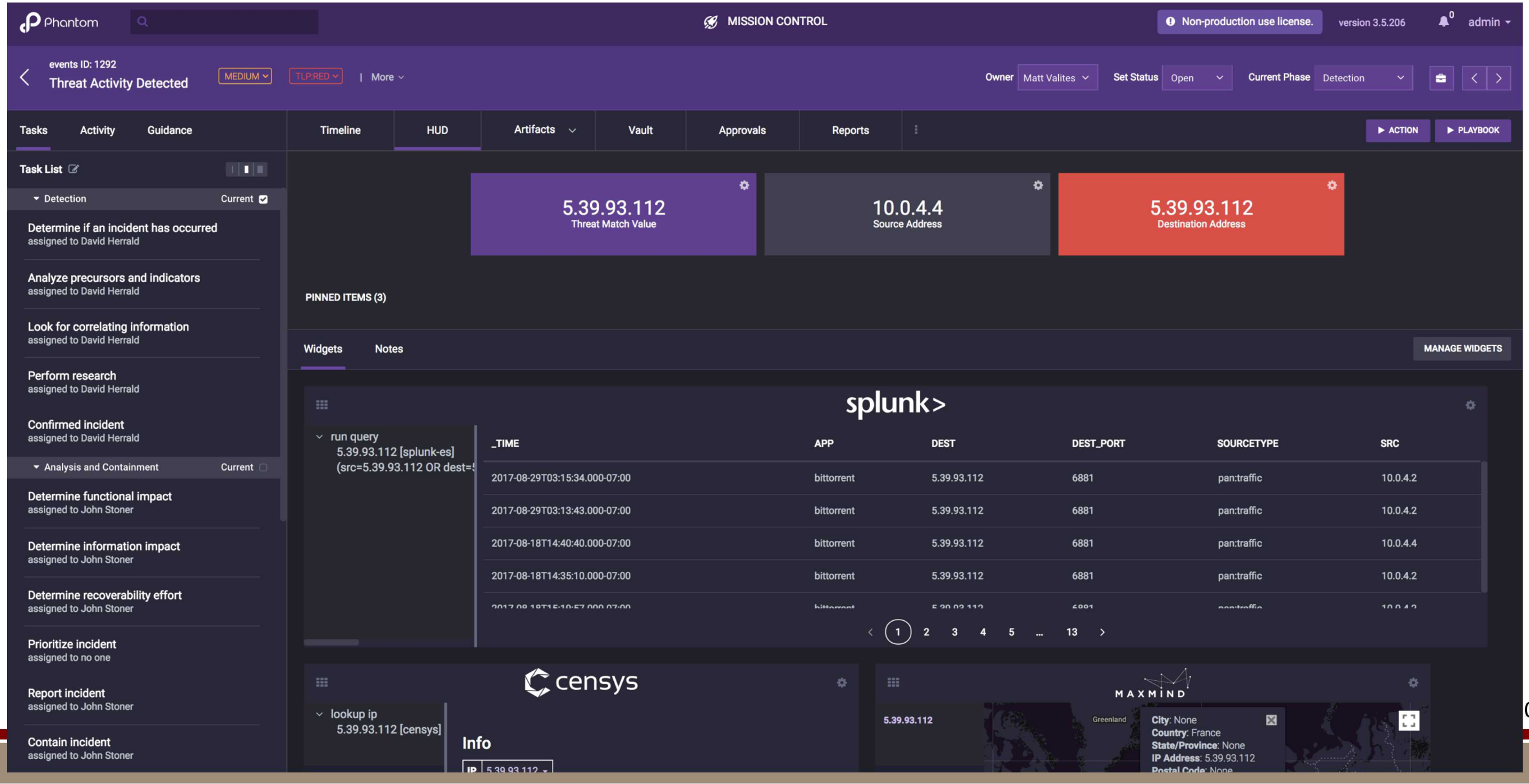
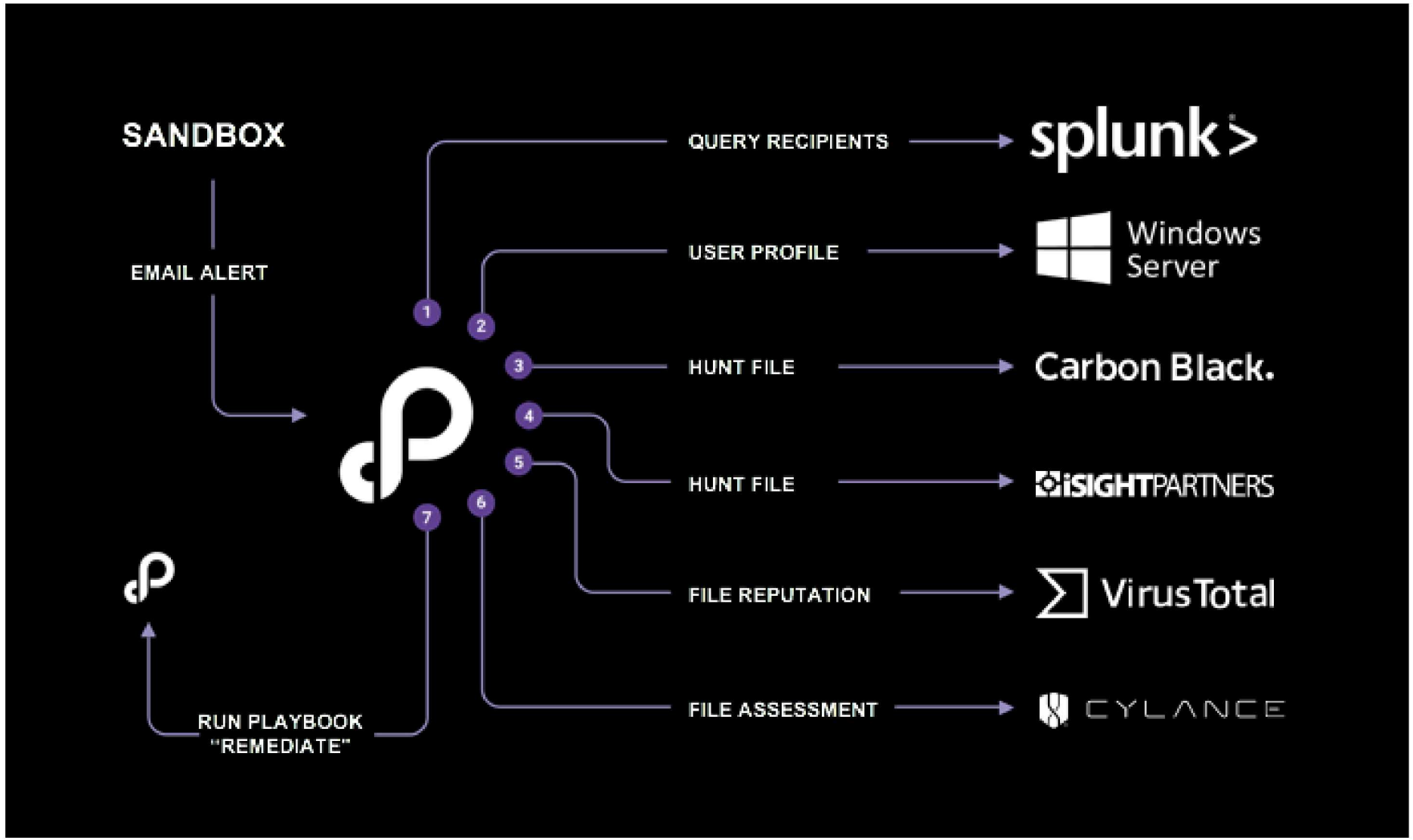


Analyst View & Apply Process To Findings



Other Examples for Response



Testing & Refining

- Remember, Hunting is Hard!
- The first search is not the perfect search
- May end up with false positives like alerting
- Mitigation
  - Build your leads/hypothesis and test on a known good system
    - Reduce risk of returning lots of noise
  - Run data against sample data set
    - Ensure you won't get overrun on a monthly long search

Operationalize Your Findings

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- Create Feedback Loop from Hunting to Incident Response
- Hunting is proactive
- Develop a hypothesis
- “End goal of hunting should be a change in policy or procedure - operationalization, don’t do the same thing over and over again”
  - Threat Hunting Webshells with Splunk, James Bower