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Building a Threat-Based Cyber Team

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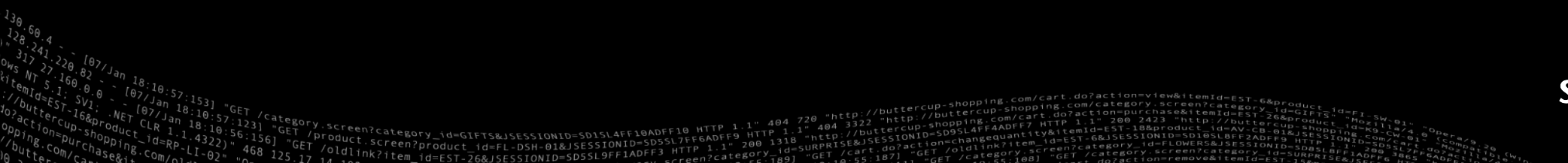
Common Themes

- 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



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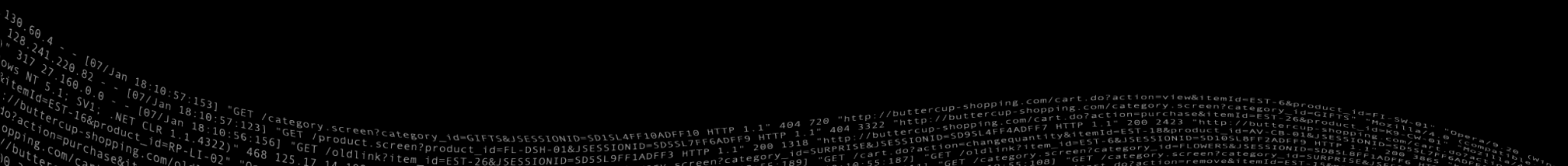
Cyber Attack 2009

- 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



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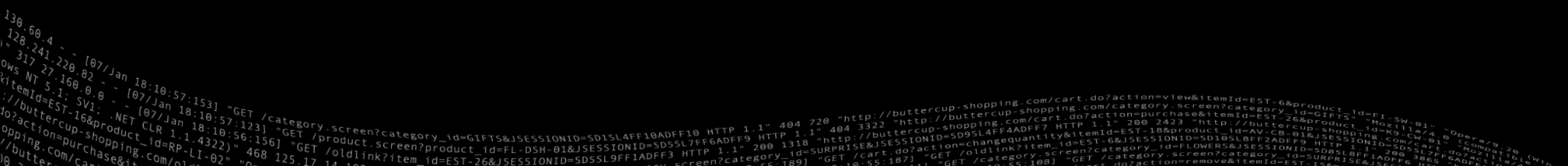
Build Resilient Security Infrastructure

- **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



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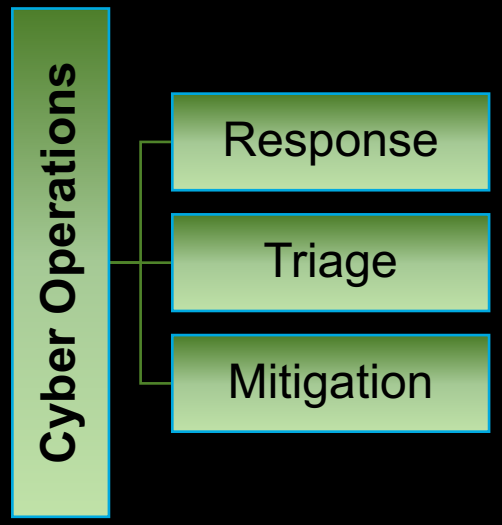
Cyber Maturity Evolution



- **Philosophy Changing**
  - Use Cases
  - Behaviors
  - Visibility focused

Capability Posture

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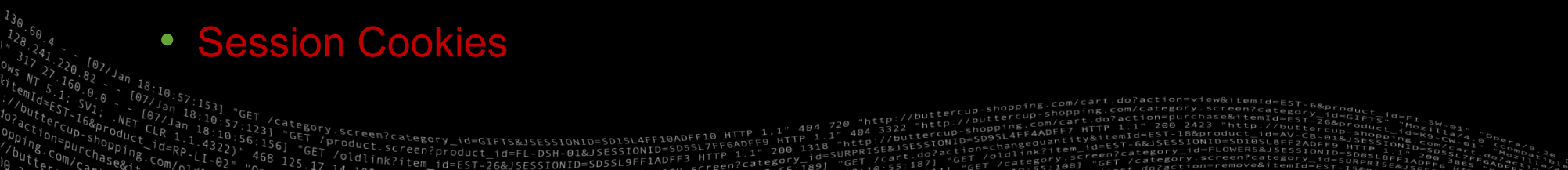
Cyber Attack 2014

- 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



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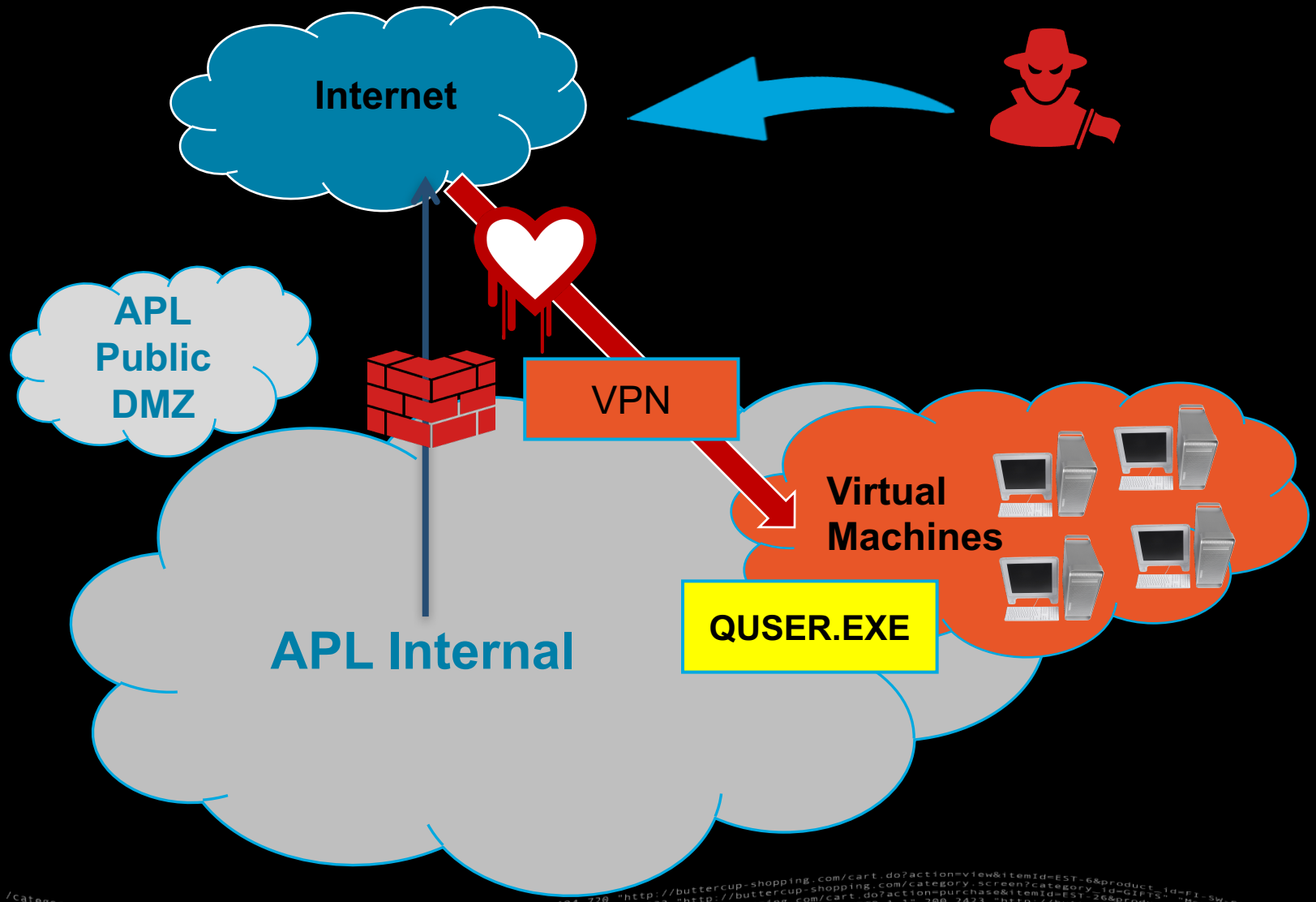
APL Unclassified Network



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The Landscape is Changing

Emergence of New Methodologies

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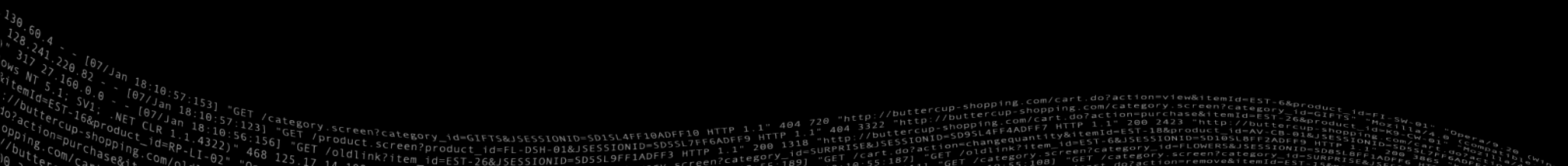
Defense Partner – March IR Collaboration

- **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



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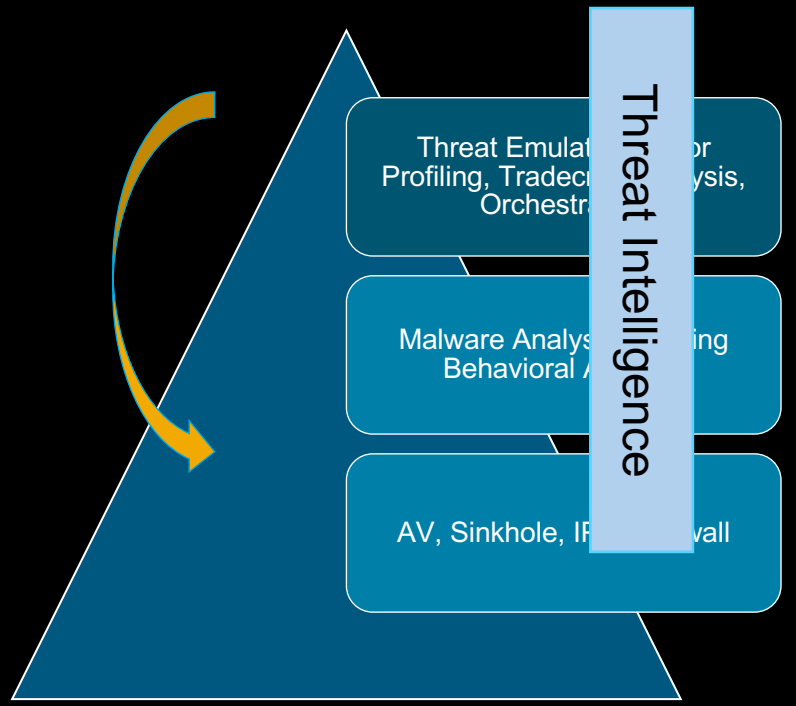
Change in Philosophy

- 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



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Defensive Cyber Operations Inception

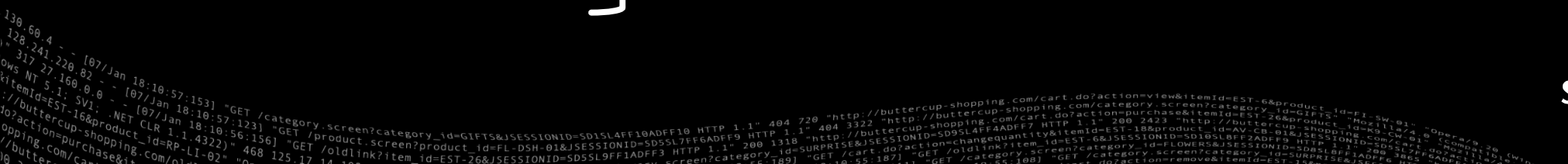
Philosophy

- 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



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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

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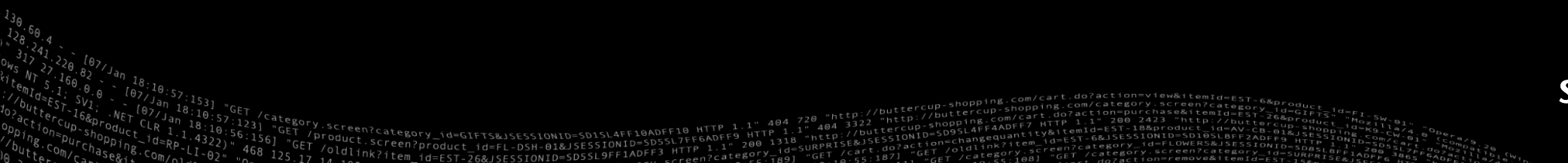
- All analysts creating content
- Dynamic & behavioral content
- Google like query language for agility
- More visibility means more data



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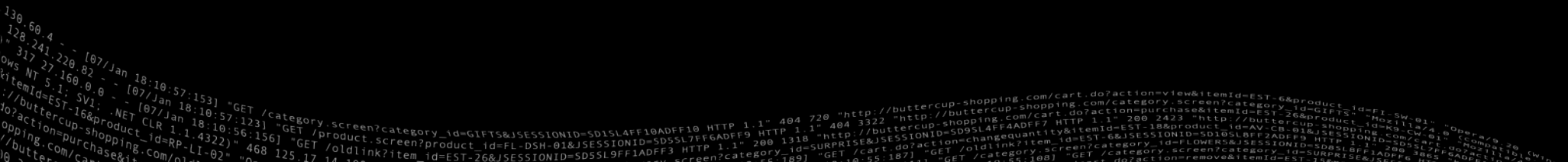
Change in People

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



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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

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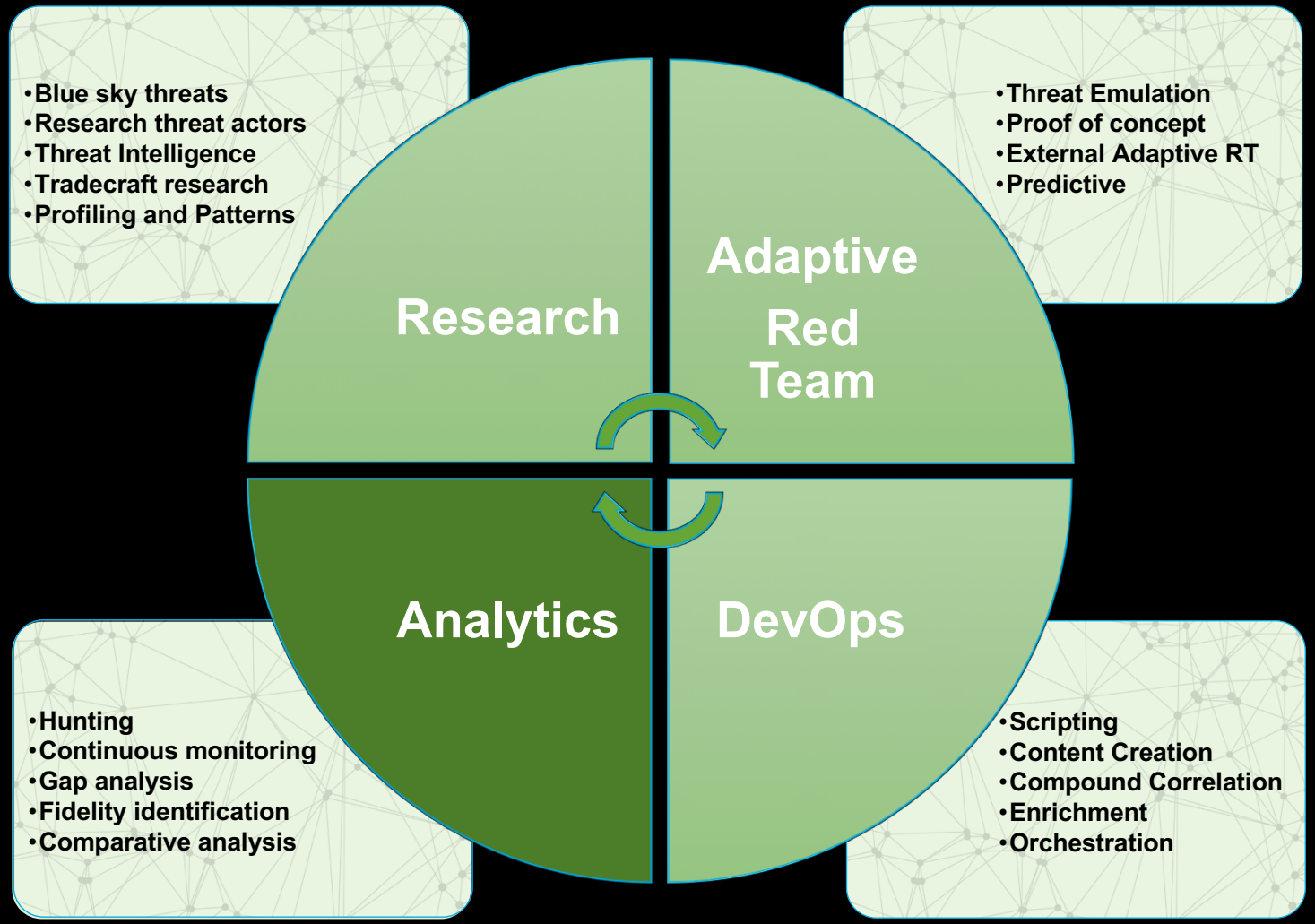
Cyber Threat Team Construct



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Putting It All Together

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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**


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

Get-WmiObject -Class Win32_Net
```

```
powershell.exe -NonInteractive -ExecutionPolicy Bypass -EncodedCommand
ZgB1AG4AYwB0AGkAbwBuACAAcABlAHIAZgBDAHIAKAAkAGMAcgBUAHIALAAgACQAZABhAHQ
```

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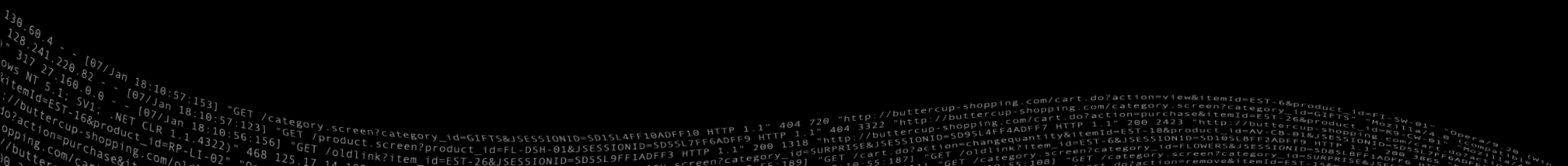
Adaptive Red Team

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



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DevOps

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

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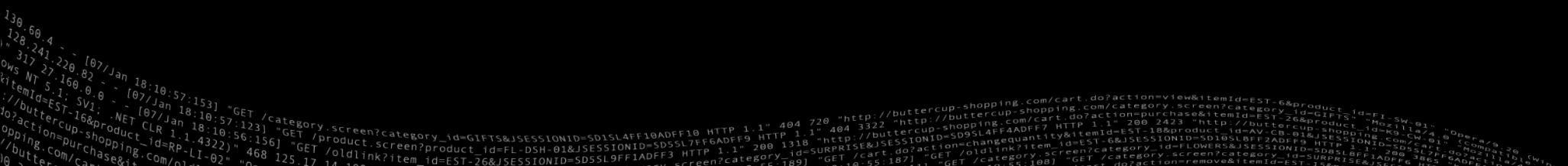
Analytics

- **Proactive Threat Hunting**
  - Process behaviors
  - Network behaviors
  - Account behaviors
- **Uniqueness/Rareness/Newness**
  - Email
  - FQDN
- **Gap analysis**
  - Visibility
  - Technology
  - People
- **Content review**
  - Threat scoring
  - Prioritization



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Challenges & Wins

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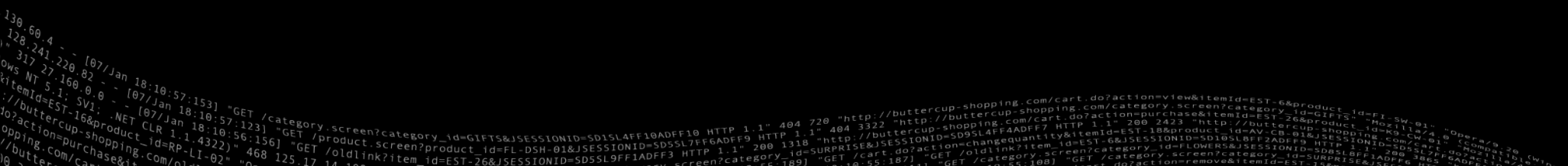
Challenges

- 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



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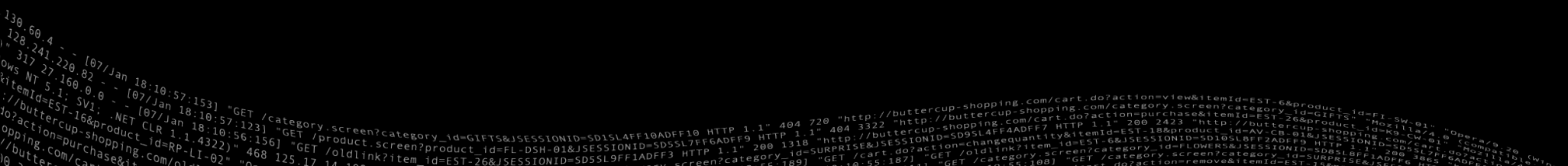
Wins

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



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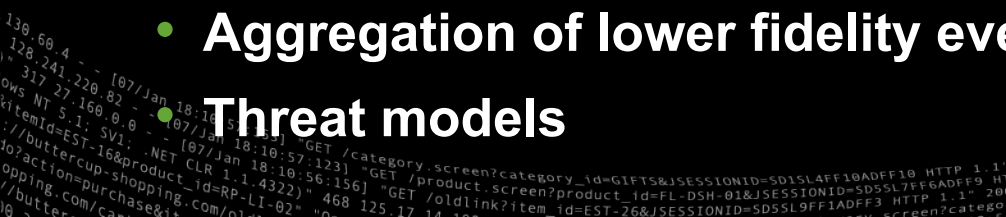
Adaptive Red Team Exercise

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



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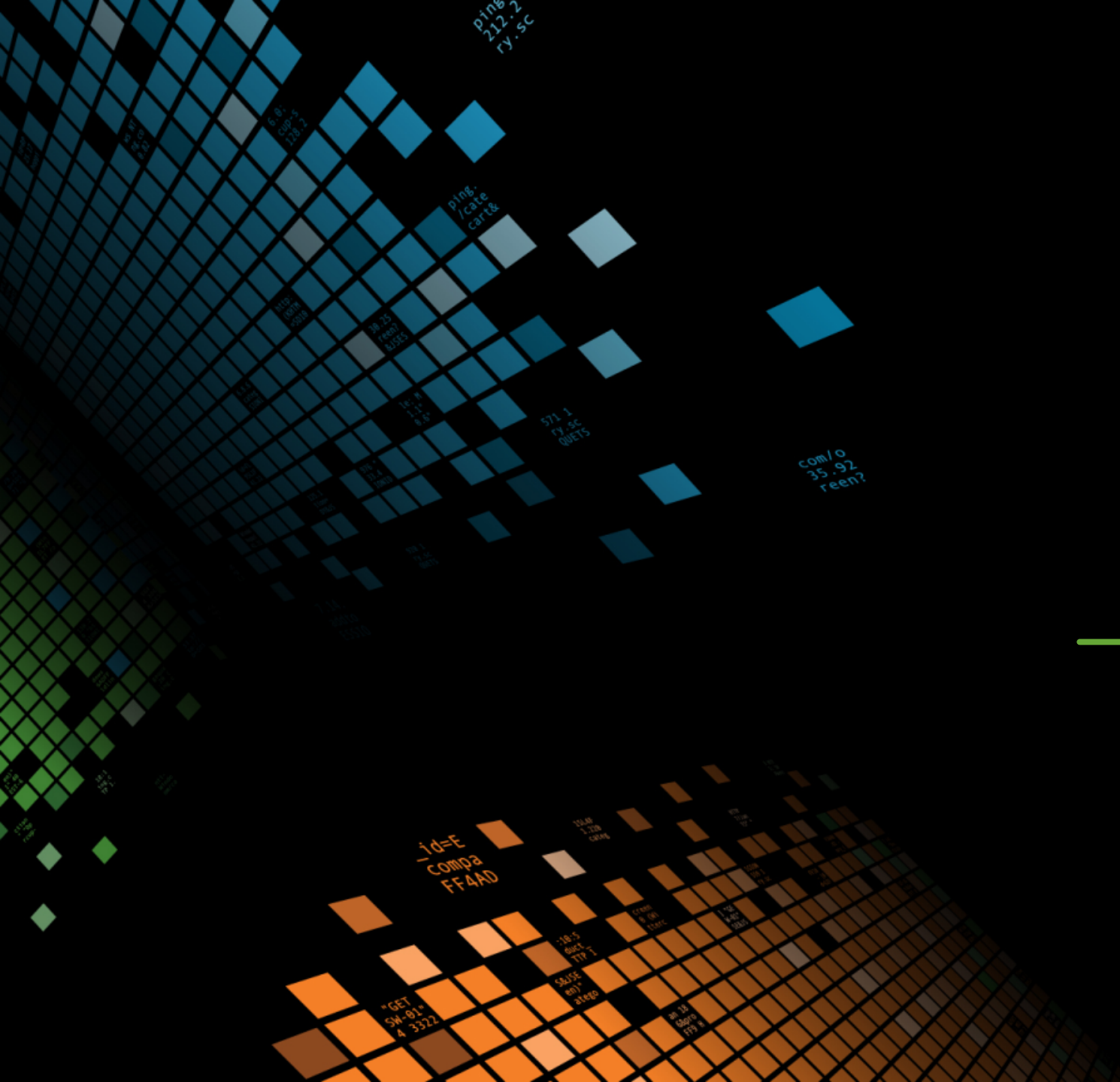

Summary

Key Takeaways

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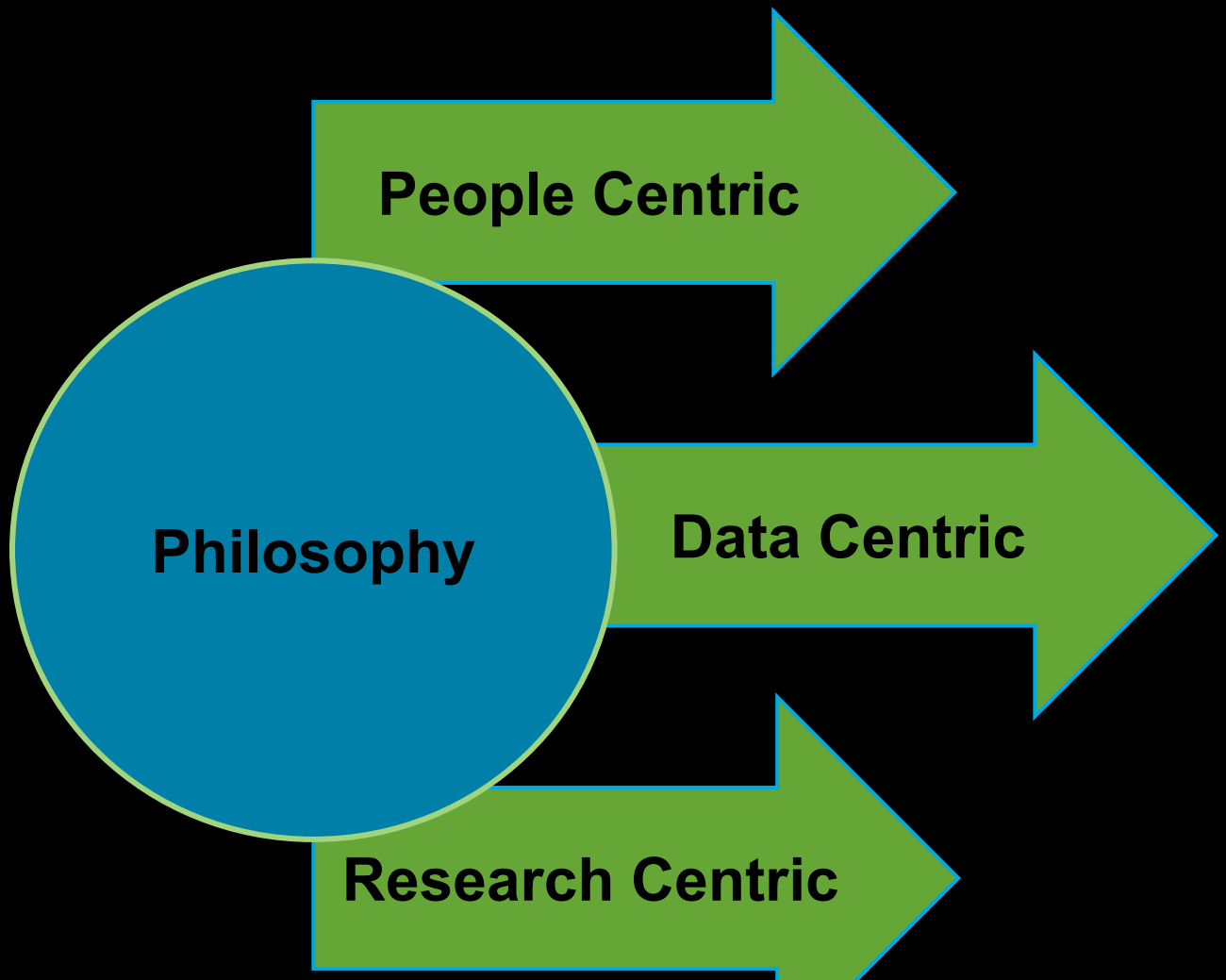
Summary



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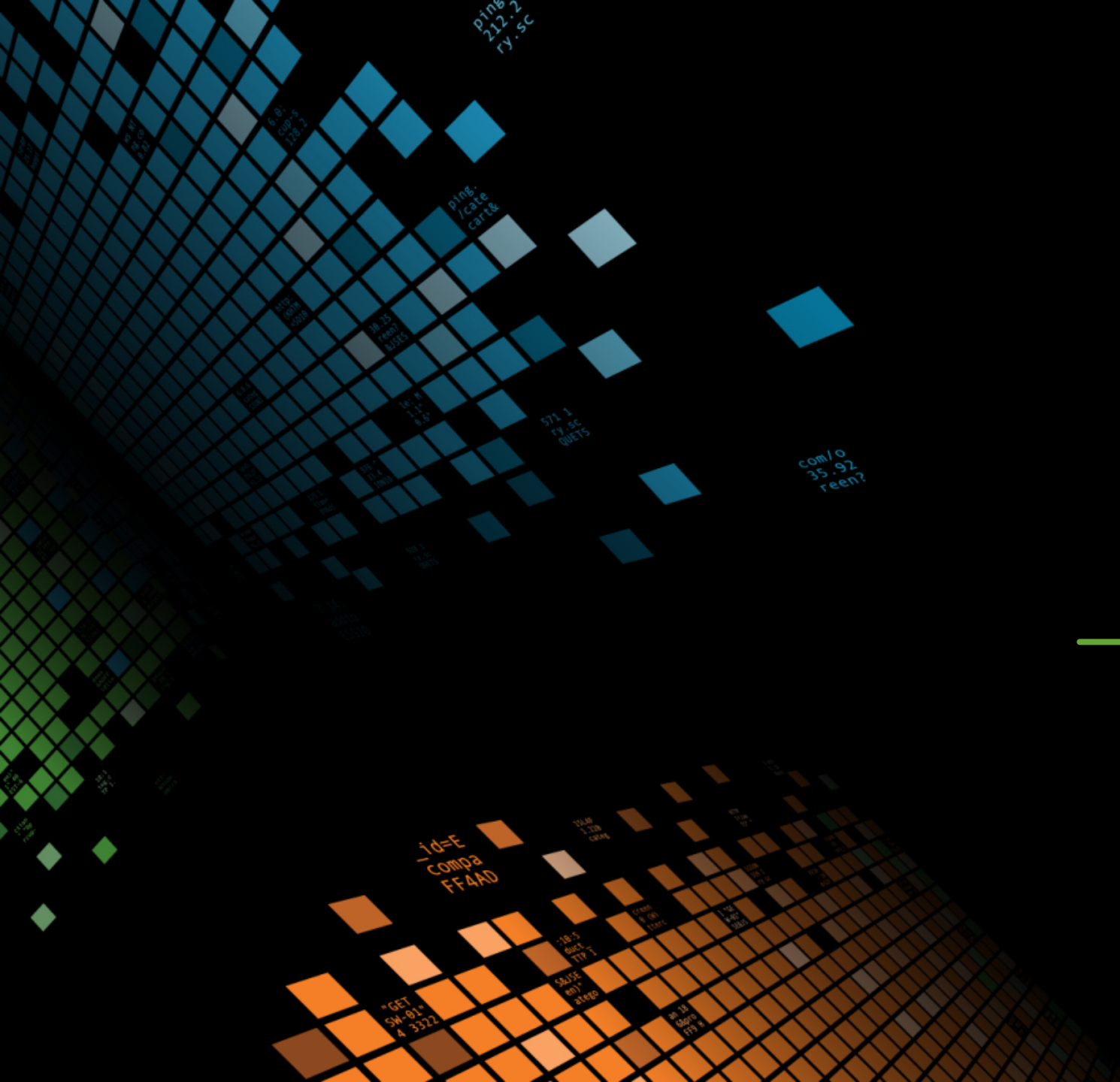

Questions

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