

Building a Threat-Based Cyber Team

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Common Themes

- ► Change in Threat Landscape
- The **Philosophy** of Security Posture vs. Capability Posture
- The value of making multi-faceted change in Technology, People, and Process
- Implementing new Core competencies including Research, Adaptive Red Team, DevOps, Analytics



Cyber Attack 2009

- ► APT targeted JHUAPL
- ▶ 5 unique pieces of malware on disk
 - Backdoor, Password dumpers, Network exploration utility
- ▶ 13 accounts compromised
 - Domain Administrator
- Unclassified data exfiltrated
- Operational impact
 - 2 Weeks disconnected from the Internet



Build Resilient Security Infrastructure

▶ Technology

- Legacy SIEM
- Anti-Virus
- IPS/IDS
- Blackhole/Sinkhole
- Sandboxes
- Application Whitelisting

Security Posture

Philosophy

- Response
- Signature based
- Alert based
- Mitigation focused
- Tool focused
- IOC focused
- Limited data ingestion

Capability Posture



Cyber Maturity Evolution

Cyber Oberations

Response

Triage

Mitigation



▶ Philosophy Changing

- Use Cases
- Behaviors
- Visibility focused

Capability
Posture

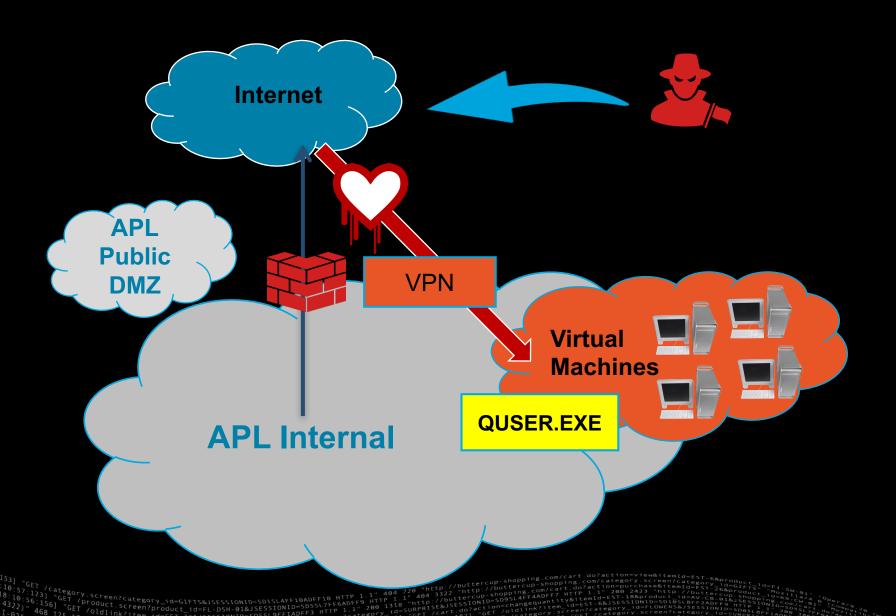


Cyber Attack 2014

- Heartbleed
 - CVE-2014-0160 (Common Vulnerability & Exposures)
 - Publicly disclosed in April 2014
 - Vulnerability in the OpenSSL cryptography library
 - When it is exploited it leads to the leak of memory contents from the server to the client and from the client to the server
 - What is in memory?
 - Encryption keys
 - Usernames
 - Passwords
 - Session Keys
 - Session Cookies



APL Unclassified Network







The Landscape is Changing

Emergence of New Methodologies



Defense Partner – March IR Collaboration

Never Let a Good Incident Go to Waste

- Extensive use of commercial cloud and SSL
 - Command & Control
 - Exfiltration
 - Distributing malware
 - Constantly changed infrastructure
- PowerShell
 - Reflective injection into memory
 - Lateral movement
 - Reconnaissance
- Persistence
 - Windows Management Instrumentation (WMI)
 - Scheduled tasks
 - Registry (RunOnce)
- Actor's actions on network more agile than incident responders

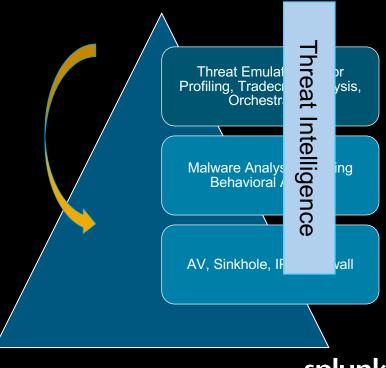
Defenders had limited network visibility

Living off the Land



Change in Philosophy

- ▶ Threat Focused Cyber Operations
 - Research and identify Threats targeting your organization
 - · Target advanced tactics, techniques and procedures of adversary
 - Emulate threat in your environment
 - Develop hunting and analytics techniques
- Changes, Challenges & Culture
 - What is behavioral monitoring anyways?
 - Mitigation vs Detection
 - Not everything can be mitigated
 - Value in Visibility
 - What is Threat Intelligence?
 - More than indicators of compromise





Defensive Cyber Operations Inception

Philosophy

- Use Cases
- Data Analysis
- Behaviors
- Visibility based
- Agility
- Enrichment
- Automation
- Independence
- DevOps

Capability Posture

- ▶ Technology
 - Splunk
 - EDR
- ▶ People
 - New skillsets
 - New approach
- Process
 - Hunting
 - Agility

Vehicle For Change



Change in Technology

Legacy SIEM implementation

- A few specialists creating content
- Very static and signature content
- Run scheduled reports for data analysis
- Only acquire logs that you need

Splunk

- All analysts creating content
- Dynamic & behavioral content
- Google like query language for agility
- More visibility means more data



Change in People

Traditional Cyber Skillset

- Firewall Management
- ► IPS/IDS administrator
- Implementing rule/signature rulesets
- Strong network competencies
- Dead box forensics
- Implement mitigations

Adaptive Skillset

- Data manipulation capabilities
- OS internals
- ▶ Malware & memory analysis
- Strong research skills
- Collaborative teams
- Red Team skills
- Constant development of skills



Change in Process

Analysts followed procedures

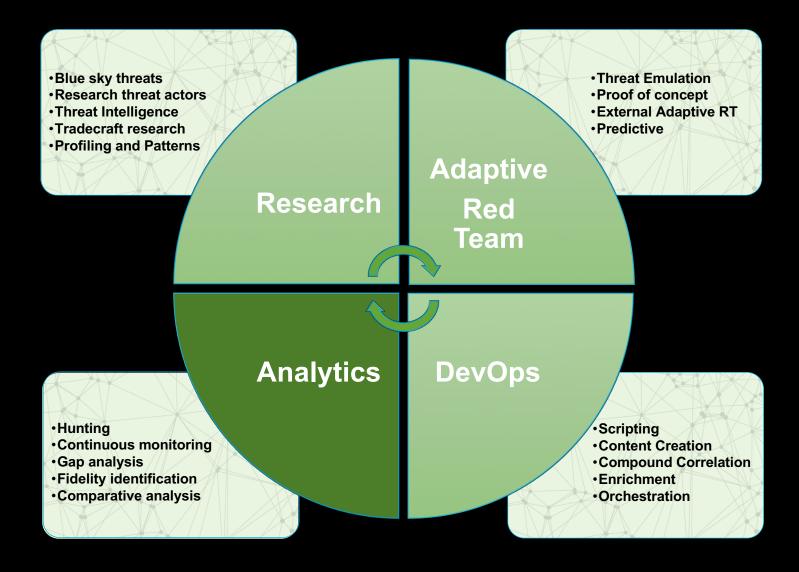
- Responded to alerts
- Followed playbooks
- Implemented mitigations

Analysts Performing Analysis

- Hunting for anomalies
- Researching threats
- Understanding adversary tradecraft
- Emulating threats
- Developing new analytics, content & alerts
- Understanding context



Cyber Threat Team Construct









Research

What are the adversary's doing?

- Blue sky threats
 - What if...
 - Based on our environment and Threat Intel
 - LoE, ROI, Likelihood
- ► Threat Intelligence
 - Research threat actors
 - Tradecraft research
 - Emerging capabilities
- ▶ Threat Models
 - Behaviors
 - Adversary profiling

 HAMMERTOSS processes the decrypted commands, which may instruct the malware to conduct reconnaissance, execute commands via PowerShell, or upload data to a cloud storage service.

```
Invoke-WmiMethod -Class Win32_
'whoami', $null

Get-WmiObject -Class Win32 Net
```

powershell.exe -NonInteractive -ExecutionPolicy Bypass -EncodedCommand ZgB1AG4AYwB0AGkAbwBuACAAcABlAHIAZgBDAHIAKAAkAGMAcgBUAHIALAAgACQAZABhAHQ



Adaptive Red Team

- Proof of concept
 - Predictive
 - Research driven
- **▶** Threat Emulation
 - Lateral movement
 - Privilege escalation
 - Persistence methodologies
 - Initial code execution
- External Adaptive RT
 - Comprehensive attack & response lifecycle



DevOps

- Scripting
 - Forensic tool development
 - Data parsing
 - Orchestration
 - Enrichment
- Application Development
 - Threat Tracking System
 - REnigma
- **▶** Content Creation
 - Use Case Development
 - Compound Correlation
 - YARA development





Analytics

- Proactive Threat Hunting
 - Process behaviors
 - Network behaviors
 - Account behaviors
- ▶ Uniqueness/Rareness/Newness
 - Email
 - FQDN

- **▶** Gap analysis
 - Visibility
 - Technology
 - People
- Content review
 - Threat scoring
 - Prioritization







Challenges

- Splunk Core is not a traditional SIEM
 - Uniqueness identifiers
 - Tagging events
- Expensive Live queries
- Sub-Search limitations
- An imperfect start is better than a perfect unimplemented plan
- Leverage existing talent in Cyber Operations
- Managing larger data sets the cost of visibility
- Solving the same problems differently



Wins

- Leveled analyst playing field
- ► APT targeting
- DMZ Breach
- ▶ Red Team
- ▶ No formal Splunk training



Adaptive Red Team Exercise

The Fruits of Our Labor

- Hits on existing custom developed content
- Anomalies associated with credential theft
 - Mimikatz
- ▶ RPC & SMB baseline drift
 - Lateral movement
 - AD Reconnaissance
- Privileged account usage
 - Uniqueness
 - Rareness
- Bubble-Up Analytics
 - Aggregation of lower fidelity events of interest
 - Threat models



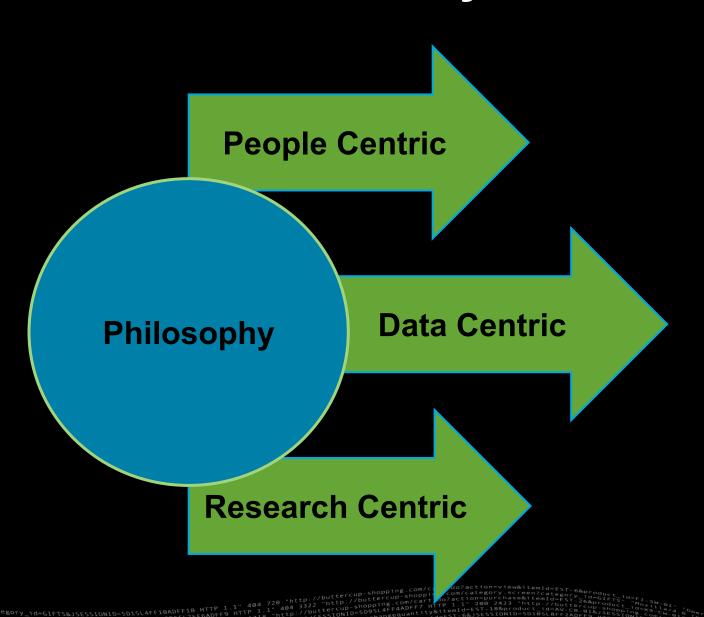
Summary

Key Takeaways





Summary





Questions



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