Threat Quantification & Prioritization 101: A Practical Guide to Building (& Maintaining) Your Cyber Threat Profile

Simone Kraus, Orange Cyberdefense
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About the Speakers

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https://www.brighttalk.com/channel/19703/

Packed Agenda!

Breaks as needed! ☺

- **08:30–09:00**: Introduction, What is a Threat Profile?, The Importance of Quantification, Our Approach
- **09:00–09:45**: Cyber Threat Quantification: Case Study & Guidance
- **09:45–10:30**: Taking Action on Your Threat Profile, TTPs & Scoring, CTI Extraction
- **10:30–11:00**: Threat Hunting, Detection Engineering, Use Case

Resources

https://www.first.org/conference/berlin2023/program#pThreat-Quantification-Prioritization-101-A-Practical-Guide-to-Building-Maintaining-Your-Cyber-Threat-Profile

- **No tools or materials are required for the workshop**
- **But a laptop with internet is helpful** for following along/browsing to resources of interest live alongside the presenters
- **Review/download of all resources is optional!** We will focus mainly on methodologies & workflows, but specific resources are provided for those who want to dive deeper as we go

Importance of Threat Quantification

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What is a Threat Profile?

What is a Threat Profile?

A buzzword?

‘Threat-Modeling’, the buzz word!

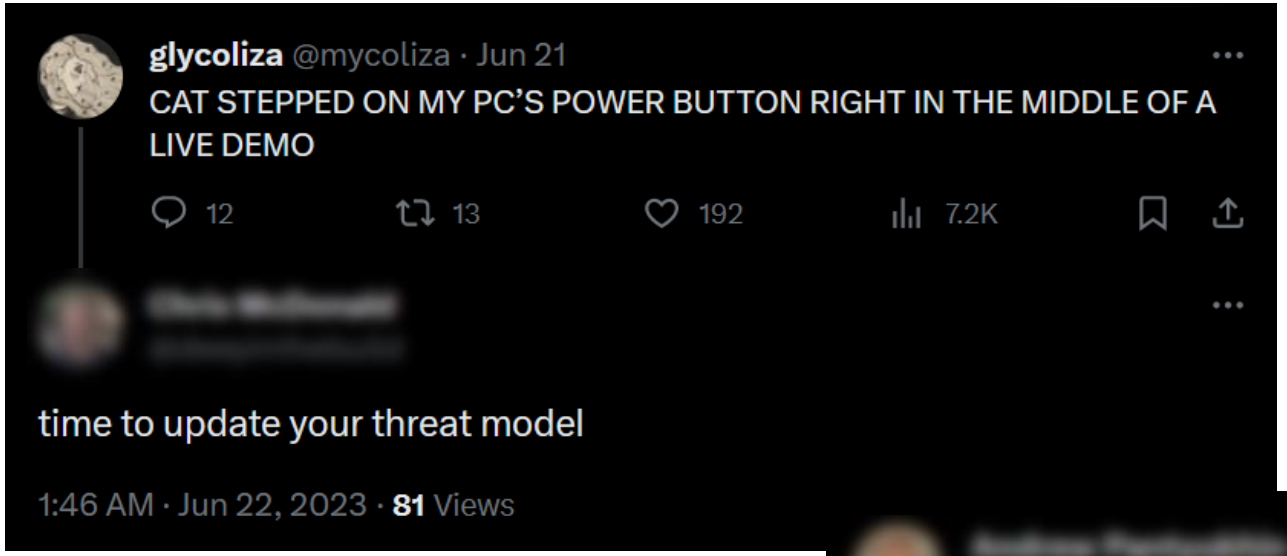
Follow

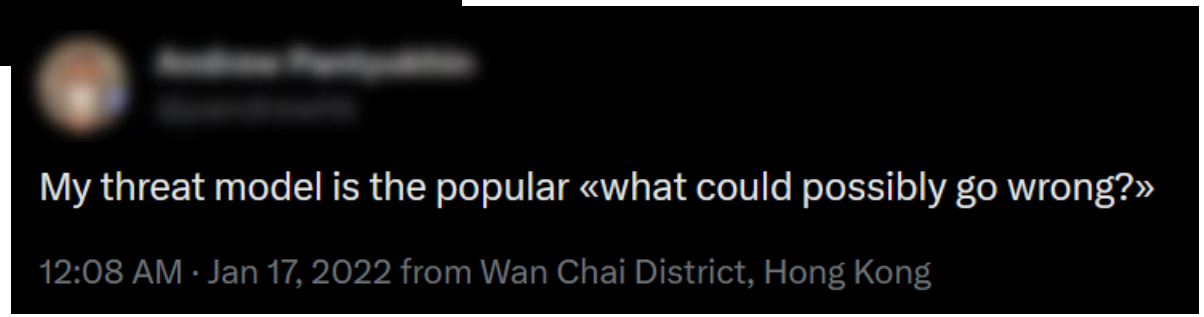
5 min read · Jul 13, 2020

What is a Threat Profile?

~~A buzzword~~

A meme?





What is a Threat Profile?

~~A buzzword~~

~~A meme~~

Simplest definition:

A collection of threats

What is a Threat Profile?

~~A buzzword~~

~~A meme~~

Slightly more granular definition:

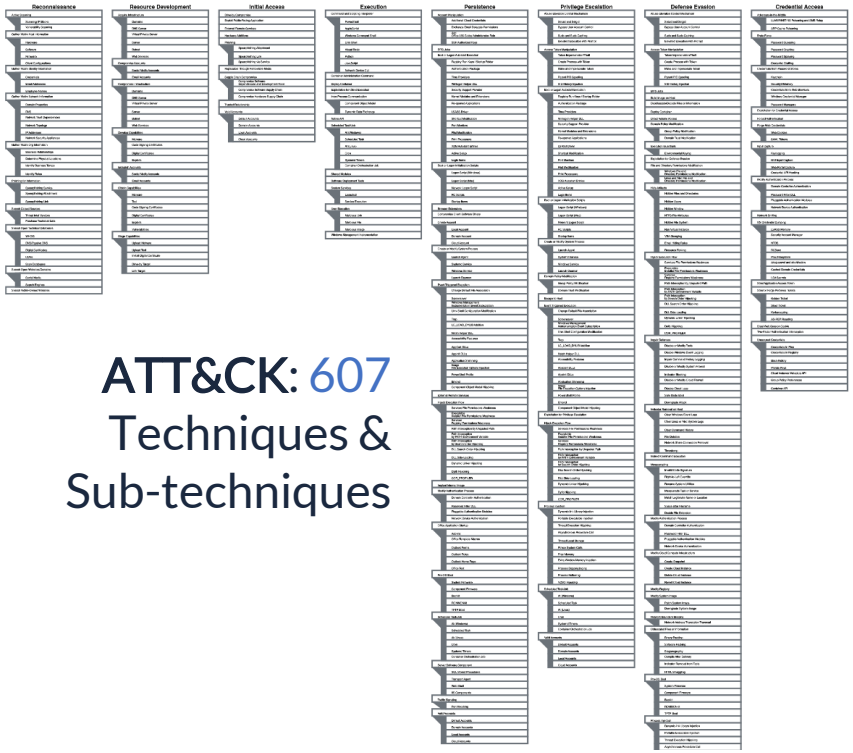
A prioritized (rank-ordered) collection of relevant threats

The Importance of Quantification

Threat Landscape: A Few Truths

The landscape is growing: more threats (groups & malware) are identified each year

- Mandiant: 3,500 groups (+900), 588 new malware families
- Microsoft: 300 actors (160 nation state + 50 ransomware)
- Google: 270 state actors, associated w/ 50+ countries
- 2023: Now over 600 ATT&CK Techniques & Sub-Techniques



ATT&CK: 607 Techniques & Sub-techniques

Threat Landscape: A Few Truths

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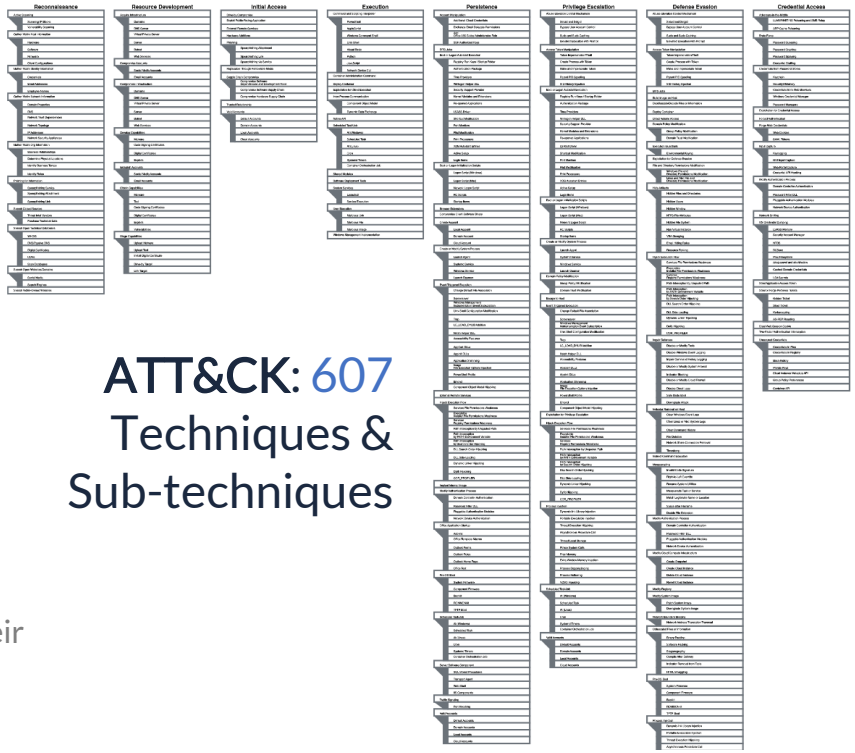

ATT&CK: 607 Techniques & Sub-techniques

Threat intelligence resources are usually limited

- Budgets are tight – in many cases stagnant, shrinking, or at least not keeping pace with threat landscape expansion
  - December 2022 Neustar survey: 49% of companies did not have sufficient budget to address their cybersecurity needs
- No team can track and address every threat at all times

Threat Landscape: A Few Truths

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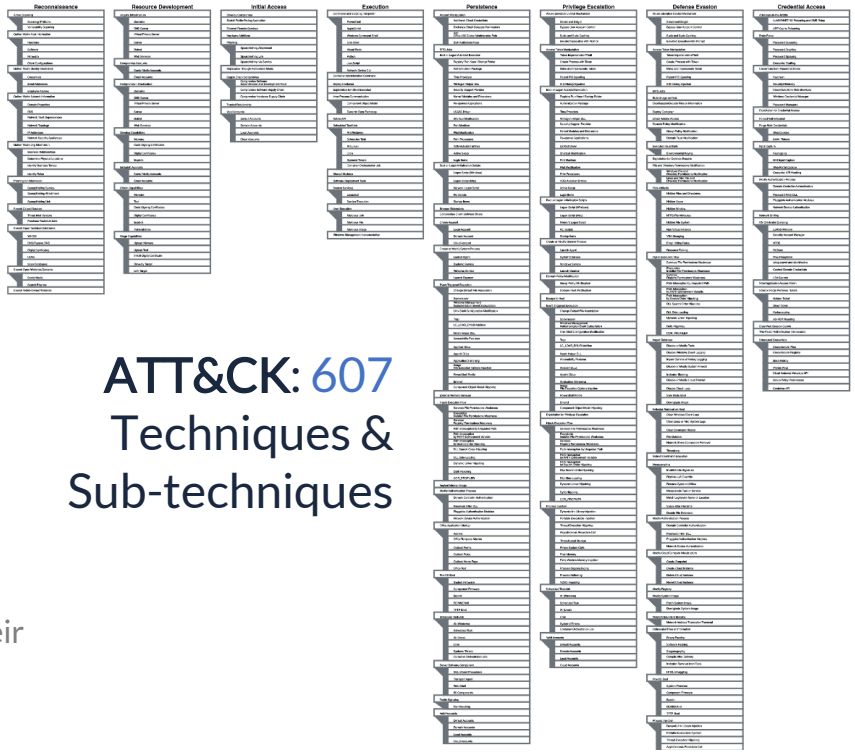

ATT&CK: 607 Techniques & Sub-techniques

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Threat prioritization is a *must*

- Prioritization can only happen with consistency, repeatability, and limited bias via quantification

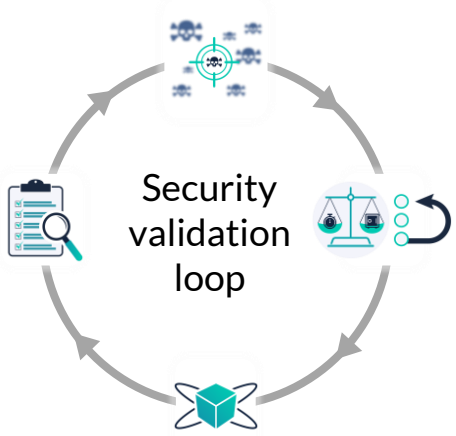
The Importance of Threat Quantification: Visualized

Wide universe of threats

Narrows the focus

Top Priority Threat
Top Priority Threat
Mid-Tier Threat
Mid-Tier Threat
Lower Priority Threat
Lower Priority Threat
Lower Priority Threat

Enables speed



Resource-intensive!

But don't take our word for it… A few classic case studies/examples:

- Nationwide: Using Threat Intelligence to Focus ATT&CK Activities (YouTube)
- Red Canary: How to prioritize effectively with Threat Modeling and ATT&CK (YouTube)
- Katie Nickels: Resistance Isn't Futile (YouTube)
- John Hubbard: Hunting for Post-Exploitation Stage Attacks (YouTube)
- Sajid Nawaz Khan: Adversarial Threat Modelling (GitHub)
- Andy Piazza: Quantifying Threat Actors with Threat Box (Medium)
- Katie Nickels: Getting Started with ATT&CK: Threat Intelligence (Medium)
- Katie Nickels & Adam Pennington: Using ATT&CK for CTI Training (ATT&CK)
- Emulation Planning for Purple Teams (AttackIQ Academy)

All listed here: github.com/tidalcyber/cyber-threat-profiling

Threat Profiling's Value (& Limitations)

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Value & Strengths + Challenges & Limitations

- Benefits of following a threat profiling methodology: **Structure**, **Repeatability, Relevance, Evidence-based, Proactive**
- Existing approaches generally fall short in at least 1 of 3 ways
- Pursuit of near-perfect data often deters/impedes efforts
- Caution: This is a *starting point*!

Factor	Limitation	Our Approach
Defensive Scope/Coverage	Asset- or system-centric	**Enterprise** (Organization)-centric
Threat Scope/Coverage	Focus on high-level threat categories or scenarios	**Focus on adversaries** supports progressive pivoting from organizational context to identification of relevant threats and their capabilities & behaviors, and ultimately to relevant defenses Surface **granular adversarial** behaviors that **align with discrete defensive capabilities**
Complexity	Lengthy, usually require SME input	Can be completed by **staff with varied skill levels** and **across team roles/disciplines**

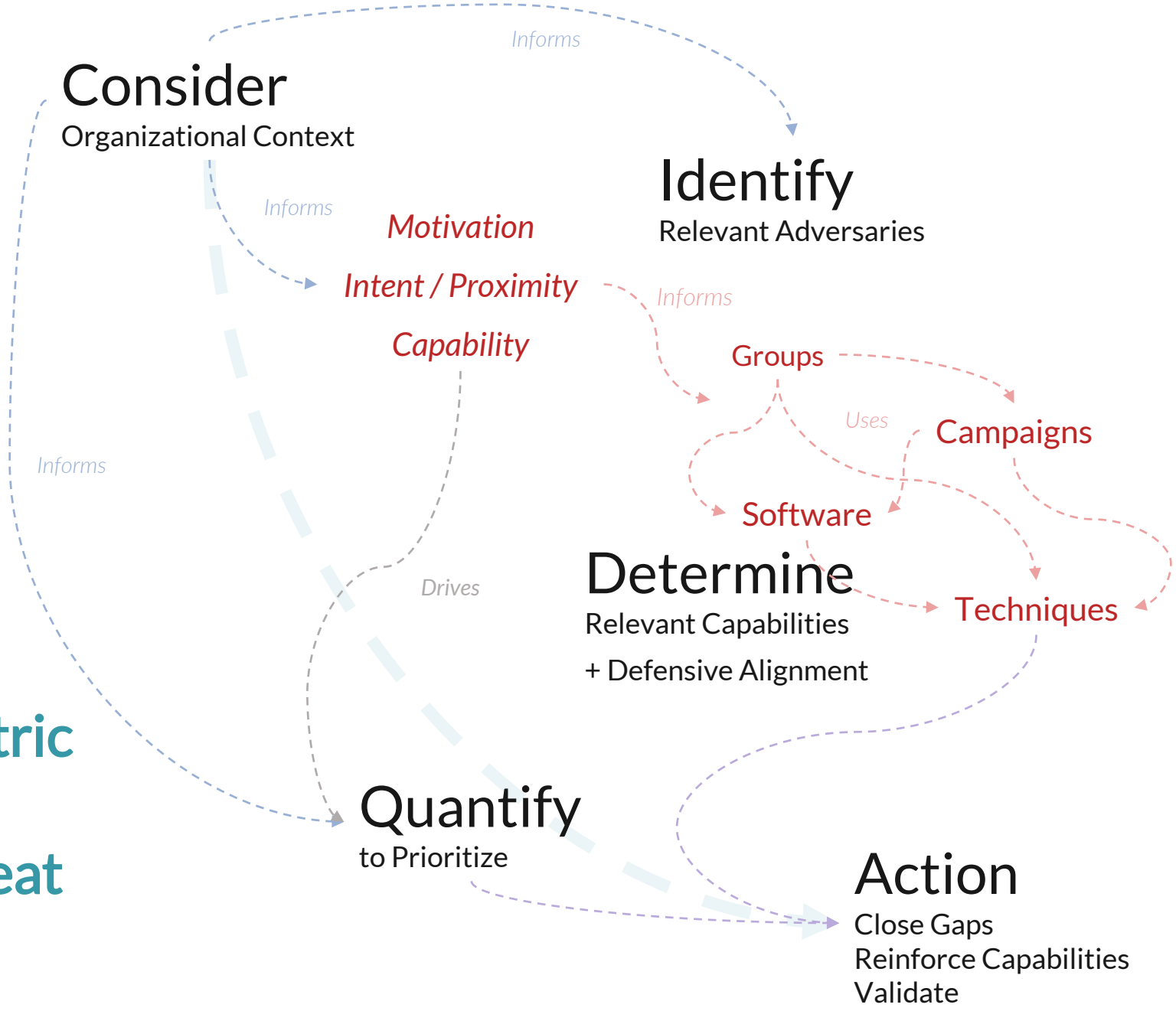
Threat Profiling Approach: Key Elements

- Consider Organizational Context
- Identify Relevant Adversaries
  - Determine Relevant Capabilities
  - Defensive Alignment
- Quantify to Prioritize
- Take Action!

Threat Profiling Approach: Key Elements

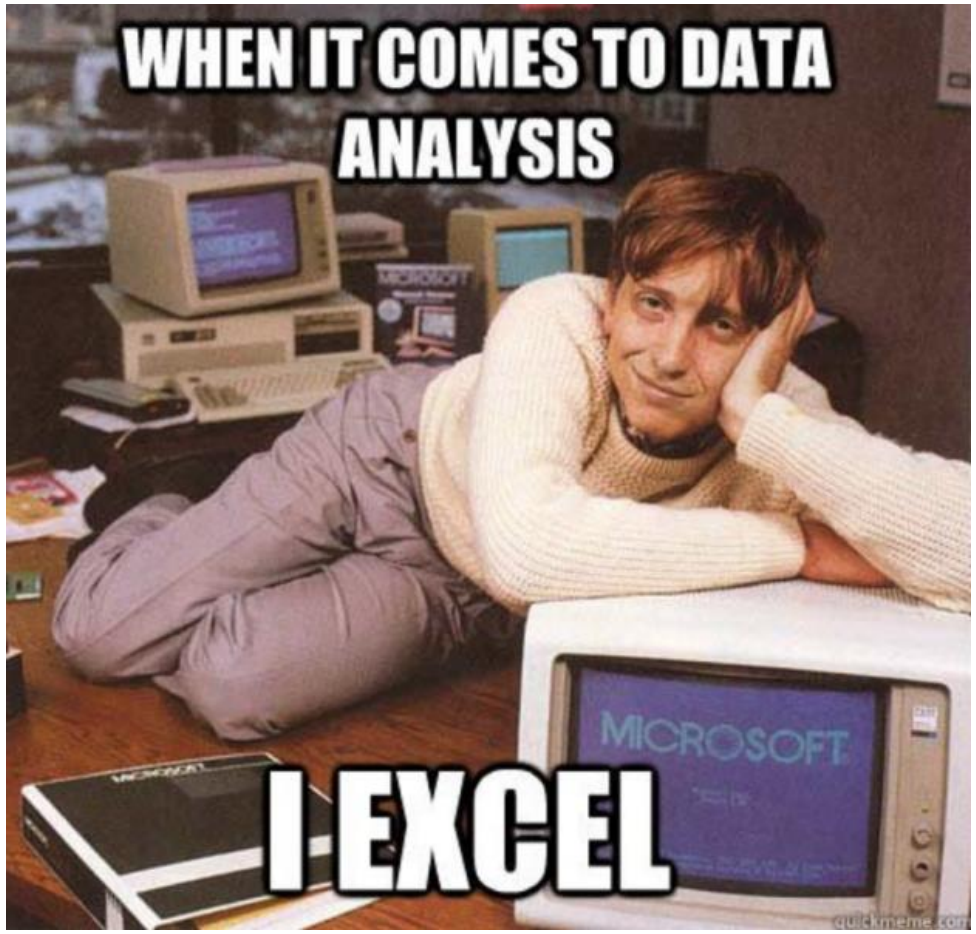
- Consider Organizational Context
- **Identify Relevant Adversaries**
  - **Determine Relevant Capabilities**
  - Defensive Alignment
- **Quantify to Prioritize**
- Take Action!

Enterprise-Centric Adversary Behavioral Threat Profiling



Threat Profile: Logistics

- Threat Profile: A prioritized **list** of relevant threats
  - Adversaries, capabilities, & techniques
- *Any list-documentation* tool or software will do
  - Notetaking/word processor
  - Spreadsheet software (simple calculations)
  - Scripts and/or dashboarding software as you mature
- Threat Profiling: It's About the **Mindset**



Case Study: European Healthcare Organization

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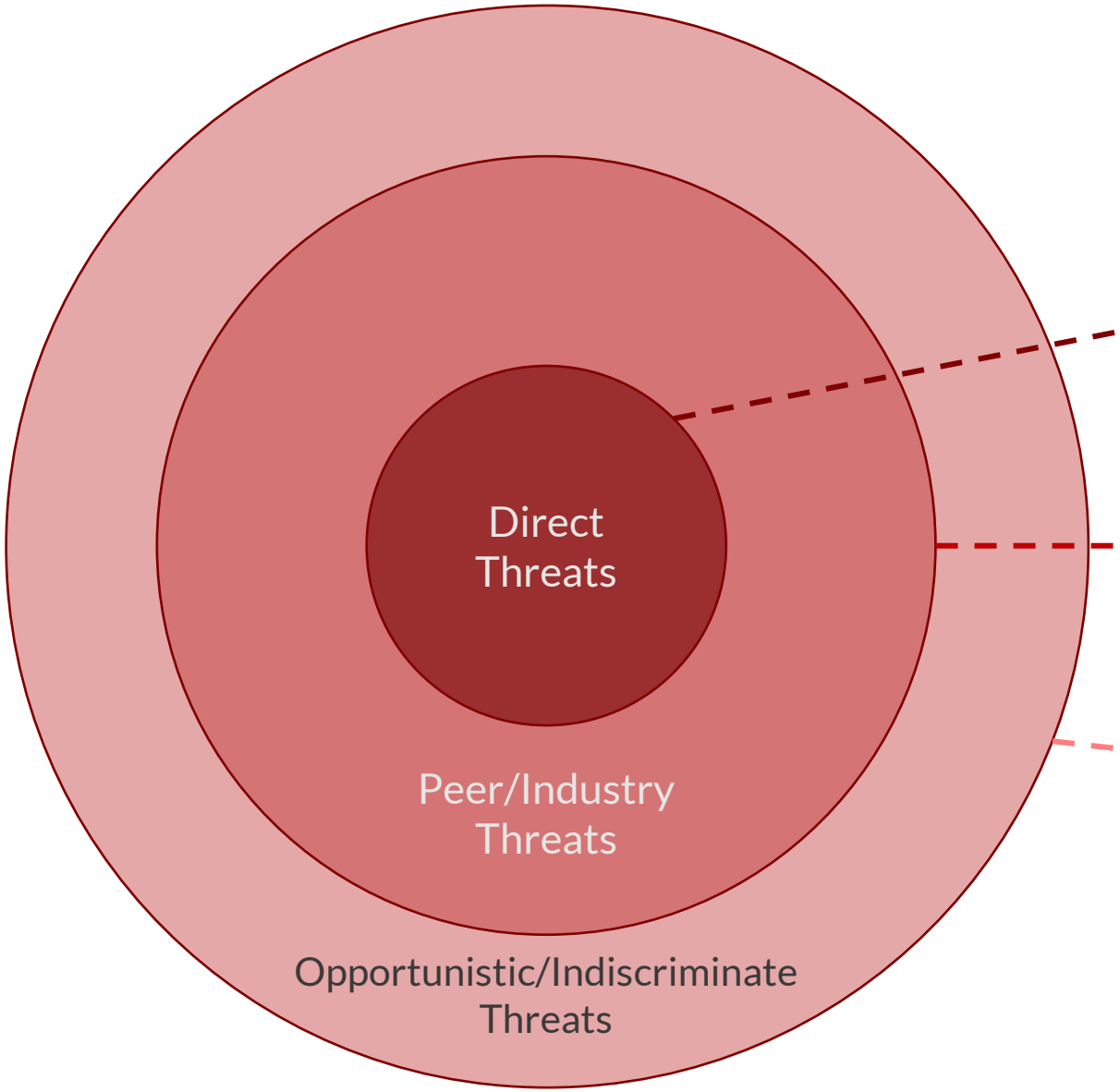
General Guidance: Quantifying Complex Threat Concepts

- Threat = **Intent** x **Capability** x Opportunity
- What we will accomplish:
  - Measure threats according to factors including **Proximity/Intent**, "**density**", **Capability** & **Capacity**, and **organizational priority**
  - **Prioritize (rank order)** based on relative final weightings/scores
- Scoring ranges: Scale relative to your team's resources, bandwidth, and/or current maturity/expertise:
  - **1-5 is most common in practice**
  - 2- to 3-point all the way to 100-point

Identify Relevant Adversaries (Populating our List)

Surfacing Relevant Adversaries



Relevant Knowledge Sources

Telemetry, Historical Incident Data

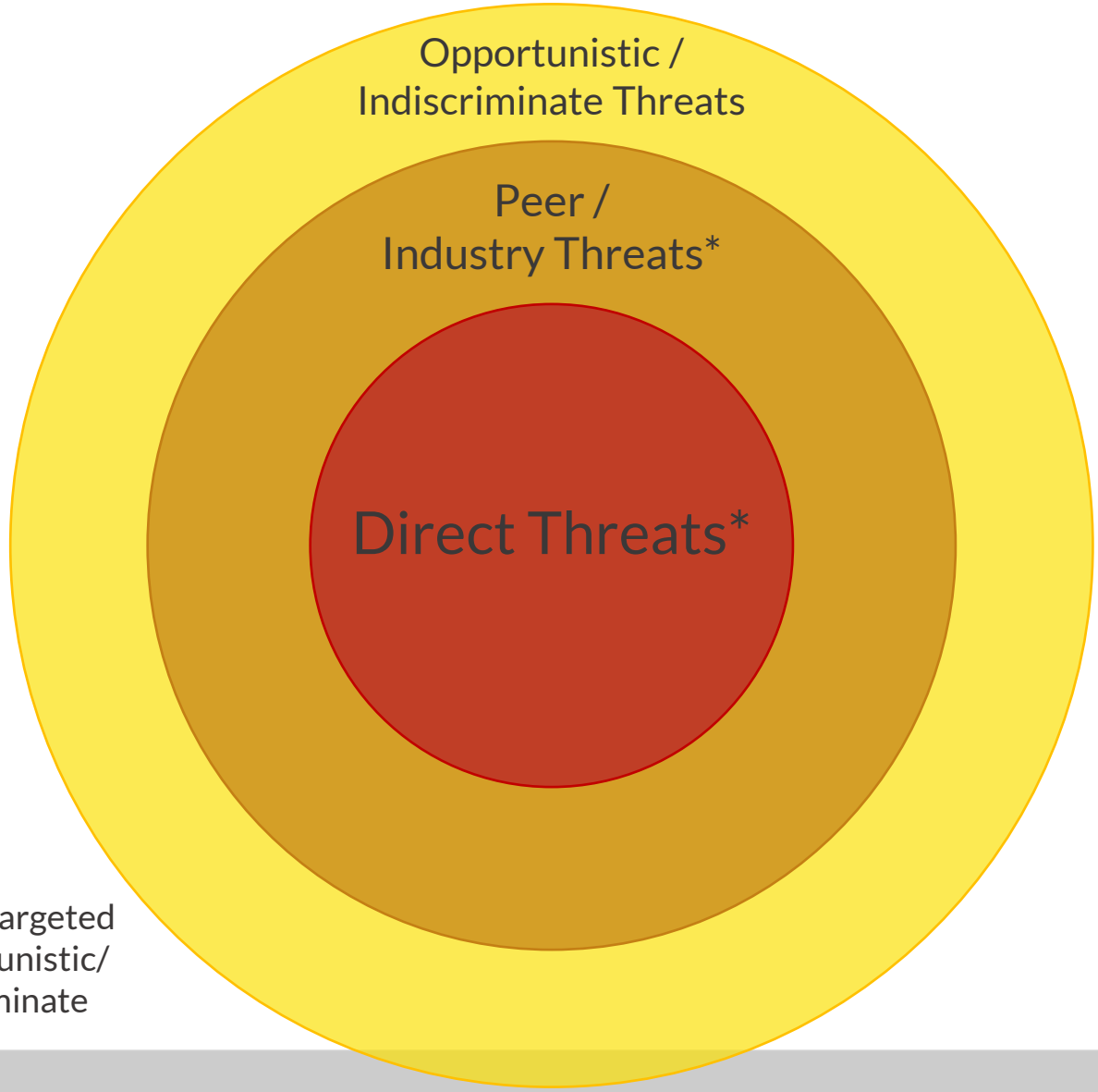
Intel Sharing, Government & Vendor Reporting

News Reporting (and sources above)

Approximating Adversary Intent

- We rarely have clear evidence pointing to adversaries' ultimate intentions
- Look to the **growing body** of cyber incident evidence to gauge approximations of them
  - We believe a cr**itical mass of data now exists**
- General recommendation: **Three "proximity" tiers**
  - Note as you go!

A Practical Approach to Approximating Adversary Intent



* May be targeted or opportunistic/ indiscriminate

Surfacing Direct Threats

- Smart to include what you already know!
  - (But some teams like to perform independent assessments)
- Lean on your partners – many teams aren't consistently attributing threats
  - (And that's ok! See especially Ch. 5 of [The Risk Business](#) by Levi Gundert)

Adversary or Campaign Name	Proximity Tier	Evidence	Proximity Score
Andariel	Direct Threat	**Our team attributed** with moderate confidence a 2021 incident to this group	5
Wizard Spider	Direct Threat	Our endpoint vendor **has quarantined multiple samples** of malware distributed by this group	5
TA1337	Direct Threat	Our email security vendor blocked phishing emails attributed to this group	5

Surfacing Proximate Threats

- **Common CTI metadata**: victim sector, location, and/or organization size
- **Common sources**: government and national CERT advisories, public or commercial vendor reporting, independent analyses (incident response or malware analysis/threat research blogs)
- **Aggregation resources** will save you time!

Some Favorites:

ETDA/ThaiCERT: Threat Encyclopedia: apt.etda.or.th/cgi-bin/aptgroups.cgi

AlienVault OTX: otx.alienvault.com

MISP Threat Actor Galaxy: github.com/MISP/misp-galaxy/blob/main/clusters/threat-actor.json

SecureWorks Cyber Threat Group Profiles: secureworks.com/research/threat-profiles

Palo Alto Unit42 Playbooks: pan-unit42.github.io/playbook_viewer

CrowdStrike Adversary Industries: adversary.crowdstrike.com/en-US/industries

APT Groups & Operations (public Google Sheet)

Tidal structured Group metadata (ATT&CK & public sources): app.tidalcyber.com/groups

Surfacing Proximate Threats: Case Study Examples

"healthcare" AND "threat actor"

(20 threats)

MITRE | ATT&CK

Matrices Tactics Techniques Data Sources Mitigations Groups Software Campaigns Resources Blog Contribute Search

healthcare

C0010, Campaign C0010
C0010 C0010 was a cyber espionage campaign conducted by UNC3890 that targeted Israeli shipping, government, aviation, energy, and healthcare organizations. Security researcher assess UNC3890 conducts operations in support of Iranian interests, and noted several limited technical connections to Iran, including PDB strings and Far...

Orangeworm, Group G0071
Orangeworm Orangeworm is a group that has targeted organizations in the healthcare sector in the United States, Europe, and Asia since at least 2015, likely for the purpose of corporate espionage.[1] ID: G0071 Contributors: Elger Vinicius S. Rodrigues, @elgervinicius, CYB...

Tonto Team, Earth Akhlut, BRONZE HUNTLEY, CactusPete, Karma Panda, Group G0131
... by 2020 they expanded operations to include other Asian as well as Eastern European countries. Tonto Team has targeted government, military, energy, mining, financial, education, healthcare, and technology organizations, including through the Heartbeat Campaign (2009-2012) and Operation Bitter Biscuit (2017).[1][2][3][4][5][6] ID: G0131 ⓘ Associated Groups: Earth Akhlut, BRONZ...

Leviathan, MUDCARP, Kryptonite Panda, Gadolinium, BRONZE MOHAWK, TEMP.Jumper, APT40, TEMP.Periscope, Group G0065
... filiated front company.[1] Active since at least 2009, Leviathan has targeted the following sectors: academia, aerospace/aviation, biomedical, defense industrial base, government, healthcare, manufacturing, maritime, and transportation across the US, Canada, Europe, the Middle East, and Southeast Asia.[1][2][3] ID: G0065 ⓘ Associated Groups: MUDCARP, Kryptonite Panda, Gadoliniu...

Deep Panda, Shell Crew, WebMasters, KungFu Kittens, PinkPanther, Black Vine, Group G0009
... Deep Panda Deep Panda is a suspected Chinese threat group known to target many industries, including government, defense, financial, and telecommunications. [1] The intrusion into healthcare company Anthem has been attributed to Deep Panda. [2] This group is also known as Shell Crew, WebMasters, KungFu Kittens, and PinkPanther. [3] Deep Panda also appears to be known as Black V...

menuPass, Cicada, POTASSIUM, Stone Panda, APT10, Red Apollo, CVNX, HOGFISH, Group G0045
... Chinese Ministry of State Security's (MSS) Tianjin State Security Bureau and worked for the Huaying Haitai Science and Technology Development Company.[1][2] menuPass has targeted healthcare, defense, aerospace, finance, maritime, biotechnology, energy, and government sectors globally, with an emphasis on Japanese organizations. In 2016 and 2017, the group is known to have targ...

APT41, Wicked Panda, Group G0096
... archers have assessed as Chinese state-sponsored espionage group that also conducts financially-motivated operations. Active since at least 2012, APT41 has been observed targeting healthcare, telecom, technology, and video game industries in 14 countries. APT41 overlaps at least partially with public reporting on groups including BARIUM and Winnti Group.[1][2] ID: G0096 ⓘ Assoc...

Tropic Trooper, Pirate Panda, KeyBoy, Group G0081
... Trooper is an unaffiliated threat group that has led targeted campaigns against targets in Taiwan, the Philippines, and Hong Kong. Tropic Trooper focuses on targeting government, healthcare, transportation, and high-tech industries and has been active since 2011.[1][2][3] ID: G0081 ⓘ Associated Groups: Pirate Panda, KeyBoy Contributors: Edward Millington; Bart Parys Version: 1...

Surfacing Proximate Threats: Case Study Examples

THREAT PROFILES

Explore the latest threat group definitions and profiles published by the Secureworks® Counter Threat Unit™ (CTU) Research Team.

health

CYBERCRIME

GOLD RAINFOREST

Objectives Extortion, Financial gain

Aliases Lapsus$, Strawberry Tempest (Microsoft)

Tools Mimikatz

GOLD RAINFOREST was an international threat group responsible for the compromises of high-profile organisations conducted between mid-2021 and September 2022 under the banner of the Lapsus$ hack-and-leak group. Originally thought to be financially motivated, group members may have been driven more by the desire to boost their reputations on underground...

READ MORE

CYBERCRIME

GOLD SOUTHFIELD

Objectives Financial gain, Ransomware

Tools REvil

GOLD SOUTHFIELD was a financially motivated cybercriminal threat group that authored and operated the REvil (aka Sodinokibi) ransomware on behalf of various affiliated threat groups. Operational from April 2019 to January 2023, the group obtained the GandCrab source code from GOLD GARDEN, the operators of GandCrab that voluntarily withdrew their...

READ MORE

1

Know them. Find them. Stop them.

Discover the adversaries targeting your industry.

Your Industry: Healthcare | Business Size | Your Country | Clear | Update Search

Your Threat Landscape

Back to Global Threat Landscape

Adversaries potentially targeting you **29** of **225**

Unlock your threat landscape

Surfacing Proximate Threats: Case Study Examples

ETDA สำนักงานพัฒนาธุรกรรมทางอิเล็กทรอนิกส์
Electronic Transactions Development Agency

Groups Tools Search Statistics

Home > Search

Threat Group Cards: A Threat Actor Encyclopedia

Database search

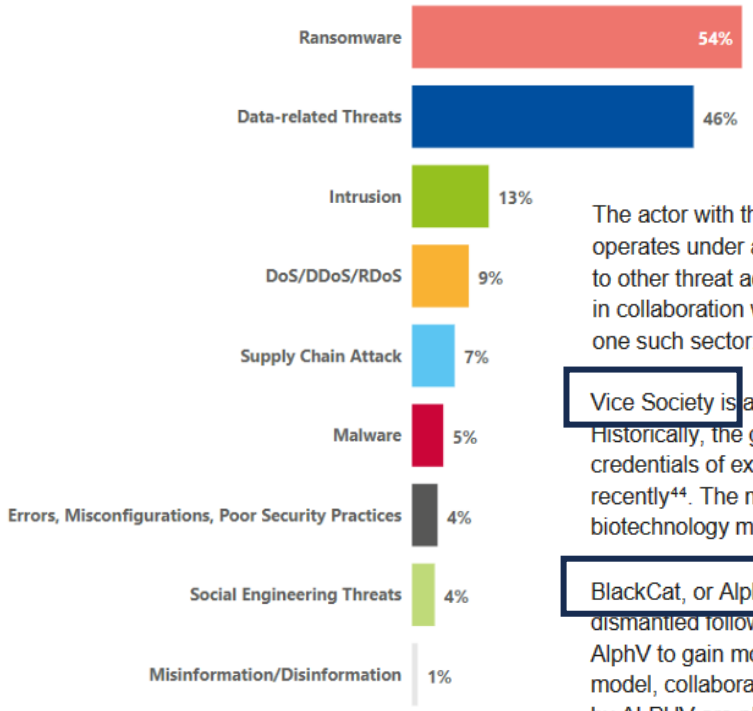
Actor	Source country	...
	Victim country	... ☐ or Worldwide
	Victim sector	Healthcare
	Motivation	...
	Free text search	(can use '*' and '?' wildcards)
		Search!

56 groups listed (53 APT, 3 other, 0 unknown)

"Observed"? "Targeted"?

Surfacing Proximate Threats: Case Study Examples

Figure 5: Threats in the health sector (January 2021 to March 2023)



The actor with the most observed incidents is LockBit 3.0, also referred to as Lockbit Black (20 incidents). The group operates under a Ransomware-as-a-Service (RaaS) model, which enables them to distribute their malicious software to other threat actors. Previous instances of this threat actor group were named LockBit 2.0 and LockBit. By working in collaboration with affiliates, the group extends its reach and targets a diverse range of sectors, healthcare being one such sector.

Vice Society is another ransomware gang that has been involved in high-profile attacks. It has been active since 2019. Historically, the group had been deploying variants of existing ransomware strains by leveraging compromised credentials of exploited internet-facing applications[43]. The group, however, started deploying their own locker software recently[44]. The main types of entities impacted by Vice Society were hospitals (6 incidents), medical device and biotechnology manufacturers (2 incidents) out of a total of 9 incidents during the reporting period.

BlackCat, or AlphV ransomware group, has been active since November 2021 but got more traction after REvil was dismantled following arrests in Russia at the beginning of 2022. This event provided an opportunity for BlackCat or AlphV to gain more traction and attention. Like other ransomware groups, they employ an affiliate-based business model, collaborating with other threat partners to carry out their attacks. The main types of entities that were impacted by ALPHV are pharmaceutical companies (3 incidents) out of a total of 5 incidents during the reporting period.

Other ransomware groups that have being active during the reporting period include Conti, Hive, LV, RansomEXX, RansomHouse (3 incidents each) and Wizard Spider and REvil (2 incidents each), followed by single instances of other groups.

https://www.enisa.europa.eu/publications/health-threat-landscape

Surfacing Proximate Threats: Case Study Examples

https://www.hhs.gov/sites/default/files/types-threat-actors-threaten-healthcare.pdf

Named adversary Groups/Software:

LockBit 3.0

Clop*

Royal*

BianLian

Lapsus$*

KillNet

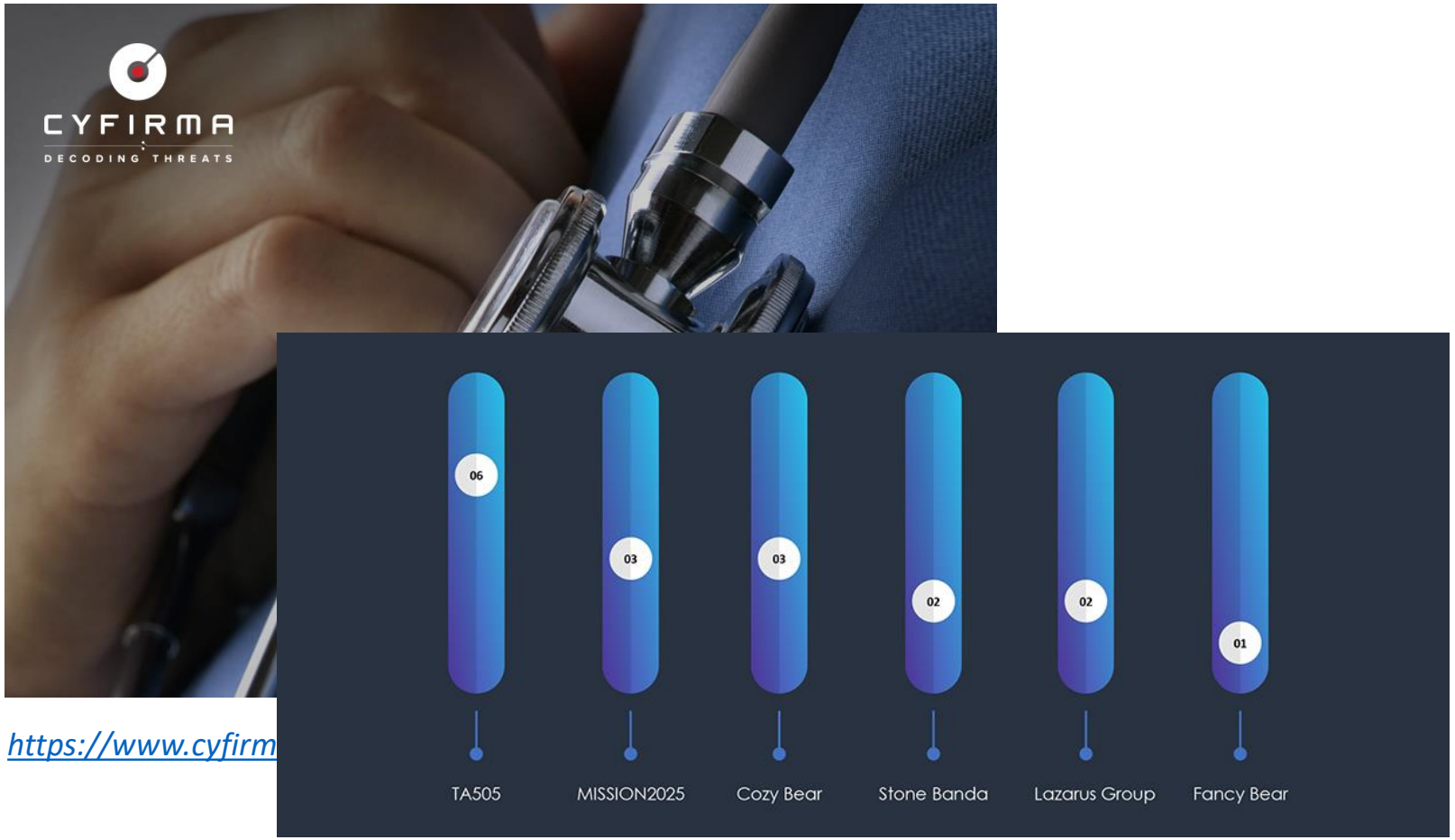
Andariel*

APT41*

NoName057(16)

**In ATT&CK (v13)*

Surfacing Proximate Threats: Case Study Examples



https://www.cyfirm

Named adversary Groups/Software ("observed campaigns"):

TA505* (6)

MISSION2025* (3)

Cozy Bear* (3)

Stone Panda* (2)

Lazarus Group* (2)

Fancy Bear* (1)

**In ATT&CK (v13)*

Note as you go!

Threat Prioritization (“Quantifying” our List)

What Now? Key Inclusion/Narrowing Factors

Ranked by feasibility (in the presenter's experience):

1. Referenced by multiple sources
   a. Source quality/reliability/confidence ("Source Value") – "Targeted" vs. "Observed" activity?
2. Wider industry vs. specific sub-sector vs. immediate Peer impact ← Note as you go!
3. Threat has (ATT&CK) TTPs? (Bandwidth limitations)

Surfacing Proximate Threats: Tally the Results

ATT&CK Website	Secureworks	Thai CERT	ENISA	HHS	Cyfirma
Operation Wocao	LAPSUS$	APT1	LockBit 3.0	LockBit 3.0	TA505
Whitefly	GOLD SOUTHFIELD	APT18	Vice Society	Clop	menuPass
C0010	REvil	APT28	BlackCat	Royal	APT29
Fox Kitten		APT33	Conti	BianLian	APT10
Leviathan		APT37	Hive	Lapsus$	Lazarus Group
EXOTIC LILY		APT41	LV	KillNet	APT28
Tonto Team		APT-C-36	RansomEXX	Andariel	
Tropic Trooper		BlackTech	RansomHouse	APT41	
APT41		Carbanak	Wizard Spider	NoName057(16)	
Orangeworm		Cleaver	REvil		
LAPSUS$		Dark Caracal			
menuPass		Darkhotel			
Deep Panda		FIN4			
FIN4		FIN8			
Clop		Fox Kitten			
EKANS		Higaisa			
Pysa		Indrik Spider			
Bandook		Kimsuky			
		Magic Hound			
		menuPass			
		Mofang			
		MuddyWater			
		Orangeworm			
		Suckfly			
		TA505			
		Tropic Trooper			
		Whitefly			
		Winnti Group			
		Wizard Spider			

58 total threats identified

Threat	Sum of "Source Value"	Sources Referenced (6 Total)
LAPSUS$	6	3
APT41	6	3
LockBit 3.0	5	2
Clop	5	2
menuPass	4	3
REvil	3	2
Tropic Trooper	3	2
Orangeworm	3	2
FIN4	3	2
Whitefly	3	2
Wizard Spider	3	2
Fox Kitten	3	2
Royal	3	1
NoName057(16)	3	1
Andariel	3	1
BianLian	3	1
KillNet	3	1
APT28	2	2
TA505		
Pysa		
LV		
Leviathan		
Conti		
Operation Wocao		
RansomHouse		
Deep Panda		

"Top 5" Threats = ~30 minutes of work

(At least they're unlikely to be "wrong"!)

Surfacing Proximate Threats: Tally the Results

	Adversary or Campaign Name	Proximity Tier	Evidence	Proximity Score
Also a Proximate threat	**Andariel**	Direct Threat	**Our team attributed** with moderate confidence a 2021 incident to this group	5
Also a Proximate threat	**Wizard Spider**	Direct Threat	Our endpoint vendor **has quarantined multiple samples** of malware distributed by this group	5
	TA1337	Direct Threat	Our email security vendor blocked phishing emails attributed to this group	5
Score boost (relevance)	**APT41**	Proximate Threat	Per news reporting, carried out a campaign **targeting our largest competitor** (our closest peer)	4
Score boost (relevance)	**LAPSUS$**	Proximate Threat	Per our ISAC, **targeted another peer org** (one that manufactures significantly different products but with a similar geographic & supplier footprint)	4
Score boost (relevance)	**Vice Society**	Proximate Threat	Per public reporting, linked to **several attacks involving European healthcare orgs** (specific companies not known)	4
	menuPass	Proximate Threat	Per public reporting, linked to attacks involving entities in our industry generally	3
	FIN4	Proximate Threat	Per public reporting, linked to attacks involving entities in our industry generally	3

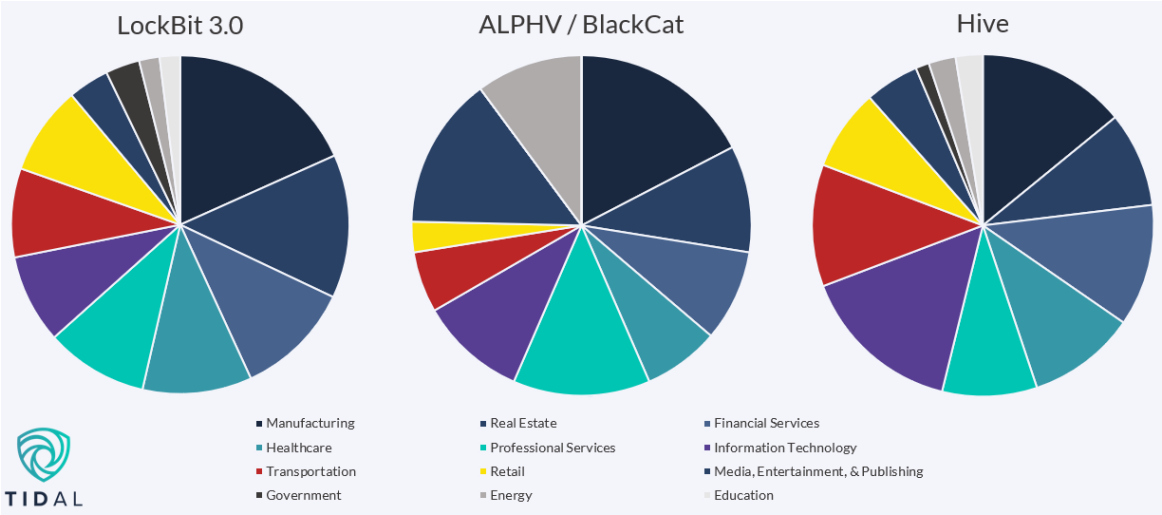
Indiscriminate Threats: Measuring Intent & Prevalence

“Opportunistic” & Indiscriminate Threats

- Some of the most difficult to threat profile
  - However, there is often considerable data around them (not necessarily standardized…)
- What ultimately determines thresholds? **You**
  - Lean on the metrics, even imperfect ones
  - Critical thinking: *Why* would a top/trending adversary look at/target you?

CRIMEWARE

SocGholish Diversifies and Expands Its Malware Staging Infrastructure to Counter Defenders



Groups

APT29

ADD TO MATRIX

Suspected Attribution: Russia

Motivation: Cyber Espionage

Observed Countries: Austria, Brazil, China, France, Germany, Hungary, Japan, Republic of Korea, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, Ukraine, United Kingdom, United States, Uzbekistan

Observed Sectors: Aerospace, Education, Energy, Financial Services, Government, Insurance, Legal, Manufacturing, Media, NGOs, Non Profit, Pharmaceuticals, Technology, Telecommunications, Think Tanks

Sources: MITRE, Tidal Cyber

Quantifying “Indiscriminate” Ransomware Threats

ransomwatch.telemetry.ltd

type to search

ransomwatch

home

group index

recent posts

stats & graphs

group profiles

notable projects

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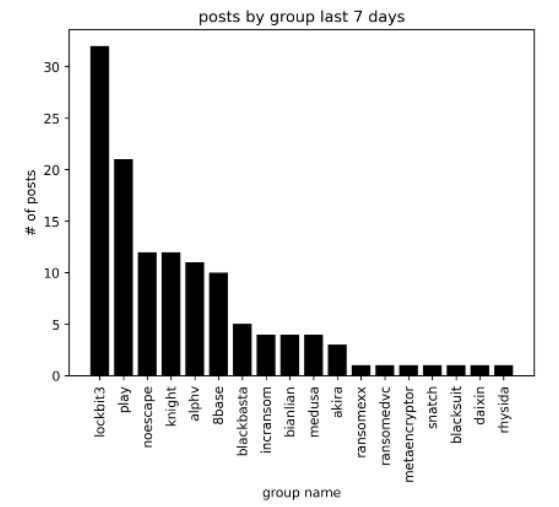
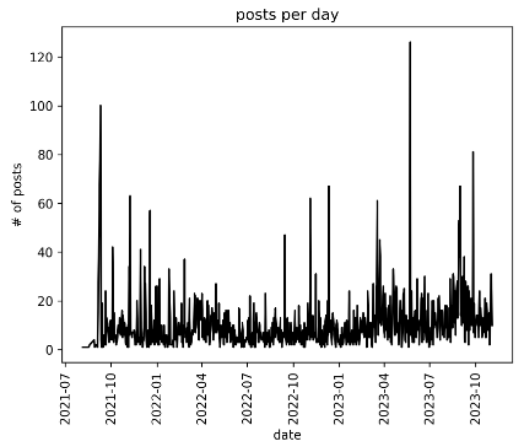
group profiles

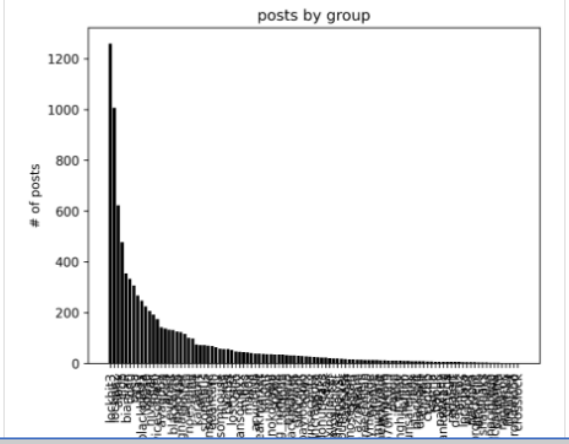
notable projects

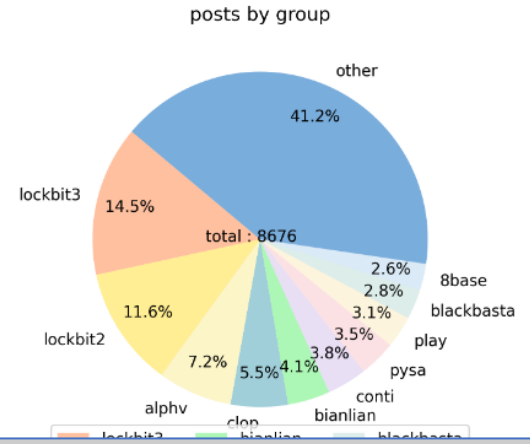
stats

timestamp association commenced october 21"









Quantifying “Indiscriminate” Ransomware Threats

Threat	Healthcare - Public Victims	Total Victims	Ratio of Healthcare
clop	142	1507	9%
lockbit3	44	1266	3%
~~lockbit2~~	~~23~~	~~1006~~	~~2%~~
pysa	22	308	7%
alphv	17	625	3%
royal	15	192	8%
~~hiveleak~~	~~14~~	~~207~~	~~7%~~
everest	12	133	9%
~~conti~~	~~11~~	~~333~~	~~3%~~
bianlian	11	354	3%
vicesociety	9	174	5%
karakurt	8	74	11%
blackbyte	8	131	6%
snatch	6	116	5%
avaddon	6	142	4%
~~quantum~~	~~6~~	~~68~~	~~9%~~
blackbasta	5	247	2%
ransomhouse	5	58	9%
marketo	5	32	16%
~~suncrypt~~	~~4~~	~~30~~	~~13%~~
~~trigona~~	~~4~~	~~45~~	~~9%~~
lorenz	4	72	6%
xinglocker	4	21	19%
noescape	3	101	3%
ransomexx	3	46	7%

Threat	Healthcare - Public Victims	Total Victims	Ratio of Healthcare
clop	142	1507	9%
lockbit3	44	1266	3%
pysa	22	308	7%
alphv	17	625	3%
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everest	12	133	9%
bianlian	11	354	3%
vicesociety	9	174	5%
karakurt	8	74	11%
blackbyte	8	131	6%
snatch	6	116	5%

Threat	Healthcare - Public Victims	Total Victims	Ratio of Healthcare
projectrelic	1	5	20%
xinglocker	4	21	19%
daixin	2	11	18%
0mega	1	6	17%
redalert	1	6	17%
marketo	5	32	16%
karakurt	8	74	11%
clop	142	1507	9%
everest	12	133	9%
ransomhouse	5	58	9%
royal	15	192	8%

Our Current Threat Profile

Adversary or Campaign Name	Proximity Tier	Evidence	Proximity Score
Andariel	Direct Threat	**Our team attributed** with moderate confidence a 2021 incident to this group	5
Wizard Spider	Direct Threat	Our endpoint vendor **has quarantined multiple samples** of malware distributed by this group	5
TA1337	Direct Threat	Our email security vendor blocked phishing emails attributed to this group	5
LockBit	Proximate Threat	Noted as an industry threat in multiple high-reliability reports and a leading healthcare ransomware group, in terms of total victims	4
APT41	Proximate Threat	Per news reporting, carried out a campaign **targeting our largest competitor** (our closest peer)	4
LAPSUS$	Proximate Threat	Per our ISAC, **targeted another peer org** (one that manufactures significantly different products but with a similar geographic & supplier footprint)	4
Vice Society	Proximate Threat	Per public reporting, linked to **several attacks involving European healthcare orgs** (specific companies not known)	4
menuPass	Proximate Threat	Per public reporting, linked to attacks involving entities in our industry generally	3
FIN4	Proximate Threat	Per public reporting, linked to attacks involving entities in our industry generally	3
Cl0p Actors	Proximate Threat	A leading healthcare ransomware group, in terms of total and proportion of victims	3
Royal Ransomware Actors	Proximate Threat	A leading healthcare ransomware group, in terms of total and proportion of victims	3
Everest Ransomware Actors	Proximate Threat	A leading healthcare ransomware group, in terms of total and proportion of victims	2
Karakurt Extortion Group	Proximate Threat	A leading healthcare ransomware group, especially in terms of proportion of victims	2

Further Quantification: “Capacity” & Capabilities

Key (Practical) Quantification Factors

Ranked by feasibility (in the presenter's experience):

1. Proximity Tier ✓
2. Reference count
   a. Especially references where Proximity exists (points towards "targeting"?)
3. Source count/prevalence
4. Activity *recency*
   a. Does the group even still exist? (e.g., ransomware disruptions)
   b. Every team will vary but…2 years for "still active", 6 months-1 year for "recently active"
5. Adversary capability/capacity/sophistication
6. Activity *levels*

Quantification: Adversary Software “Density”

LAPSUS$	APT41	LockBit Ransomware Actors & Affiliates	Clop	menuPass	GOLD SOUTHFIELD	Tropic Trooper	Orangeworm	Whitefly	Wizard Spider	Fox Kitten
Mimikatz	ASPXSpy	7-Zip	Clop	AdFind	Revil	BITSAdmin	Arp	Mimikatz	AdFind	China Chopper
Ntdsutil	BITSAdmin	AdFind	LEMURLOOT	certutil	ConnectWise	KeyBoy	cmd		Bazar	Chisel
	BLACKCOFFEE	Advanced IP Scanner		ChChes		PoisonIvy	ipconfig		BloodHound	Nmap
	certutil	Advanced Port Scanner		cmd		ShadowPad	Kwampirs		Cobalt Strike	Pay2Key
	China Chopper	AdvancedRun		Cobalt Strike		USBferry	Net		Conti	PsExec
	Cobalt Strike	AnyDesk		Ecipekac		YAHOYAH	netstat		Dyre	TightVNC
	Derusbi	Atera Agent		esentutl			route		Emotet	
	dsquery	Backstab		EvilGrab			Systeminfo		Empire	
	Empire	Bat Armor		FYAnti					GrimAgent	
	ftp	BloodHound		Impacket					Mimikatz	
	gh0st RAT	Chocolatey		Mimikatz					Net	
	ipconfig	ConnectWise		Net					Nltest	
	KEYPLUG	Defender Control		Ntdsutil					Ping	
	MESSAGETAP	ExtPassword		P8RAT					PsExec	
	Mimikatz	FileZilla		Ping					Ryuk	
	Net	FreeFileSync		PlugX					TrickBot	
	netstat	GMER		PoisonIvy						
	njRAT	Impacket		PowerSploit						
	Ping	LaZagne		PsExec						
	PlugX	Ligolo		pwdump						
	PowerSploit	LockBit 3.0		QuasarRAT						
	pwdump	LostMyPassword		RedLeaves						
	ROCKBOOT	MEGAsync		SNUGRIDE						
	ShadowPad	Mimikatz		SodaMaster						
	Winnti for Linux	PasswordFox		UPPERCUT						
	ZxShell	PCHunter								
		Plink								
		PowerTool								
		ProcDump								
		Process Hacker								
		PsExec								
		Rclone								
		Seatbelt								
		SoftPerfect Network Scanner								
		Splashtop								
		TDSSKiller								
		TeamViewer								
		ThunderShell								
		WinSCP								

Quantification: Adversary "Capacity"

- Probably the most subjective factor
- **Use structured criteria**
- Start in the middle, then compare relatively
- Scoring may be biased on information availability
- Recommendation: Assign lower scores if not enough details exist
- It's ok to assign low scores!

MEASUREMENTS OF THREAT ACTOR SOPHISTICATION

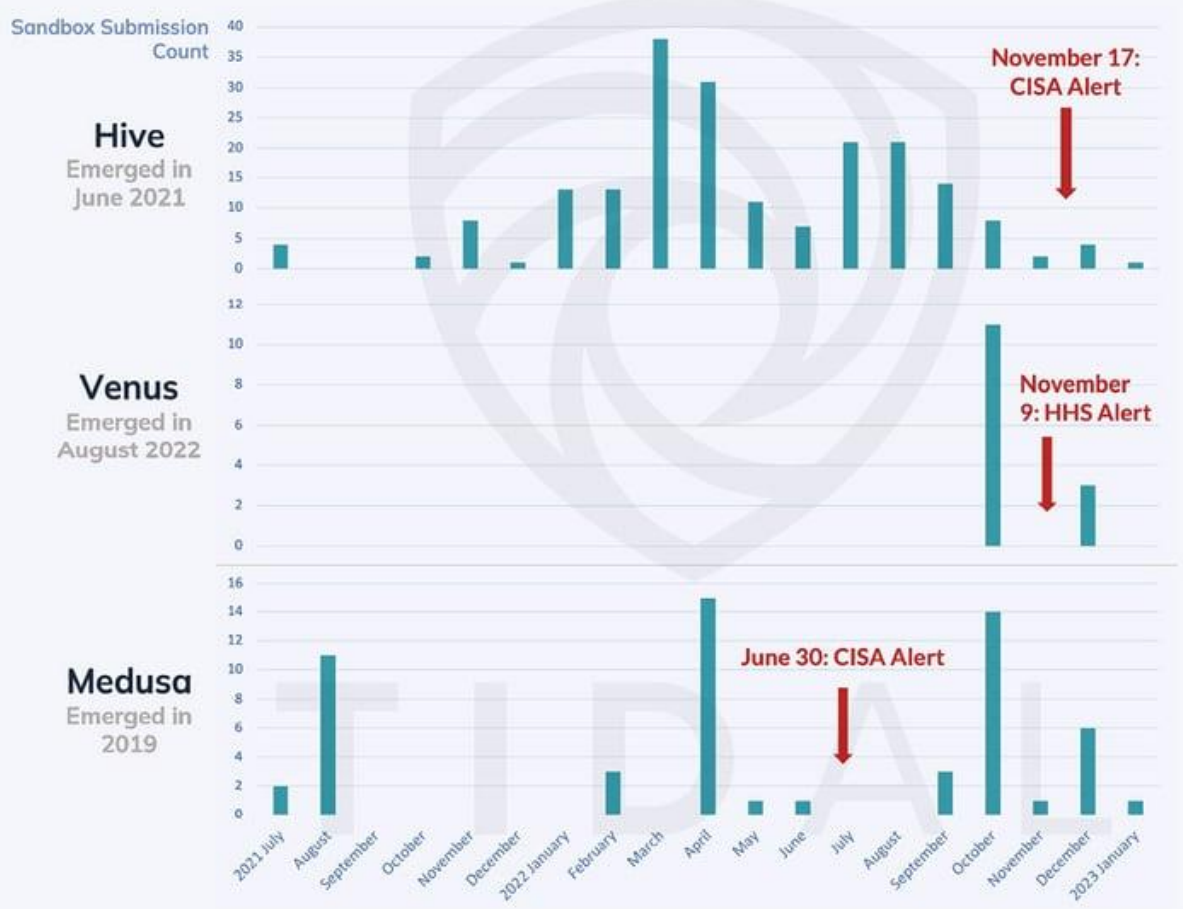
- Attack Precision
- Cross-platform Capabilities
- Targeting
- OPSEC
- Resilience
- Stealth

Sophisticuffs: The Rumble Over Adversary Sophistication (Paul Jaramillo)

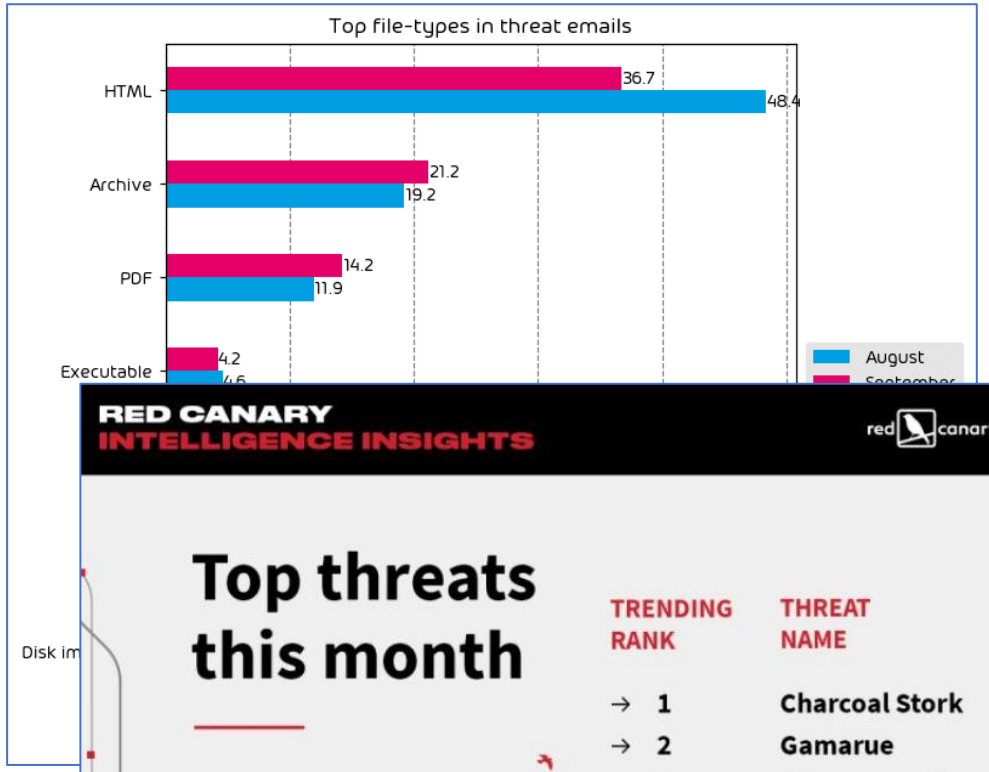
Quantification: Adversary "Capacity"

Weighting	Level	Criteria	Representative Examples
5	Superior	Characterized by groups suspected of possessing near-unlimited or very large supplies of resources. Groups often consist of many operators who generally possess high levels of skill and OPSEC. Funding is typically high and provided by a state, but may be supplemented with illicit sources. Often uses custom, sophisticated tooling (alongside existing tools) and has usually been associated with multiple novel techniques or exploits.	The most advanced/prolific APTs (e.g. APT28, Lazaurs Group)
4	High	Characterized by groups suspected of possessing very large resource supplies. Group members generally possess high levels of skill and OPSEC. Funding is relatively high and may be provided by a state or illicit sources. May use custom, sophisticated tooling alongside existing tools, and might be known to periodically use novel techniques or exploits.	-Major/well-known APTs supporting major adversarial nations (e.g. APT41, Fox Kitten) -The most advanced/prolific ransomware-as-a-service operations (e.g. LockBit, ALPHV/BlackCat)
3	Moderate	Characterized by possessing access to many resources, including funding which may come from a nation-state or illicit means. These groups may be linked to a considerable volume of attacks but may also have mixed levels of success and/or periodic OPSEC blunders. May use custom tooling, but it typically does not display extreme sophistication. (This is also a common assignment for APTs and major crimeware operations when knowledge gaps remain.)	-Many APTs -Many prolific initial access threats (e.g. QakBot, SocGholish, Emotet)
1-2	Low/Limited	May be individual actors or groups, generally smaller and/or loosely organized ones. Adversaries here may claim or threaten attacks often but do not consistently follow through, at least successfully. Funding is usually limited and not at nation-state scale. Operators and their tools are usually not highly sophisticated, although some successful attacks may have occurred. Custom tools and novel exploits are uncommon. This is also a common assignment when significant knowledge gaps remain.	-Hacktivists -Lower-tier APTs & ransomware groups (including where knowledge is limited) -Infostealer campaigns

Quantification: Activity Levels – Technical Sources



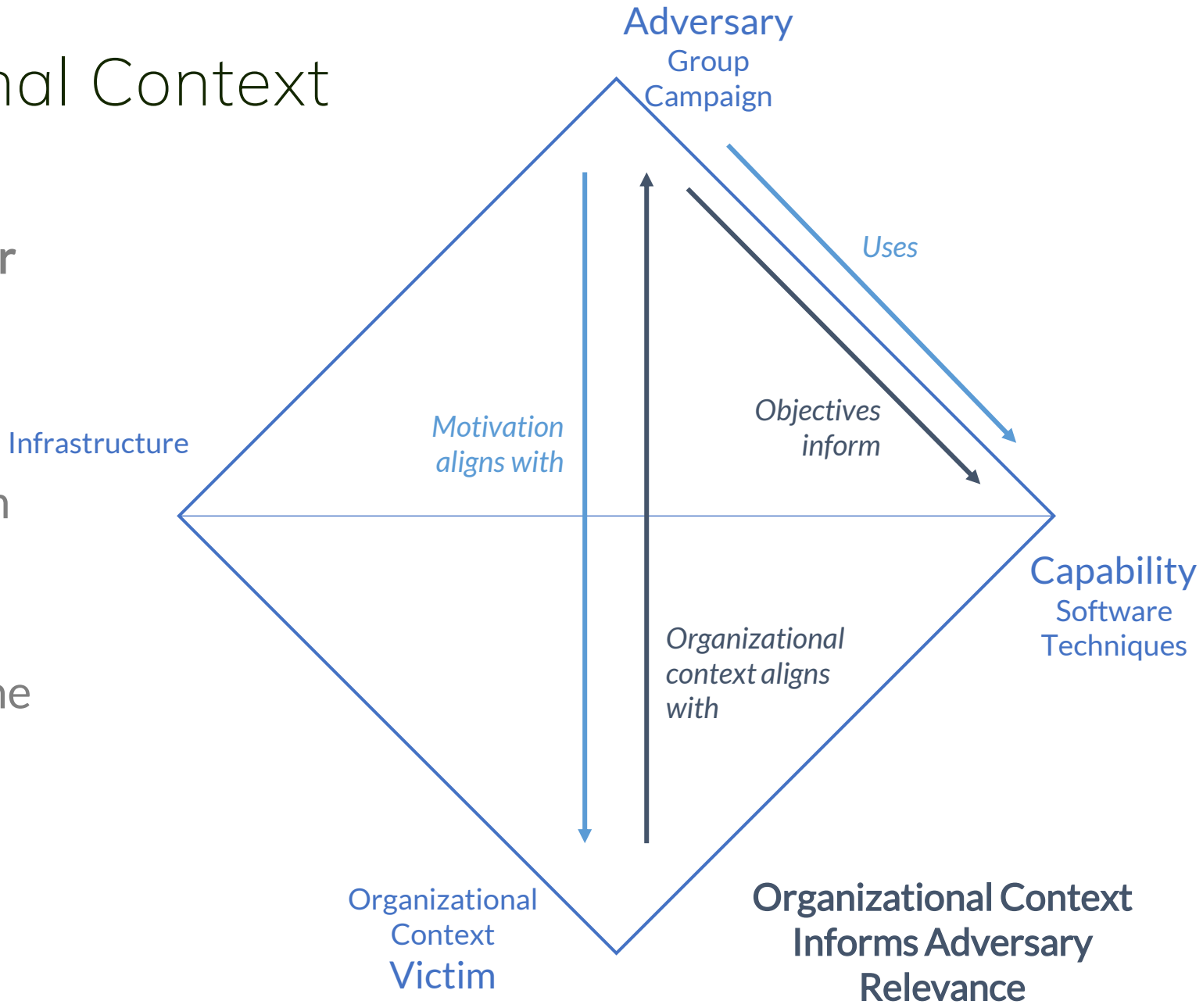
MalwareBazaar



Consider Organizational Context

Consider Organizational Context

- **Goal**: Determine **a few logical characteristics most unique to your organization**, which informs the general types of adversaries that might impact it
- A strong threat profile starts with **introspection**
- First, consider broad *types* of adversaries that might threaten the organization
- Helps orient, validate, filter, & supplement later research, and **drive relevance** throughout



Organizational Considerations			Effect on CIA if compromised			Adversary Motivations			
Business Function (Annual Report Section)	**Analyst Context**	**Priority Ranking**	**C**	**I**	**A**	**Espionage**	**Financial Gain**	**Destruction**	**Est. $ Impact**
Primary Markets/ Contracts	We support major US space launch programs; Army/Navy Air Force programs (missiles & torpedos); an asteroid redirection effort; an emerging nuclear fission program	1	✓		✓	✓		✓	High
Research & Development	R&D efforts are critical to maintaining our leadership position. **We possess many US & foreign patents, trademarks & trade secrets**	2	✓			✓			High
Suppliers and Raw Materials	Supply base **continues to consolidate**; we sometimes depend on **sole suppliers**	3			✓			✓	High
Information Technology & Security	We process, store & transmit **large amounts of confidential information & IP** related to internal operations and associated with subcontractors & customers	4	✓	✓		✓	✓		Medium
Production	Assembly traditionally performed at a **single site** in California but opened a new site in Arizona and are exploring another in the UK	5			✓			✓	High
Human Capital	We permit certain support task to be performed remotely	6	✓		✓	✓			Low
Environmental Matters	We are continue to pay for remediation costs associated with **environmental contamination** at one of our production sites	7			✓			✓	Low

Common Next Questions

Common next questions

1. What about threats that haven't been seen impacting our sector yet? (How do we predict the next big thing?)
   a. You can't! No one really can…
   b. Our process narrowed from thousands of global threats to dozens of relevant ones, and even this is probably too much for most teams to address/validate each. Why focus on something else?
2. How do I correlate/deduplicate among threat names?
   a. github.com/StrangerealIntel/EternalLiberty
3. Why add "low-priority" threats at all (1's or 2's)?
   a. A really good habit and procedural habit to follow. Threat levels change – good to show you've been tracking it!

Taking Action on Your Threat Profile – Threat Informed Defense Approach

FIRST™
Improving Security Together

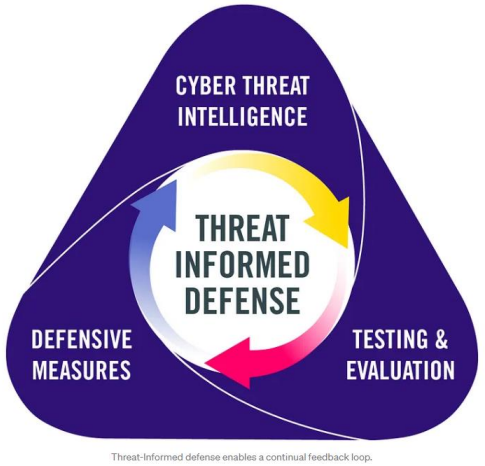
Threat Informed Defense – Taking action on your threat profile with the TID approach

MITRE ENGENUITY | ATT&CK® Evaluations

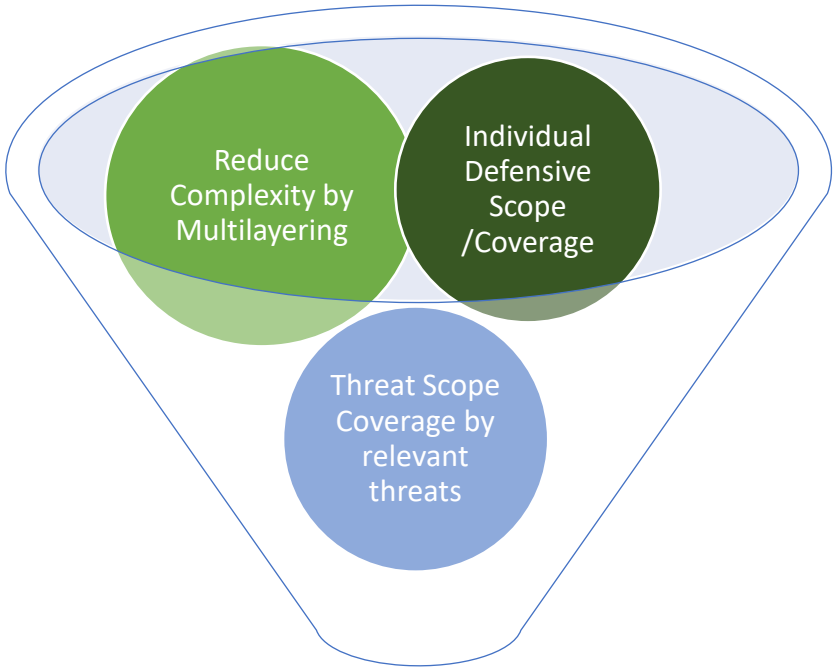
MITRE ENGENUITY | Center for Threat Informed Defense

MITRE ENGENUITY | MITRE ATT&CK Defender™

Cyber Threat Intelligence	Defensive Engagement & Measures	Collaboration & Sharing
▪ Analyze with the help of MITRE Ressources &Tools to increase the operational effectiveness	▪ Breach & Attack Simulation with Proof-of-Value and Proof-of-Concept ▪ Test and evaluation to understand true defensive posture ▪ Systematically advance the ability to detect and prevent	▪ Share your experience and results ▪ Collaborate and share with the community



The goal is to gain a **deep TECHNICAL understanding**.

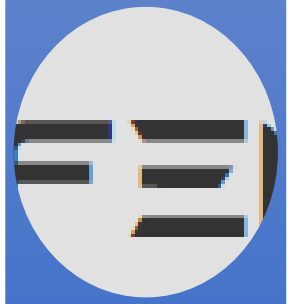


Enterprise-Centric Adversary Behavioral Threat Profiling

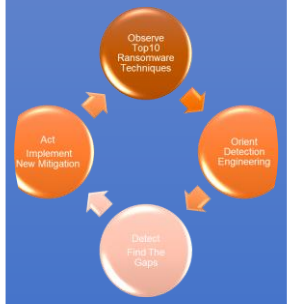
Enterprise-centric Threat Profile with MITRE ATT&CK Multilayering – Top ATT&CK Techniques WHERE TO START – Use Case Workshop

CTI-Analysis of an organizational relevant Threat Actor (Use Case LockBit & Fin12)

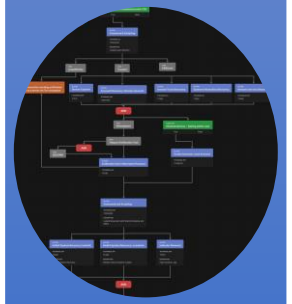
Latest CTI & MULTILAYERING of all MITRE ATT&CK TECHNIQUES for all capabilites (Healtcare)



D3FEND EXTRACTION HELPS ANALYZING CTI Reports & provides countermeasures (example FIN12)

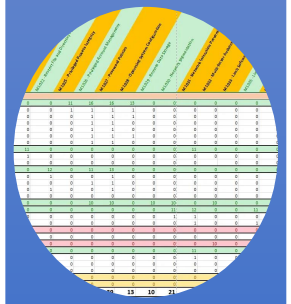


Defensive Engagement & Gap Analysis with Defensive Measures focus on top TTPs



Creating Attack Flows, proactive Threat Hunting and documentation CTI example T1219 PEAK Threat Hunting

Breach & Attack Simulation or Atomic Red Team Tests – Example MITRE Caldera with LockBit

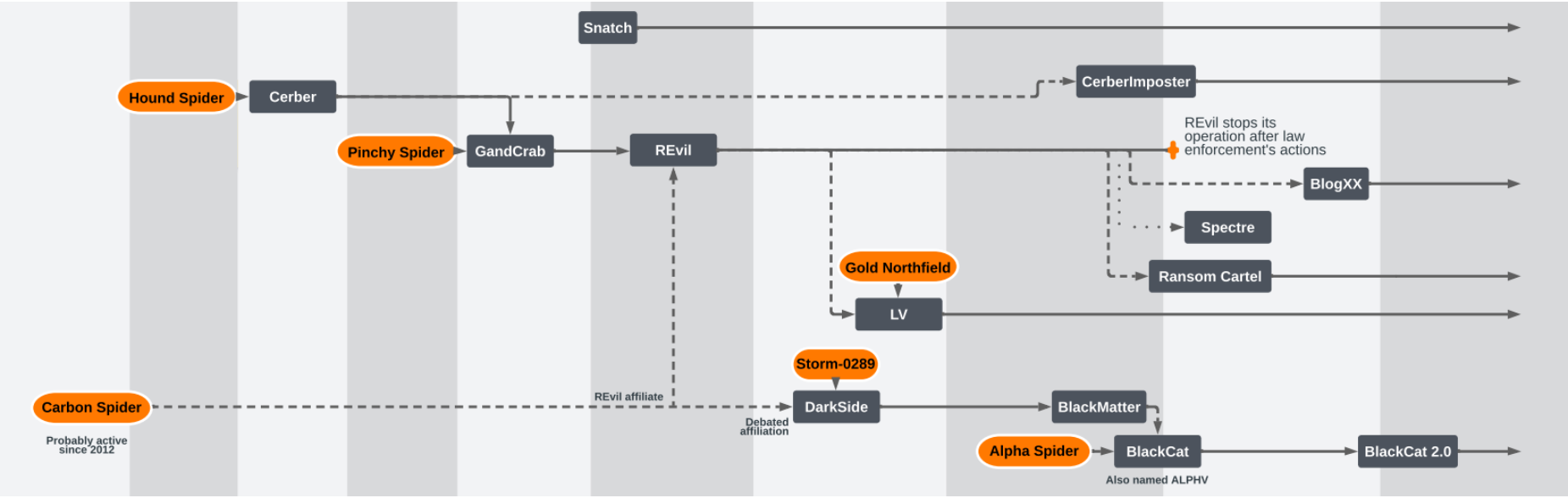


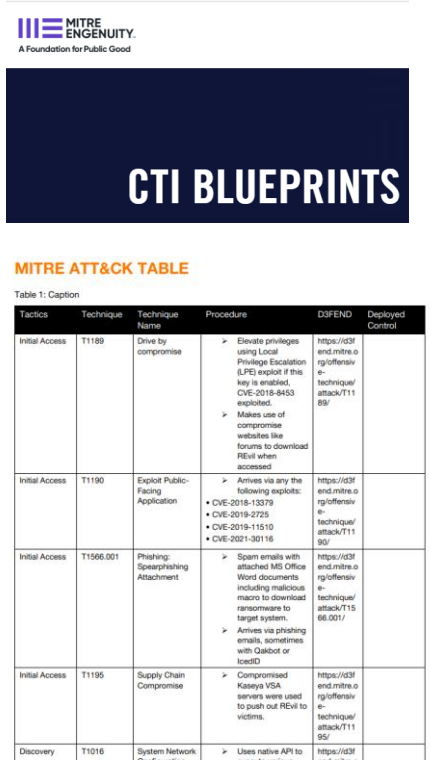
Enterprise-centric Coverage mapping, Threat Profile measures Progress, Weighting & Scoring

Improving the Capabilites: Mitigation, Detection, Prevention with Automation and Scoring

Operational Effectiveness – Ecosystem & BP

https://github.com/cert-orangecyberdefense/ransomware_map
https://mitre-engenuity.org/cybersecurity/center-for-threat-informed-defense/our-work/cti-blueprints/



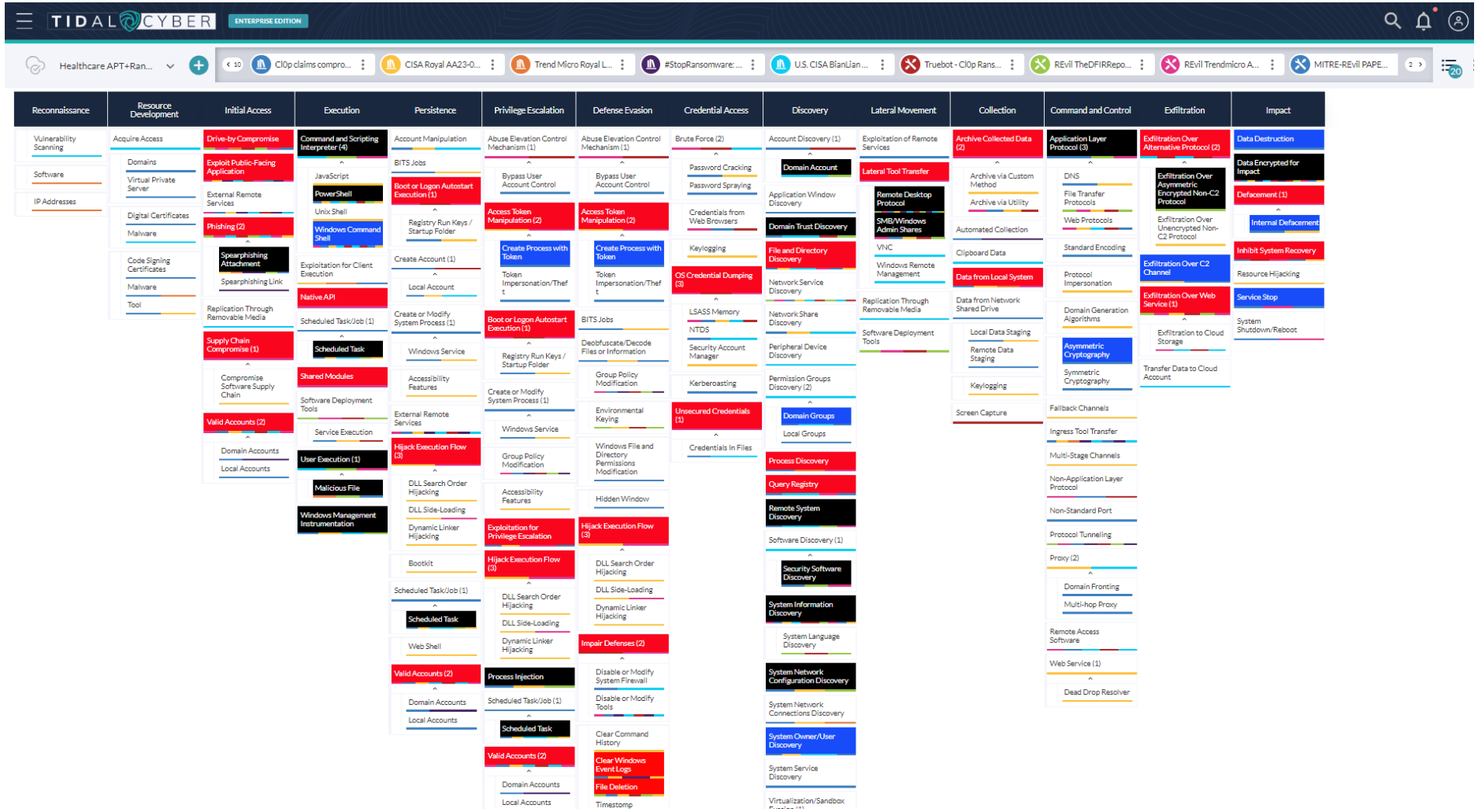


Defensive Engagement preparation – Multilayering avoiding analytical errors

https://www.cisa.gov/sites/default/files/2023-01/Best%20Practices%20for%20MITRE%20ATTCK%20Mapping.pdf

Reduction of analytical error with multilayering	0. Understand ATT&CK	1. Find the Behavior	2. Research the Behavior	3. Identify the Tactics	4. Identify the (sub-) Techniques
Leaping to Conclusions			A premature decision on TTPs without thorough examination of the behavior or artifacts can result in an erroneous mapping and a flawed final product.	Identifying the wrong tactic may occur by "leaping" to a conclusion that does not align with the report details or accumulated artifacts.	Identifying the wrong techniques may occur by "leaping" to a conclusion that doesn't align with the report details or accumulated artifacts.
Opportunity Multilayering			The more CTI reports are layered in the matrices, the more the examination and behavior of artifacts accuracy increase by numbers.	Tactics can be compared with multiple matrices and are automatically defined by the extracted technique in the matrices.	With tools like POWERED SUIT and multilayering the identification of the right technique increases with every matrix added.
Missed Opportunities	Without an understanding of ATT&CK, other possible mappings will not be considered and consequently missed.	Identification of all behaviors in a report may be overlooked.	Understanding how the behavior works may highlight other potential related mappings.		
New Opportunities Multilayering	CTI platforms with multilayering explain the techniques in the mapping. Even if there would be a lack of understanding, the number of repetitive use of one technique emphasize the right mapping.	Behavior that would be overlooked are now much more visible in comparison with other CTI reports	Multilayering highlight the most common techniques and is a starting point for prevention, mitigation and detection		
Miscategorization	Without an understanding of ATT&CK, the distinctions between two similar yet different techniques may result in an inaccurate mapping	Identification of applicable behaviors may be overlooked.	Selecting the wrong technique can occur without thorough research, understanding, or by misreading the behavior and technical details.	Misreading and insufficient research on the data or even the incorrect use of ATT&CK search can result in misidentification of the tactic.	Mapping the wrong technique is possible without researching and understanding other technique options.
Opportunity Multilayering	Accurate mapping with multilayering avoid error in analyzing similar techniques by approving a technique that is repeatable used in other CTI reports and references.	Behavior is approved by multilayering showing the most used behavior which is than an indicator that they aren't overlooked.	Even if one CTI report has a wrong technique with multilayering the misreading of behavior and technical details neutralize wrong assumption by approving other techniques for the described attack of a threat actor.	Tactics in a multilayered matrices environment are approved by the increasing number of matrices with same TTPs	Sub-Techniques are approved in other matrices. The more technique sets, and community references contain the same sub-technique, the higher the accuracy is. Multilayering emphasizes more research and accuracy where one or two sources would have gaps in research or understanding

Multilayering threat actors in the healthcare – holistic threat profile to understand their campaigns and capabilities



Top TTPs Healthcare & Scoring

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Enterprise-centric top TTPs healthcare as a starting point to prevent, mitigate and detect 1/3

Top Initial Access Techniques

- T1566 Phishing
- T1190 Exploit Public-Facing Application
- **T1133 External Remote Services (And a Persistence Technique)**
- T1068 Valid Accounts

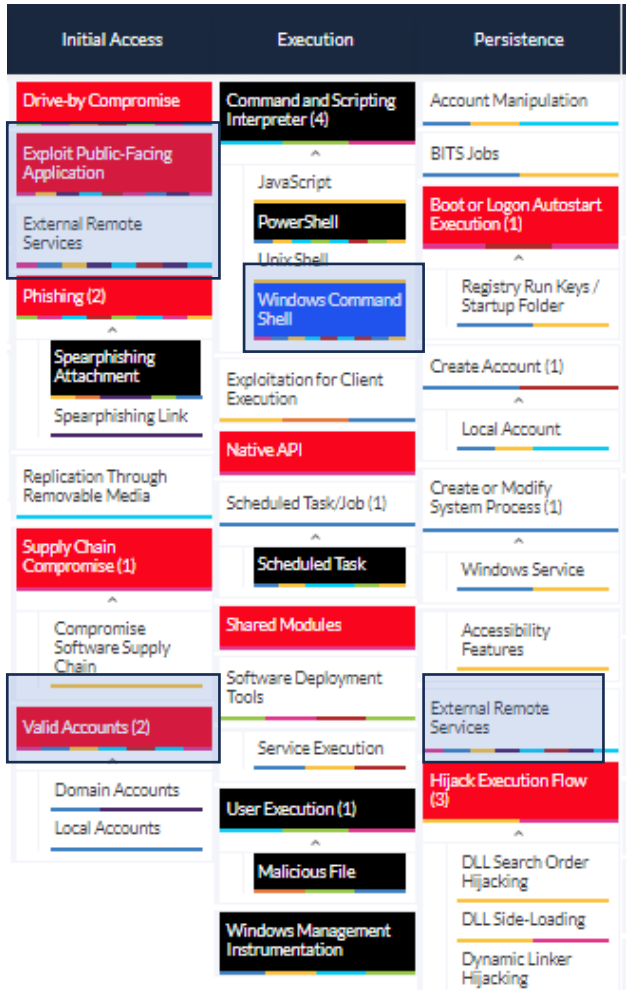
Top Techniques Execution

- T1059.003 Windows Command Shell

Top Techniques Persistence

- T1133 External Remote Services
- **T1068 Valid Accounts (And a Persistence Technique)**

=> **Which tools do the adversaries use for External Remote Services and Valid Accounts?**



Enterprise centric top TTPs as a starting point to prevent, mitigate and detect 2/3

Privilege Escalation

- T1484.001 Group Policy Modification

Defensive Evasion

- T1484.001 Group Policy Modification

=> **another great choke point for privilege escalation and defensive evasion**

Credential Access

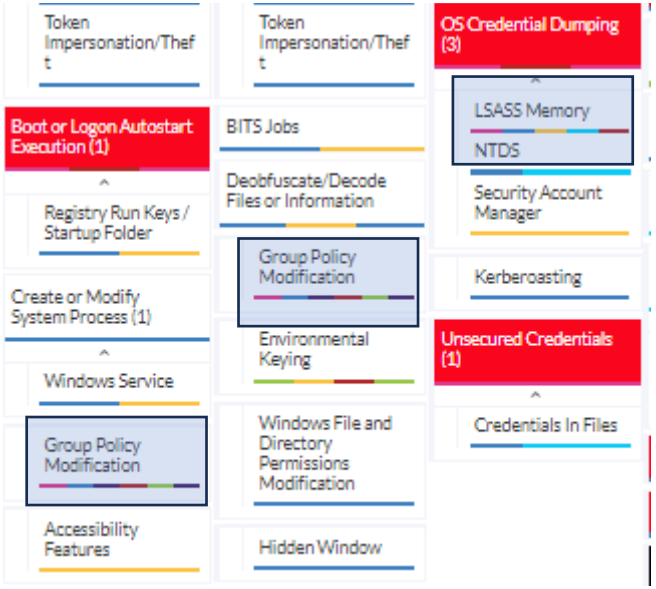
- T1003.001 OS Credential Dumping: LSASS Memory

Discovery

- T1046 Network Service Discovery
- T1082 System Information Discovery

Detection

ID	Data Source	Data Component	Detects
DS0026	Active Directory	Active Directory Object Creation	Monitor for newly constructed active directory objects, such as Windows EID 5137.
		Active Directory Object Deletion	Monitor for unexpected deletion of an active directory object, such as Windows EID 5141.
		Active Directory Object Modification	Monitor for changes made to AD settings for unexpected modifications to user accounts, such as deletions or potentially malicious changes to user attributes (credentials, status, etc.).
DS0017	Command	Command Execution	Monitor executed commands and arguments that may modify Group Policy Objects (GPOs) to subvert the intended discretionary access controls for a domain, usually with the intention of escalating privileges on the domain.



Enterprise centric top TTPs as a starting point to prevent, mitigate and detect 3/3

Lateral Movement Remote Desktop Protocol

- T1021.001Remote Desktop Protocol

Collection

- T1005 Data from Local System

Command and Control

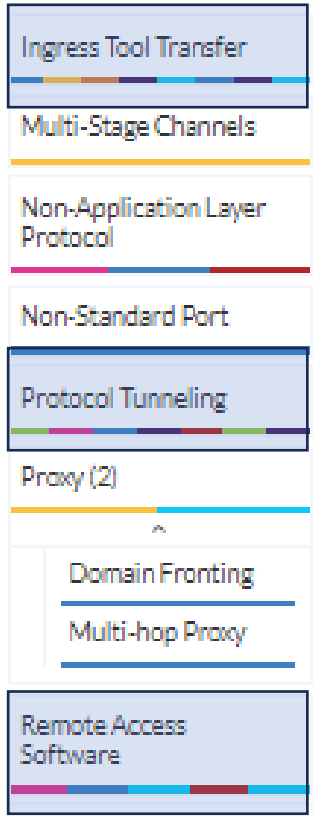
- T1572 Protocol Tunneling
- T1105 Ingress Tool Transfer
- T1219 Remote Access Software

Exfiltration

- T1567 Exfiltration Over Web Service

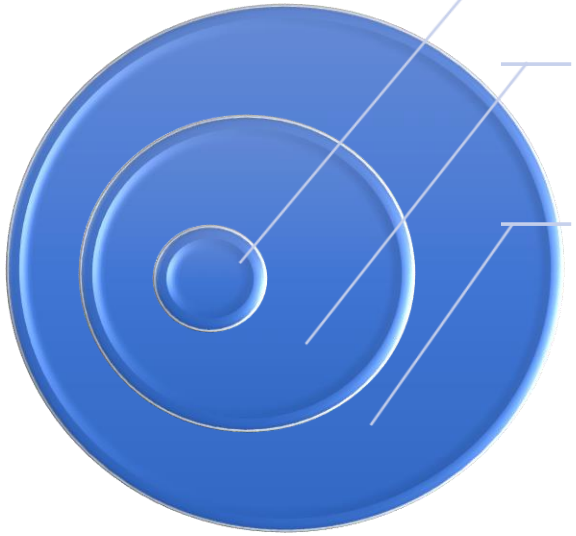
Precursor Ransomware Impact

- T1490 Inhibit System Recovery before T1486 Data Encrypted for Impact



Scoring Top TTPs for Healthcare

- Counts from CTI
- Data Sources
- Analytics
- Groups
- CIS Community Defense Model top Safeguards



Rank	Technique ID	Technique Name	Tactic	Count from CTI	Mapped Data Sources	# Sigma Analytics	# Atomic Tests	Groups	Top CIS Safeguards
1	T1021.001	Remote Desktop Protocol	Lateral Movement	4	4	12	4	6	42
2	T1190	Exploit Public-Facing Application	Initial Access	9	2	43	0	6	33
3	T1133	External Remote Services	Initial Access	6	5	9	1	5	24
4	T1566.001	Phishing	Initial Access	8	4	11	2	5	
5	T1082	System Information Discovery	Discovery	8	3	19	29	7	
6	T1046	Network Service Discovery	Discovery	7	3	9	10	5	
7	T1486	Data Encrypted for Impact	Impact	7	6	7	8	6	
8	T1484.001	Group Policy Modifiaction	Privilege Escalation	6	4	2	2	3	
9	T1068	Valid Accounts	Execution	5	3	43	0	5	
10	T1567	Exfiltration Over Web Service	Exfiltration	5	5	5	0	4	
11	T1219	Remote Access Software	Command and Control	4	4	32	11	3	
12	T1572	Protocol Tunneling	Command and Control	3	3	14	4	4	
13	T1105	Ingress Tool Transfer	Command and Control	3	4	48	29	5	
14	T1003.001	LSASS Memory	Credential Access	2	4	72	13	4	
15	T1005	Data from Local System	Collection	1	4	9	1	4	
16	T1490	Inhibit System Recovery	Impact	1	7	17	10	4	

Scoring Top TTPs with the Mitigation (Phishing

MITRE Engenuity Calculator)

- https://medium.com/@simone.kraus/mitre-engenuity-calculator-and-scoring-1c9f2f3f8f9e

Scoring Matrix	M1015 - Active Directory Configuration	M1017 - User Training	M1018 - User Account Management	M1021 - Restrict Web-Based Content	M1022 - Restrict File and Directory Permissions	M1025 - Privileged Process Integrity	M1026 - Privileged Account Management	M1027 - Password Policies	M1028 - Operating System Configuration	M1029 - Remote Data Storage	M1030 - Network Segmentation	M1031 - Network Intrusion Prevention	M1032 - Multi-factor Authentication	M1033 - Limit Software Installation	M1035 - Limit Access to Resource Over Network	M1037 - Filter Network Traffic	M1038 - Execution Prevention	M1040 - Behavior Prevention on Endpoint	M1041 - Encrypt Sensitive Information	M1042 - Disable or Remove Feature or Program	M1043	M1047 - Audit	M1049 - Antivirus/Antimalware	M1051 - Update Software	M1054 - Software Configuration	
	Top 10 Techniques (10)																									
T1003 - OS Credential Dumping	12	16	0	0	0	11	16	16	13	0	0	0	0	0	0	0	0	11	11	0	11	0	0	0	0	117
T1003.001 - OS Credential Dumping: LSASS Memory	0	1	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	7
T1003.002 - OS Credential Dumping: Security Account Manager	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
T1003.003 - OS Credential Dumping: NTDS	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4
T1003.004 - OS Credential Dumping: LSA Secrets	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
T1003.005 - OS Credential Dumping: Cached Domain Credentials	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
T1003.006 - OS Credential Dumping: DCSync	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
T1204 - User Execution		12	0	11	0	0	0	0	0	0	0	11	0	0	0	0	11	11	0	0	0	0	0	0	0	56
T1204.001 - User Execution: Malicious Link	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
T1204.002 - User Execution: Malicious File	0	1	0	0	0	0	0	0	0	0	0	0		0	0	0	1	1	0	0	0	0	0	0	0	3
T1552 - Unsecured Credentials	11	11	0	0	12	0	11	13	0	0	0	0	0	0	0	0	0	0	0	0	0	14		11	0	83
T1552.001 - Unsecured Credentials: Credentials In Files	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4
T1552.002 - Unsecured Credentials: Credentials in Registry	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
T1552.004 - Unsecured Credentials: Private Key	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	4
T1552.006 - Unsecured Credentials: Group Policy Preferences	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3
T1072 - Software Deployment Tools	10	10	10	0	0	0	10	10	0	10	10	0	10	0	0	0	0	0	0	0	0	0	0	10	0	90
T1557 - Adversary-in-the-Middle	0	11	0	0	0	0	0	0	0	0	11	12	0	0	11	12	0	0	11	12	0	0	0	0	0	80
T1557.001 - Adversary-in-the-Middle:LLMNR/NBT-NS Poisoning and S	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	4
T1557.002 - Adversary- in-the-Middle:ARP Cache Poisoning	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	0	6
T1213 - Data from Information Repositories	0	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	33
T1213.002 - Data from Information Repositories: Sharepoint	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		3
T1539 - Steal Web Session Cookie		10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	10	30
T1566 - Phishing	0	13	0	13	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	12		12	61
T1566.001 Phishing: Spearphishing Attachement	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	5
T1566.002 Phishing: Spearphishing Link	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
T1566.003 Phishing: Spearphishing via Service	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
T1528 - Steal Application Access Token	0	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0		40
T1176 Browser Extension	0	10	0	0	0	0	0	0	0	0	0		0	10		0	10	0	0	0	0	10	0	10		50
Results	33	114	31	34	12	11	37	39	13	10	21	34	20	10	11	12	21	22	22	12	11	45	12	31	22	

Defensive Engagement & Measures

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Defensive Engagement & Measures

Score the top TTPs, prioritize prevention, mitigation, detection best practise (for e.g. CIS Defense Model 2.0)

↓

Start with the research for the top TTPs that are most relevant for your organization

↓

Rigid, structured, measerable analysis and documentation, focus on your organization

↓

Start with the mitigation best practice (validated security controls and safe guards)

↓

Start with the proactive Threat Hunting – use therefor a framework of your choice (goal automation)

↓

Documentation of critical findings – OODA loop

↓

Testing & Analyzing with the help of your own telemetry, documentation for IR & security control validation.

↓

Create robust detection with analytical scoring with the help of your own sensors, data and telemetry

↓

Optimize detection to make it more robust iteratively

↓

Structured documentation with for e.g. ADS framework for detections and CTI blueprints for TI

↓

Repeat tests and documentation regularly to measure improvement and get more visibility

RMM Tools Healthcare – Mapping for Ransomware Groups

Focus on specific tools that are relevant for your sector

RMM Tools Healthca...

AnyDesk | Atera Agent | Ngrok | PsExec | QuasarRAT | Splashtop | TeamViewer | Netsupport RAT

8

Execution	Persistence	Privilege Escalation	Defense Evasion	Credential Access	Discovery	Lateral Movement	Collection	Command and Control	Exfiltration
Windows Command Shell	Registry Run Keys / Startup Folder	Bypass User Account Control	Bypass User Account Control	Credentials from Password Stores (1)	File and Directory Discovery	Lateral Tool Transfer	Data from Local System	Domain Generation Algorithms	Exfiltration Over Web Service
Scheduled Task	Domain Account	Registry Run Keys / Startup Folder	Hidden Files and Directories	Credentials from Web Browsers	Process Discovery	Remote Desktop Protocol	Keylogging	Symmetric Cryptography	
Software Deployment Tools	Windows Service	Windows Service	Hidden Window	Keylogging	Query Registry	SMB/Windows Admin Shares	Video Capture	Ingress Tool Transfer	
Service Execution	Scheduled Task	Scheduled Task	Masquerading	Credentials In Files	System Information Discovery	Software Deployment Tools		Non-Application Layer Protocol	
Windows Management Instrumentation			Modify Registry		System Location Discovery			Non-Standard Port	
			Software Packing		System Network Configuration Discovery			Protocol Tunneling	
			Code Signing		System Network Connections Discovery			Proxy	
					System Owner/User Discovery			Remote Access Software	
								Web Service	

RMM Tools Recommendation Mitigation CISA

- Implement best practices to block phishing emails.
- Audit remote access tools on your network to identify currently used and/or authorized RMM software.
- Review logs for execution of RMM software to detect abnormal use of programs running as a portable executable.
- Use security software to detect instances of RMM software only being loaded in memory.
- Implement application controls to manage and control execution of software, including allowlisting RMM programs. (See NSA Cybersecurity Information sheet Enforce Signed Software Execution Policies).

Tradecraft Uncertainty – Research T1219 helps to predict attacks

Tradecraft Uncertainty

- Which techniques are attackers likely to employ in my environment?
- What distinct procedures can be used to carry out these techniques?
- Which operations are different between these procedures?

Telemetry Uncertainty

- What telemetry is generated by known distinct procedures?
- What characteristics (fields/values) of this telemetry can be used to identify actions that may be the result of an attacker?

Event 17, Sysmon

General | Details

```
Pipe Created:
RuleName: -
EventType: CreatePipe
UtcTime: 2023-10-04 19:48:19.920
ProcessGuid: {bd6ed866-c183-651d-cc02-000000000d00}
ProcessId: 2376
PipeName: \adprinterpipe
Image: C:\Program Files (x86)AnyDesk\AnyDesk.exe
```

Event 1, Sysmon

General | Details

```
Process Create:
RuleName: technique_id=T1204,technique_name=User Execution
UtcTime: 2023-10-04 19:48:19.394
ProcessGuid: {bd6ed866-c183-651d-cc02-000000000d00}
ProcessId: 2376
Image: C:\Program Files (x86)AnyDesk\AnyDesk.exe
FileVersion: 8.0.3
Description: AnyDesk
Product: AnyDesk
Company: AnyDesk Software GmbH
OriginalFileName: -
CommandLine: "C:\Program Files (x86)AnyDesk\AnyDesk.exe" --control
CurrentDirectory: C:\Windows\system32\
```

Image | Performance | Performance Graph | GPU Graph | Threads | TCP/IP | Security | Environment

Count: 11

TID	CPU	Cycles Delta	Suspend Count	Start Address
3804				ntdll.dll!TpCallbackIndependent+0x140
4328				AnyDesk.exe+0x53ac90
7584				ntdll.dll!TpCallbackIndependent+0x140
1820				AnyDesk.exe+0x1ce5
5144				gdiplus.dll!GdiplusStartup+0x1a80
3300				AnyDesk.exe+0x53ac90
7148				AnyDesk.exe+0x53ac90
5148				AnyDesk.exe+0x53ac90
392				AnyDesk.exe+0x53ac90
4492				AnyDesk.exe+0x53ac90
2092				AnyDesk.exe+0x53ac90

Image File

AnyDesk

Version: 8.0.3.0

Build Time: Fri Sep 22 10:14:12 2023

Path:

C:\Program Files (x86)AnyDesk\AnyDesk.exe

Command line:

"C:\Program Files (x86)AnyDesk\AnyDesk.exe" --control

Current directory:

C:\Windows\System32\

Autostart Location:

C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Startup\AnyDesk.lnk

Parent: explorer.exe(4468)

https://posts.specterops.io/reactive-progress-and-tradecraft-innovation-b616f85b6c0a

Extracting CTI with the D3FEND FIN12

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Analyzing a CTI Healtcare report – CERT France extraction with D3FEND and Map it to the MITRE ATT&CK

ATT&CK POWERED SUIT

Back

Bookmarks

Object ID	Name	Color	Notes
T1588.002	Tool		Utilisation de l'outil Random C
T1583.004	Server		Utilisation de VPS hébergés c
T1133	External Remote Services		Connexion à un service de bu
T1078.002	Domain Accounts		Utilisation d'authentifiants vali
T1136.001	Local Account		Tentative de création du comp
T1068	Exploitation for Privilege Escalation		Tentative d'exploitation des vu
T1036.005	Match Legitimate Name or Location		Utilisation des répertoires « C:
T1110.003	Password Spraying		Utilisation de l'outil AccountRe
T1003.001	LSASS Memory		Utilisation de l'outil Mimikatz.
T1558.003	Kerberoasting		Utilisation de l'outil SharpRoas
T1046	Network Service Discovery		Utilisation de l'outil de découv
T1018	Remote System Discovery		Utilisation des outils de décou
T1210	Exploitation of Remote Services		Tentative d'exploitation des vu
T1090.004	Domain Fronting		Utilisation du CND CLOUDFL
T1572	Protocol Tunneling		Utilisation d'un tunnel SOCKS

T1136.001	Local Account		Tentative de création du comp
T1068	Exploitation for Privilege Escalation		Tentative d'exploitation des vu
T1036.005	Match Legitimate Name or Location		Utilisation des répertoires « C:
T1110.003	Password Spraying		Utilisation de l'outil AccountRe
T1003.001	LSASS Memory		Utilisation de l'outil Mimikatz.
T1558.003	Kerberoasting		Utilisation de l'outil SharpRoas
T1046	Network Service Discovery		Utilisation de l'outil de découv
T1018	Remote System Discovery		Utilisation des outils de décou
T1210	Exploitation of Remote Services		Tentative d'exploitation des vu
T1090.004	Domain Fronting		Utilisation du CND CLOUDFL
T1572	Protocol Tunneling		Utilisation d'un tunnel SOCKS

Export Bookmarks

Export ATT&CK Navigator Layer

Export bookmarked techniques to an ATT&CK Navigator layer. Other bookmarks (e.g. software, group) are mapped to their related techniques. Only techniques in the selected domain are exported.

ATT&CK Domain: enterprise-attack

Layer Title: FIN12 CERT France

Export Navigator Layer

lpe.exe	-	70ad1a42ce05404c00513989c949c83a94feca92

ATT&CK POWERED SUIT

T1136.001 T1068 T1036.005 T1

Select all | none

Enterprise

ICS

Mobile

Deprecated

ols that can be used during targeting. Tools can be open
sed for malicious purposes by an adversary, but (unlike
poses (ex: PsExec
sition can involve the procurement of commercial

that can be used during targeting. Use of servers
n operation. During post-compromise activity,
luding for Command and Control. Adversaries may use
ions, as in Drive-by Compromise

echnique

rvices to initially access and/or persist within a network.
cess mechanisms allow users to connect to internal
. There are often remote service gateways that manage
ervices. Services such as Windows...

chnique

lomain account as a means of gaining Initial Access,
n.(Citation: TechNet Credential Theft) Domain accounts

Mapping Capabilities & Tools latest Fin12 campaign

- Cobalt Strike
- SystemBC
- AccountRestore
- Mimikatz
- SharpRoast
- Softperfect Network Scanner
- PingCastle
- Bloodhound

3.1 Tableau de TTP

Phase	Technique	Nom	Commentaire
Resource Development	T1588.002	Obtain Capabilities: Tool	Utilisation de l'outil **Random C2 Profile Generator** pour générer le profil *Malleable C2* **Cobalt Strike**.
Resource Development	T1583.004	Acquire Infrastructure: Server	Utilisation de VPS hébergés chez VULTR comme serveurs C2 **SystemBC**, et utilisation du port 4177.
Initial Access	T1133	External Remote Services	Connexion à un service de bureau à distance.
Initial Access	T1078.002	Valid Accounts: Domain Accounts	Utilisation d'authentifiants valides pour se connecter à un service de bureau à distance.
Persistence	T1136.001	Create Account: Local Account	Tentative de création du compte « supp ».
Privilege Escalation	T1068	Exploitation for Privilege Escalation	Tentative d'exploitation des vulnérabilités *LocalPotato* (CVE-2023-21746) et CVE-2022-24521.
Defense Evasion	T1036.005	Masquerading: Match Legitimate Name or Location	Utilisation des répertoires « `C:\Users\Public\Music\` » et « `C:\Users\[user]\Downloads\` ».
Credential Access	T1110.003	Brute Force: Password Spraying	Utilisation de l'outil **AccountRestore** avec le dictionnaire « `Passwordar.txt` ».
Credential Access	T1003.001	OS Credential Dumping: LSASS Memory	Utilisation de l'outil **Mimikatz**.
Credential Access	T1558.003	Steal or Forge Kerberos Tickets: Kerberoasting	Utilisation de l'outil **SharpRoast**.
Discovery	T1046	Network Service Discovery	Utilisation de l'outil de découverte réseau **Softperfect Network Scanner**.
Discovery	T1018	Remote System Discovery	Utilisation des outils de découverte **PingCastle** et **BloodHound**.
Lateral Movement	T1210	Exploitation of Remote Services	Tentative d'exploitation des vulnérabilités *PrintNightmare* (CVE-2021-34527), *BlueKeep* (CVE-2019-0708) et *ZeroLogon* (CVE-2020-1472).
Command and Control	T1090.004	Proxy: Domain Fronting	Utilisation du CND CLOUDFLARE afin de dissimuler le serveur C2 **Cobalt Strike** final.
Command and Control	T1572	Protocol Tunneling	Utilisation d'un tunnel SOCKS5 via l'implant **SystemBC**.

Mapping Fin12 Capabilities latest CERT Alert France

Fin12 Capabilities & ... | SystemBC | Cobalt Strike Rando... | FIN12 CERT France ... | SystemBC | AccountRestore | SharpRoast | SoftPerfect Networ... | PingCastle | BloodHoun | 2 | 10

Resource Development	Initial Access	Execution	Persistence	Privilege Escalation	Defense Evasion	Credential Access	Discovery	Lateral Movement	Collection	Command and Control
Server	External Remote Services	PowerShell	Account Manipulation	SID-History Injection	SID-History Injection	Password Spraying	Domain Account	Exploitation of Remote Services	Archive Collected Data	Protocol Tunneling
Virtual Private Server	Domain Accounts	Native API	Security Support Provider	Security Support Provider	Match Legitimate Name or Location	Credentials from Password Stores (2)	Local Account	Pass the Hash		Domain Fronting
Tool		Scheduled Task/Job	Local Account	Exploitation for Privilege Escalation	Rogue Domain Controller	Credentials from Web Browsers	Domain Trust Discovery	Pass the Ticket		
			External Remote Services	Scheduled Task/Job	Pass the Hash	Windows Credential Manager	Group Policy Discovery			
			Scheduled Task/Job	Domain Accounts	Pass the Ticket	DCSync	Network Service Discovery			
			Domain Accounts		Domain Accounts	LSA Secrets	Password Policy Discovery			
					Time Based Evasion	LSASS Memory	Domain Groups			
						Security Account Manager	Local Groups			
						Steal or Forge Authentication Certificates	Query Registry			
						Golden Ticket	Remote System Discovery			
						Kerberoasting	System Information Discovery			
						Silver Ticket	System Owner/User Discovery			
						Private Keys	Time Based Evasion			

Fin12 Tidal – Details External Remote Services Useful Analytics

External Remote Services

Vendors (18) | Groups (27) | Software (7) | Data Sources (5) | Campaigns (7) | References (45) | Analytics (9)

Name ↑	Repository
External Remote RDP Logon from Public IP	Sigma
External Remote SMB Logon from Public IP	Sigma
Failed Logon From Public IP	Sigma

Analytic Detail

External Remote RDP Logon from Public IP

Detects Technique(s): Brute Force, External Remote Services, Valid Accounts

Location: https://github.com/SigmaHQ/sigma/blob/60b8e9b70fffaf49b17abfcae4a0ea08f2da7f71/rules/windows/builtin/security/account_management/win_security_successful_external_remote_rdp_login.yml

Source: SIGMA

Contributors: Micah Babinski (@micahbabinski), Zach Mathis (@yamatosecurity)

License: Detection Rule License 1.1

Detects successful logon from public IP address via RDP. This can indicate a publicly-exposed RDP port.

```
selection: EventID: 4624 LogonType: 10filter_ipv4: IpAddress|cidr: - 127.0.0.0/8 - 10.0.0.0/8 - 172.16.0.0/12 - 192.168.0.0/16filter_ipv6:- IpAddress: ::1 # IPv6 loopback-
IpAddress|startswith: - 'fe80:' # link-local address - fc # private address range fc00::/7 - fd # private address range fc00::/7filter_empty: IpAddress: '-'condition: selection
and not 1 of filter_*
```

Some Artifacts and Command Line as starting point for Threat Hunting and Detection Engineering 1/2

- Cobalt Strike: Random C2 Profile Generator for T1588.002 Obtain Capabilities Tool
- SystemBC: specific port **4177** with **VULTR** and **SOCKS5 Tunneling T1572 Protocol Tunneling**

Nom de fichier	Chemin	SHA1	Serveur C2	Commentaire
host.dll	C:\Users\Public\Music\	8a0743f17110dc945007f08f3e63da166a3937dc	149.28.197.120 149.28.213.157	SystemBC
b64.exe	C:\Users\Public\Music\	9e2737994aa8bf0d6900e5369d51978adc4c02f9	youthconscience.com	Cobalt Strike

- Mimikatz: LSASS credentials

Nom de fichier	Chemin	SHA1	Commentaire
svchost.exe	C:\Users\[user]\Downloads\svchost\	28400c267815762e49c200e8b481a592c67f9cf7	AccountRestore
sharproast.exe	C:\Users\[user]\Downloads\PingCastle_2.11.0.1\	d65969088eb8f6098c33c5427a650e8576cdbfa6	SharpRoast
svchost.exe	C:\Users\[user]\Downloads\svchost1\	-	Mimikatz

- SharpRoast: for kerberoasting

sharproast.exe	SharpRoast	d65969088eb8f6098c33c5427a650e8576cdbfa6

- Softperfect Network Scanner: **netscan.exe** as ACL or for threat hunting or detection

Nom de fichier	Chemin	SHA1	Commentaire
netscan.exe	C:\Users\[user]\Downloads\scan\8.1.5\	eeaf29a71330db50cdd4630f8d9f1c2b6a34578c	Softperfect Network Scanner
PingCastle.exe	C:\Users\[user]\Downloads\8.1.5\Nouveau dossier\	292629c6ab33bddf123d26328025e2d157d9e8fc	PingCastle
PingCastleAutoUpdater.exe	C:\Users\[user]\Downloads\8.1.5\Nouveau dossier\	536734aa6ec0f0b1ba8e43088edc6857eca42667	PingCastle

Some Artifacts and Command Line as starting point for Threat Hunting and Detection Engineering PrintNightmare 2/2

- Batch files and SHA1 hash
- Specific executable and DLLs

Nom de fichier	Chemin	SHA1	Commentaire
LPE-Exploit-RunAsUser.bat	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\	e2a68116d52182f207c087f349e04e049982d431	CVE-2021-34527
Step1-RunAsAdmin.bat	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\	fae6068d4433b33751bf7de866d7f2900aa15139	CVE-2021-34527
Step2-RunAsUser.bat	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\	d69420a636dacfbafaf01f7153692c197e9b6400	CVE-2021-34527
spn.exe	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\Release\	68a07540fbf58fe743636b7fc8f0370c84134eb3	CVE-2021-34527
spn_nf3.exe	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\Release\	58cb839dbc0232874b6fed9a354d4cc6d355cbac	CVE-2021-34527
spider.dll	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\share\	1e0ec6994400413c7899cd5c59bdbd6397dea7b5	CVE-2021-34527
spider_32.dll	C:\Users\[user]\Downloads\PrintNightmare-Manual\Attacker\share\	35ff55bcf493e1b936dc6e978a981ee2a75543a1	CVE-2021-34527
CreShar.exe	C:\Users\[user]\Downloads\PrintNightmare-Manual\C#-CreateShare\	a00ebf699ea0759e7bf4af65dddd741133c38484	CVE-2021-34527
MakeMeGood.bat	C:\Users\[user]\Downloads\PrintNightmare-Manual\Victim\	df12386df2c0fcf65522282914424d63da962d79	CVE-2021-34527
bks.exe	C:\Users\[user]\Downloads\8.1.5\bluekeep\	-	CVE-2019-0708

Emulate & Threat Hunting Healthcare RMM Tools

FIRST™
Improving Security Together

Defensive Engagement – Emulate or Simulate threat actors & top TTPs in the Healtcare with BAS Tools & Atomic Red Team

Preparation with the Attack Flow as a playbook for the threat actor

CALDERA

BAS Tools MITRE Caldera

Purple Teaming with BAS

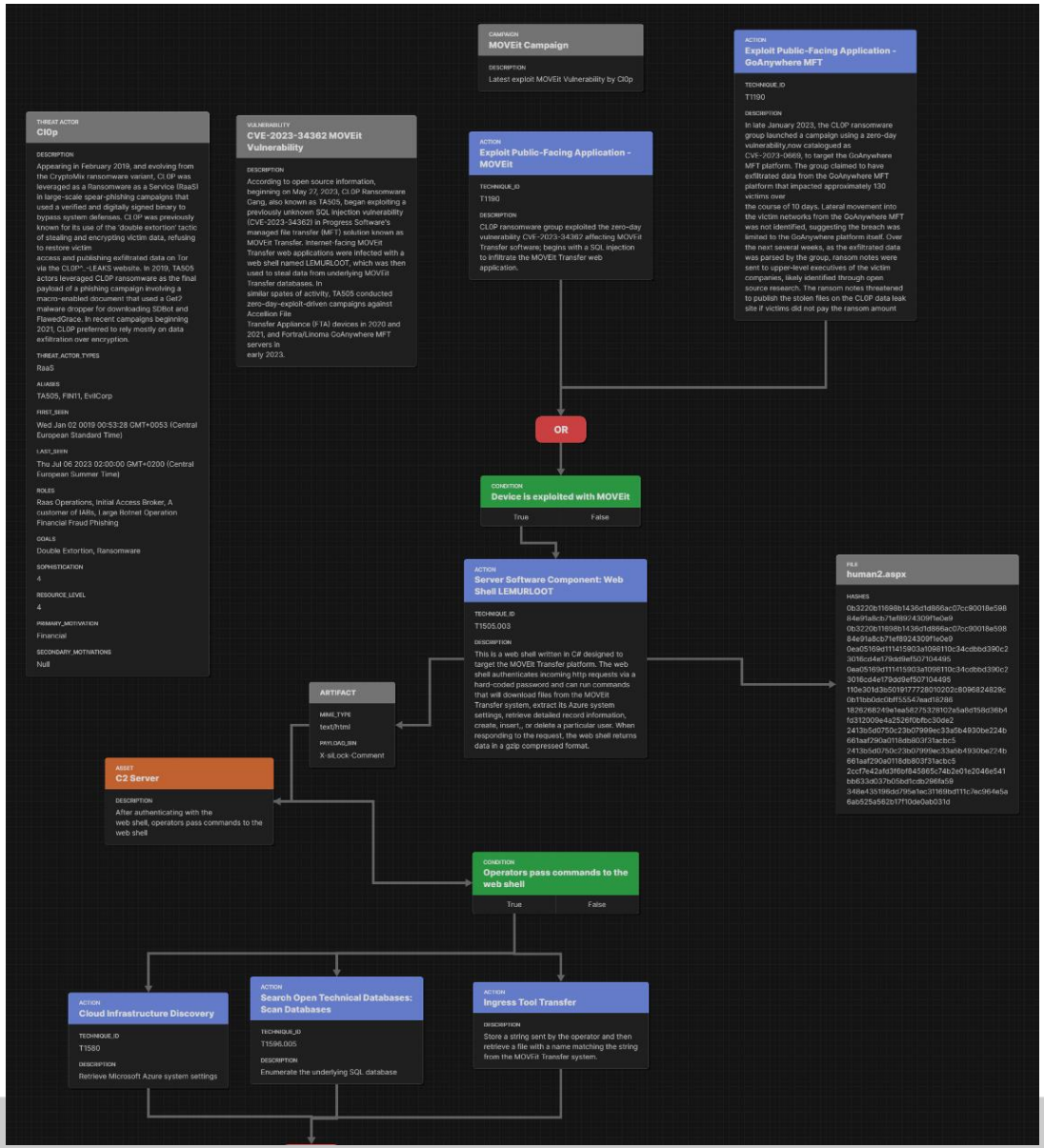
HackTr

Pentesting or Red Teaming test examples of different websites like HackTricks or Atomic Red Team

Vulnerabilties testing with the help of websites like – Exploit-DB

Example Attack Flow – Cl0p MOVEit

- Create your own flow with:
- Action: MITRE ATT&CK Technique
- Artifacts, Files and Processes
- Vulnerability
- Malware (Malware analysis)
- Threat Actor and campaign
- => Every sequence in the attack flow helps to understand adversarial behavior.



Threat Hunting RMM Tools

PEAK Framework David Bianco

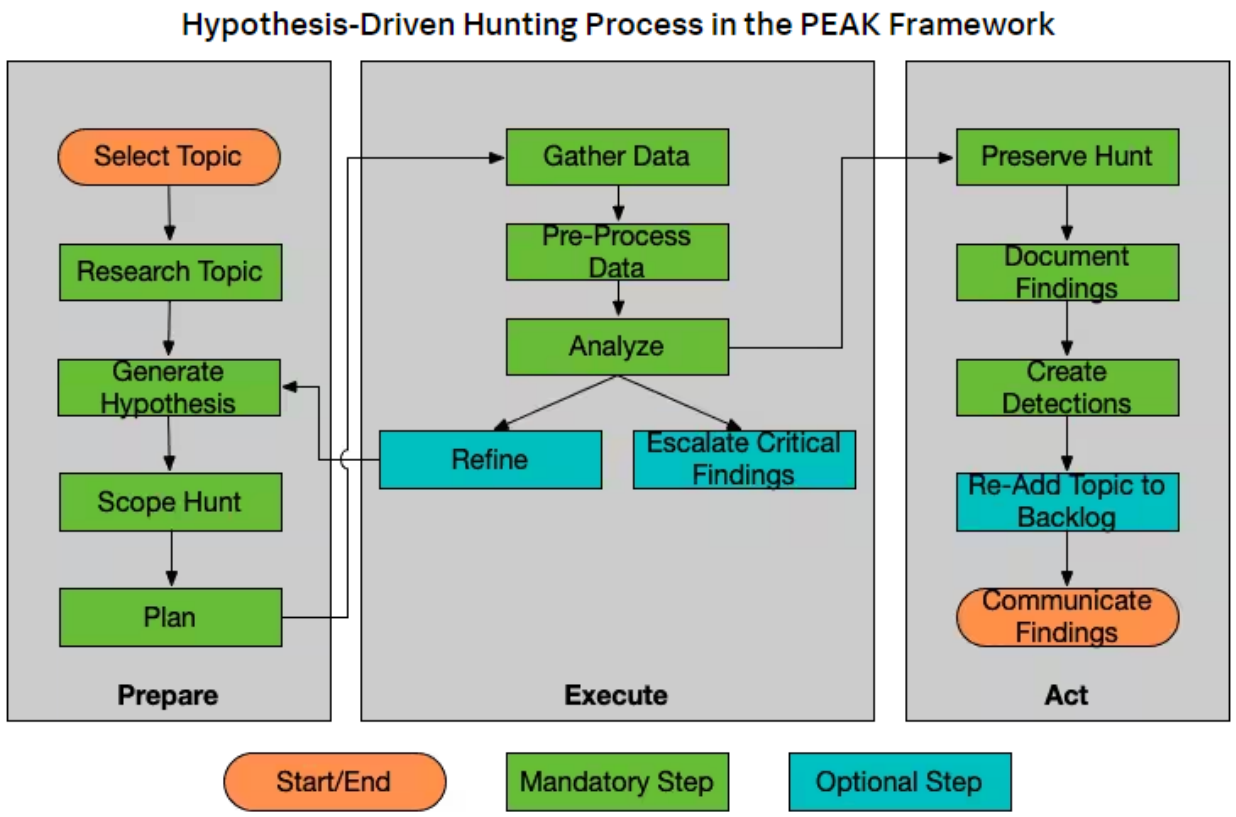
ABLE translated into threat informed defense

Example for AnyDesk

Test and telemetry results

Other Sigma rules for RMM Tools

Hypothesis-Driven Hunting Process PEAK Framework @David Bianco



- Come up with a topic – select a MITRE ATT&CK technique
- Make it testable
- Refine as necessary

- Holistic Thread Modeling – structured analysis
- Cyber Threat Intelligence and Cyber Threat Profiling => mulitlayering hypothesis (ACH)
- Defensive Engagement: test, rigid, repeat
- Refine results in a OODA-Loop

PEAK framework translated into Threat Informed Defense

David Biancos ABLE

- Actor: the threat actor you're looking for
- Behavior: the specific activity your trying to find (TTPs)
- Location: End-user's dektop, internet-facing web server etc.
- Evidence: data sources you need to consult the activity

Threat Informed Defense Enterprise-Centric ABLE:

- Actor: the threat actor you're looking for is contextual organizational analyzed (CSIRT, IR, own incidents and artifacts, vulnerabilities etc.)
- Behavior: the specific activity known from multilayering the capabilities (TTPs)
- Location: End-user's dektop, internet-facing web server etc. Organization's network
- Evidence: data sources you need to consult the activity within the organization (which data source do you have available? What do you see and which data is missing?)

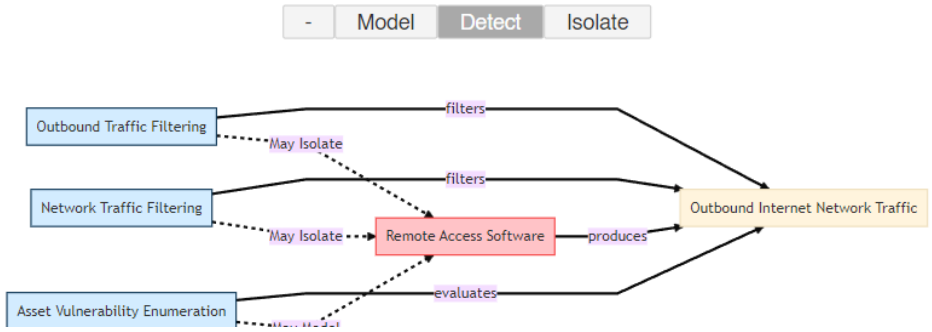
ABLE for RMM Tools

Threat Informed Defense Enterprise-Centric ABLE:

- Actor: We're looking for ransomware groups in the healtcare using RMM Tools (evidence-based)
- Behavior: the known technique is T1219 and the abuse of legitimate tools for external remote access T1133
- Location: End-user's dektop, End-users's AppData or ProgramData and your network traffic (flow, content and connection creation)
- Evidence: Which data source do you have available in your environment? Can you log everything? Do you have any data gaps?

Relevant Data Sources for T1219:

- Network Traffic
  - Network Connection Creation
  - Network Traffic Content
  - Network Traffic Flow
- Process => process creation



ABLE Phase 1. Prepare: Setting the Stage for your hunt

- Select Topic: **T1219 Remote Access Software**
- Research Topic:
  - Learn about the specific relevant RMM tools for Healtcare Ransomwaregroups
  - Detection of such Tools
  - MITRE ATT&CK documentation T1219
  - Command Lines to test and detect
  - Specific threat actor comparison
  - Use platforms and tools like HUNTER, D3FEND & KAPE (forensics) for technical details and specific research
- Generate Hypothesis: Threat actor could establish a C2 connection via a remote tool - external remote access to move laterally.
- Scope Hunt: Try to find all RMM Tools in the environment. Differentiate abnormal behavior from normal by finding outlier.
- Plan:
  - Gathering the data from the Logs & Telemetry
  - Using Sysmon and Telemetry, Testing with Atomic and other research sources, to understand the results in the own environment (security tools)
  - Start Hunting with the suggested technique in HUNTER or with a own created query
  - Focus on sensors and data source like network connection, traffic & flow, proces creation etc.

ABLE Phase 1. Research RMM Tools Healthcare Ransomware groups – Example AnyDesk download and execution

AnyDesk

- Atera RMM
- LogMeIn
- ManageEngine
- Netsupport Manager Application
- Ngrok
- PsExec
- Putty
- Quasar RAT
- rsocx
- RealVNC
- Splashtop
- TeamViewer

Command

```
AnyDesk.exe --install "%ProgramFiles(x86)%¥AnyDesk" --start-with-win --silent
```

TIDAL CYBER

Analytic Detail

Anydesk Temporary Artefact

Detects Technique(s): Remote Access Software

Location: https://github.com/SigmaHQ/sigma/blob/e78cb13cfdd5f2308e720e432ccb2e73e39d2d60/rules/windows/file/file_event/file_event_win_anydesk_artefact.yml

Source: SIGMA

Contributors: frack113

License: Detection Rule License 1.1

An adversary may use legitimate desktop support and remote access software, such as Team Viewer, Go2Assist, LogMein, AmmyyAdmin, etc, to establish an interactive command and control channel to target systems within ne software, and may be allowed by application control within a target environment. Remote access tools like VNC, Ammyy, and Teamviewer are used frequently when compared with other legitimate software commonly used by

```
selection: TargetFilename|contains: - \AppData\Roaming\AnyDesk\user.conf - \AppData\Roaming\AnyDesk\system.conf TargetFilename|endswith: .tempcondition: selection
```

Files

master

Go to file

- .github
- Modules
- Targets
  - !Disabled
  - Antivirus
  - Discord.tkape
  - DoubleCommander.tkape
  - Dropbox_Metadata.tkape

Documentation • Share feedback

KapeFiles / Targets / Apps / AnyDesk.tkape

AndrewRathbun update documentation - AnyDesk

Code Blame 73 lines (72 loc) · 3.75 KB

```
Description: AnyDesk
Author: Andrew Rathbun, Scott Hanson, and Nicole Jao
Version: 1.4
Id: 6c3736f5-39e2-4cce-9af8-02c76c09b91c
RecreateDirectories: true
Targets:
    -
        Name: AnyDesk Logs - User Profile - *.trace
        Category: Communications
        Path: C:\Users\%user%\AppData\Roaming\AnyDesk\
        FileMask: '*.trace'
        Comment: "Collects the trace logs for AnyDesk from a user profile"
    -
        Name: AnyDesk Logs - ProgramData - *.trace
        Category: Communications
        Path: C:\ProgramData\AnyDesk\
        FileMask: '*.trace'
        Comment: "Collects the trace logs for AnyDesk from ProgramData"
    -
        Name: AnyDesk Logs - User Profile - *.conf
        Category: Communications
        Path: C:\Users\%user%\AppData\Roaming\AnyDesk\
        FileMask: '*.conf'
        Comment: "Collects the conf logs for AnyDesk from a user profile"
    -
        Name: AnyDesk Logs - ProgramData - *.conf
        Category: Communications
        Path: C:\ProgramData\AnyDesk\
        FileMask: '*.conf'
        Comment: "Collects the conf logs for AnyDesk from ProgramData"
    -
        Name: AnyDesk Videos
        Category: Communications
        Path: C:\Users\%user%\Videos\AnyDesk\
        FileMask: '*.anydesk'
        Comment: "Collects any session recordings made by the user while using AnyDesk"
    -
        Name: AnyDesk Logs - User Profile - connection_trace.txt
        Category: Communications
        Path: C:\Users\%user%\AppData\Roaming\AnyDesk\
        FileMask: 'connection_trace.txt'
        Comment: "Collects the connection trace log from user profile"
```

Atomic Test #2 - AnyDesk Files Detected Test on Windows

An adversary may attempt to trick the user into downloading AnyDesk and use to establish C2. Download of AnyDesk installer will be at the destination location and ran when sucessfully executed.

Supported Platforms: Windows

auto_generated_guid: 6b8b7391-5c0a-4f8c-baee-78d8ce0ce330

Attack Commands: Run with `powershell`! Elevation Required (e.g. root or admin)

```
Invoke-WebRequest -OutFile C:\Users\$env:username\Desktop\AnyDesk.exe https://download.anydesk.com/AnyDesk.exe
$file1 = "C:\Users\" + $env:username + "\Desktop\AnyDesk.exe"
Start-Process $file1 /S;
```

Cleanup Commands:

```
$file1 = "C:\Users\" + $env:username + "\Desktop\AnyDesk.exe"
Remove-Item $file1 -ErrorAction Ignore
```

ABLE Phase 1. Research RMM Tools Healthcare Ransomware groups – Test downlaod and installation in your environment

AnyDesk
Atera RMM
LogMeIn
ManageEngine
Netsupport Manager Application
Ngrok
PsExec
Putty
Quasar RAT
rsocx
RealVNC
Splashtop
TeamViewer
Tor C2

- Evidence: data sources you need to consult - the activity within the organization (which data source do you have available?)
  - Network Traffic
    - Network Connection Creation
      - Sysmon EID 3
    - Network Traffic Content
      - Protocols 443
    - Network Traffic Flow
      - Invariant **net.anydesk.com**
  - (File creation EID 11 Sysmon for downloading the tool)
  - Process creation
    - Windows Event 4688 or Sysmon EID 1

- Artifacts during installation own telemtry example:
  - During installation startup folder AnyDesk.lnk with Sysmon EID 11 file creation
  - Command line contains AnyDesk and --control

- Several registry keys

\REGISTRY\MACHINE\SOFTWARE\Classes\AnyDesk\shell\open\command\

'C:\Program Files\AnyDesk\AnyDesk.exe" "%1"

- Pipe creation found in own telemetry
  - \adprinterpipe

ABLE Phase 2 Execute: Gather data and escalate critical findings

- Gather Data
- Pre-Process Data
  - Convert to JSON or CSV
  - Normalize logs
  - Throw out nonsensical values
- Analyze
  - Clustering
  - Visualization
  - Least/most frequency/occurrence
    - (outlier)
- Refine Hypothesis
- Escalate Critical Findings

Sigma Rules | Sigma | Splunk Query (SPL) | TRANSLATE

Save As | Validate | Intelligence

```yaml
title: Remote Access Tool - AnyDesk Silent Installation
id: 114e7f1c-f137-48c8-8f54-3888c24ce4b9
status: test
description: Detects AnyDesk Remote Desktop silent installation. Which can be used by attackers to gain remote access.
references:
    - https://twitter.com/TheDFIRReport/status/1423361119926816776?s=20
    - https://support.anydesk.com/Automatic_Deployment
author: Ján Trenčanský
date: 2021/08/06
modified: 2023/03/05
tags:
    - attack.command_and_control
    - attack.t1219
logsource:
    category: process_creation
    product: windows
detection:
    selection:
        CommandLine|contains|all:
            - '--install'
            - '--start-with-win'
            - '--silent'
    condition: selection
fields:
    - CommandLine
    - ParentCommandLine
    - CurrentDirectory
falsepositives:
    - Legitimate deployment of AnyDesk
level: high
```

Save As

```
index=* source="WinEventLog:*" AND ((CommandLine="*--install*") AND (CommandLine="*--start-with-win*") AND (CommandLine
    ="*--silent*")) | table CommandLine,ParentCommandLine,CurrentDirectory
```

```
DeviceProcessEvents | where (ProcessCommandLine contains @'--install' and ProcessCommandLine contains @'--start-with
    -win' and ProcessCommandLine contains @'--silent')
```

Event 1, Sysmon

General | Details

```
Process Create:
RuleName: technique_id=T1059.003,technique_name=Windows Command Shell
UtcTime: 2023-10-04 19:48:16.584
ProcessGuid: {bd6ed866-c180-651d-c702-000000000d00}
ProcessId: 5136
Image: C:\Users\observer\Desktop\AnyDesk.exe
FileVersion: 8.0.3
Description: AnyDesk
Product: AnyDesk
Company: AnyDesk Software GmbH
OriginalFileName: -
CommandLine: AnyDesk.exe  --install "C:\Program Files (x86)AnyDesk" --start-with-win --silent
CurrentDirectory: C:\Users\observer\Desktop\
User: DESKTOP-MM6FS36\observer
LogonGuid: {bd6ed866-11f5-650e-fb2b-040000000000}
LogonId: 0x42BFB
TerminalSessionId: 1
IntegrityLevel: High
Hashes: SHA1=1895D7C4F785F92E48B5191FD812822593CBC73F,MD5=37E172BE64B12F3207300D11B74656B8,SHA256=BC747E3BF7B6E02C09F3D18BDD0E64EEF62B940B2F16C9C72E647EEC85CF0138,IMPHASH=
00000000000000000000000000000000
ParentProcessGuid: {bd6ed866-c010-651d-ba02-000000000d00}
```

TIDEC-ABLE Phase 3 Act. Preserve Hunt and Document Findings

- Preserve Hunt: create your own knowledge base or wiki, documentation etc.
- Documents Finding: report on findings and incidents escalated
- Create Detections: Convert your findings into production detection rules or signatures to help catch similar threats in the future. Or send your detailed findings to the detection engineers if that's how your organization rolls. Either way, using hunts to improve automated detection is the other key driver behind continuous improvement of your security posture.
- Re-Add Topic to Backlog: new ideas and future hunting
- Communication Findings: Collaboration & Sharing

Other RMM Tools Sigma rules examples

- Atera: https://github.com/SigmaHQ/sigma/blob/04f72b9e78f196544f8f1331b4d9158df34d7ecf/rules/windows/builtin/application/win_software_atera_rmm_agent_install.yml
- Ngrok:
- https://github.com/SigmaHQ/sigma/blob/e78cb13cfdd5f2308e720e432ccb2e73e39d2d60/rules/windows/network_connection/net_connection_win_ngrok_tunnel.yml
- Splashtop
- https://github.com/The-DFIR-Report/Sigma-Rules/blob/c253c57c627b6d8cbcfa06320a3ad1ba2b9dedd4/win_network_splashtop.yml
- https://github.com/The-DFIR-Report/Sigma-Rules/blob/c253c57c627b6d8cbcfa06320a3ad1ba2b9dedd4/win_software_splashtop.ym
- Hunting
- https://github.com/SigmaHQ/sigma/blob/60b8e9b70fffaf49b17abfcae4a0ea08f2da7f71/rules/windows/dns_query/dns_query_win_remote_access_software_domains.yml

sigma / rules / windows / builtin / application / win_software_atera_rmm_agent_install.yml

frack113 Order rules

Code Blame 23 lines (23 loc) · 739 Bytes

```yaml
title: Atera Agent Installation
id: 87261fb2-69d0-42fe-b9de-88c6b5f65a43
status: experimental
description: Detects successful installation of Atera Remote Monitoring & Management (RMM) agent as recently found to be used by Conti operators
references:
  - https://www.advintel.io/post/secret-backdoor-behind-conti-ransomware-operation-introducing-atera-agent
date: 2021/09/01
modified: 2021/10/13
author: Bhabesh Raj
level: high
logsource:
    service: application
    product: windows
tags:
    - attack.t1219
detection:
    selection:
        EventID: 1033
        Provider_Name: MsiInstaller
        Message|contains: AteraAgent
    condition: selection
falsepositives:
    - Legitimate Atera agent installation
```

Pyramid of Pain & Summiting the Pyramid – Cyber Analytic Engineering in CTI

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Improving Security Together

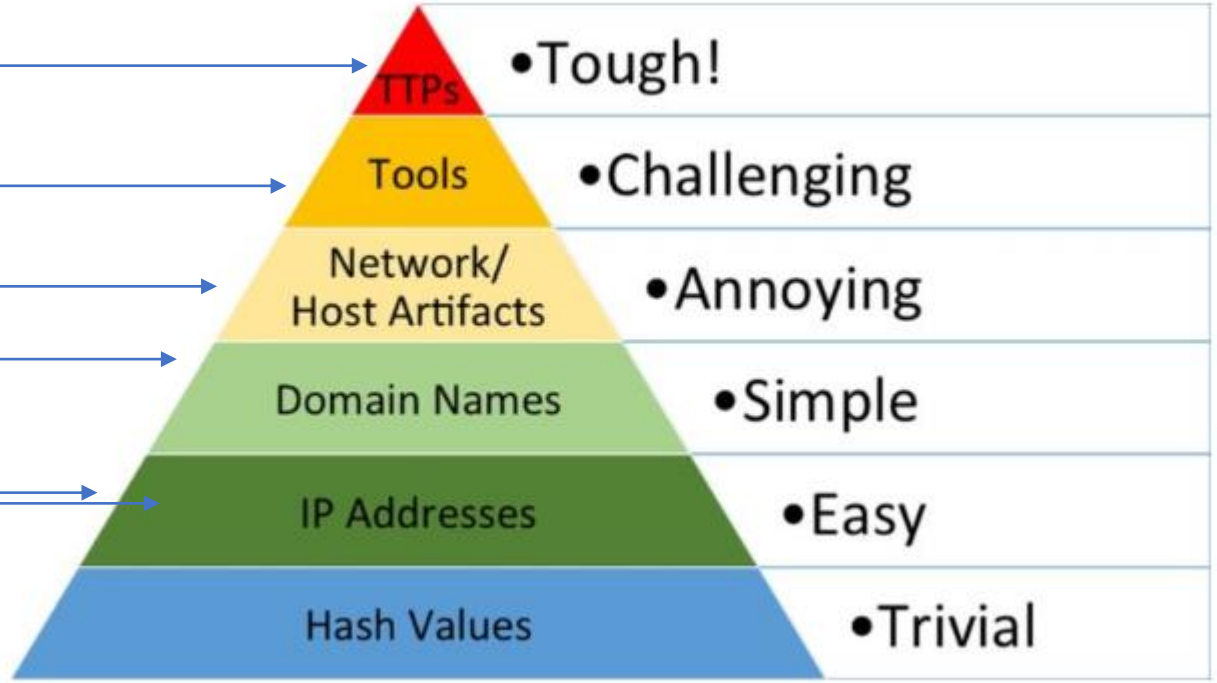
Pyramid of Pain - Downloading AnyDesk

Event 3, Sysmon

General | Details

```
Network connection detected:
RuleName: technique_id=T1036,technique_name=Masquerading
UtcTime: 2023-09-23 00:08:04.884
ProcessGuid: {bd6ed866-b7a6-651d-8302-000000000d00}
ProcessId: 2896
Image: C:\Users\observer\Desktop\AnyDesk.exe
User: DESKTOP-MM6FS36\observer
Protocol: tcp
Initiated: true
SourceIsIpv6: false
SourceIp: 192.168.146.147
SourceHostname: DESKTOP-MM6FS36
SourcePort: 62453
SourcePortName: -
DestinationIsIpv6: false
DestinationIp: 57.128.101.75
DestinationHostname: relay-bfa30227.net.anydesk.com
DestinationPort: 443
DestinationPortName: https
```

Log Name:	Microsoft-Windows-Sysmon/Operational		
Source:	Sysmon	Logged:	10/4/2023 9:06:19 PM
Event ID:	3	Task Category:	Network connection detected (rule: Network
Level:	Information	Keywords:	
User:	SYSTEM	Computer:	DESKTOP-MM6FS36
OpCode:	Info		
More Information:	Event Log Online Help		

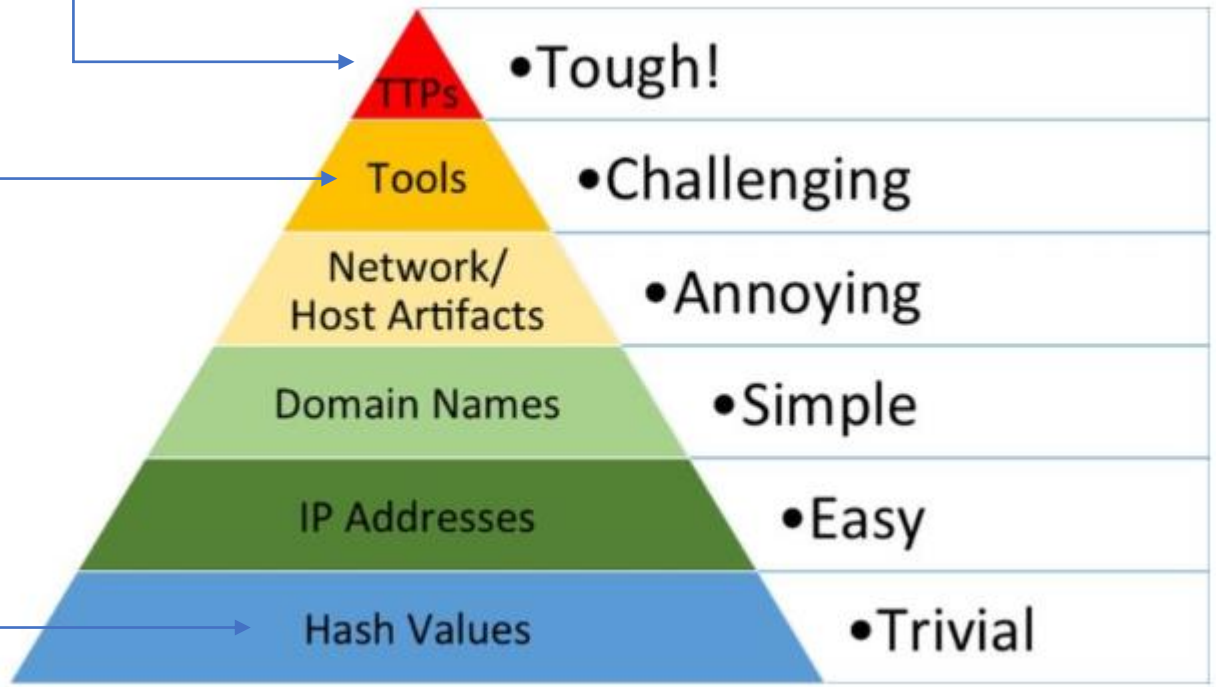


Pyramid of Pain - Installation of AnyDesk

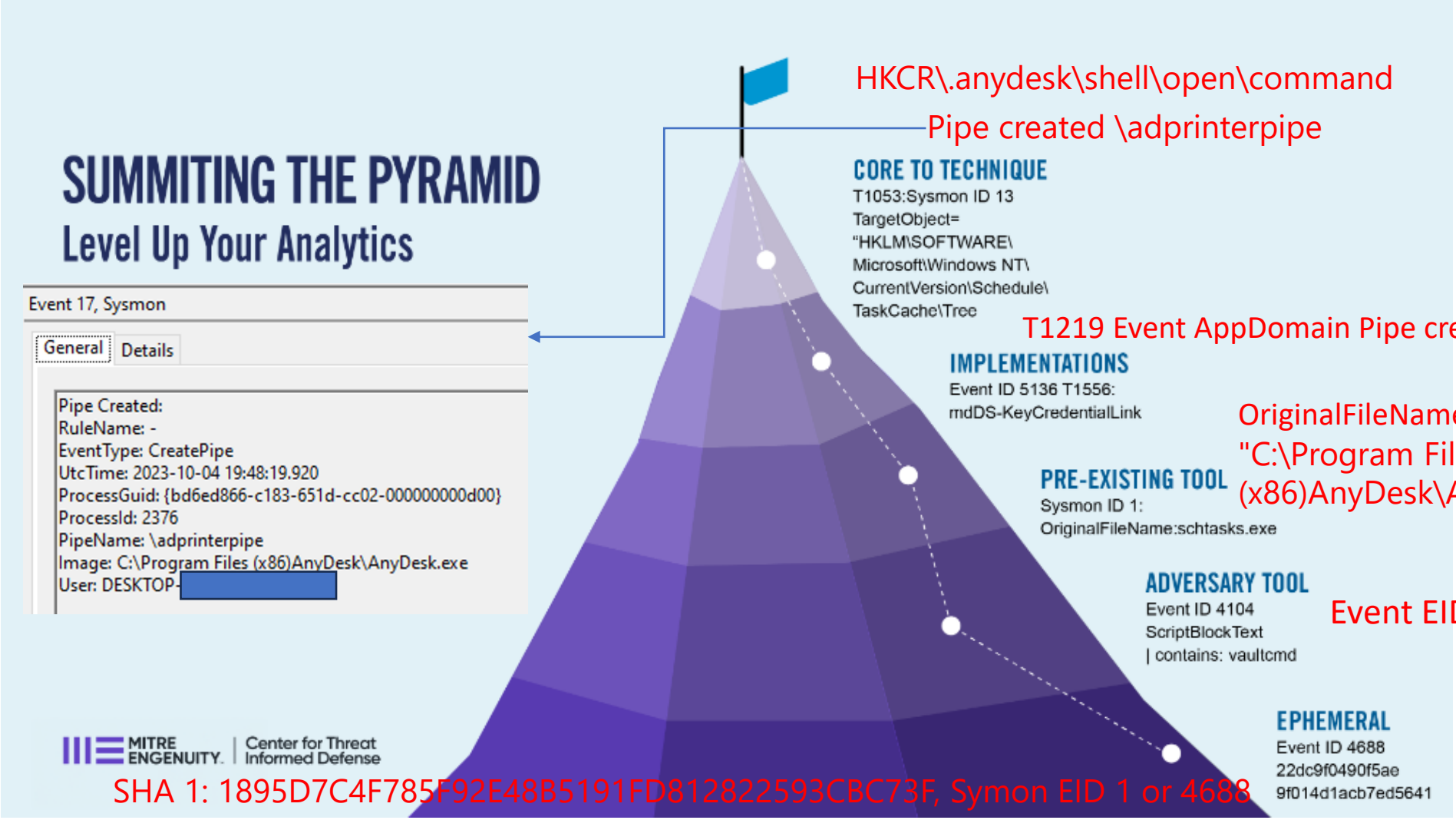
Event 1, Sysmon

General Details

```
Process Create:
RuleName: technique_id=T1059.003,technique_name=Windows Command Shell
UtcTime: 2023-10-04 19:48:16.584
ProcessGuid: {bd6ed866-c180-651d-c702-000000000d00}
ProcessId: 5136
Image: C:\Users\observer\Desktop\AnyDesk.exe
FileVersion: 8.0.3
Description: AnyDesk
Product: AnyDesk
Company: AnyDesk Software GmbH
OriginalFileName: -
CommandLine: AnyDesk.exe  --install "C:\Program Files (x86)AnyDesk" --start-with-win --silent
CurrentDirectory: C:\Users\observer\Desktop\
User: DESKTOP-MM6FS36\observer
LogonGuid: {bd6ed866-11f5-650e-fb2b-040000000000}
LogonId: 0x42BFB
TerminalSessionId: 1
IntegrityLevel: High
Hashes: SHA1=1895D7C4F785F92E48B5191FD812822593CBC73F,MD5=37E172BE64B12F3207300D11B
00000000000000000000000000000000
ParentProcessGuid: {bd6ed866-c010-651d-ba02-000000000d00}
```



Summiting the Pyramid – TID Analysis AnyDesk



HKCR\.anydesk\shell\open\command

Pipe created \adprinterpipe

T1219 Event AppDomain Pipe creation: ID 53505 Pipe IPC

OriginalFileName AnyDesk.exe: "C:\Program Files (x86)AnyDesk\AnyDesk.exe" --control

Event EID 3 net.anydesk.com

SHA 1: 1895D7C4F785F92E48B5191FD812822593CBC73F, Symon EID 1 or 4688

Analytical Scoring – How Robust is the detection?

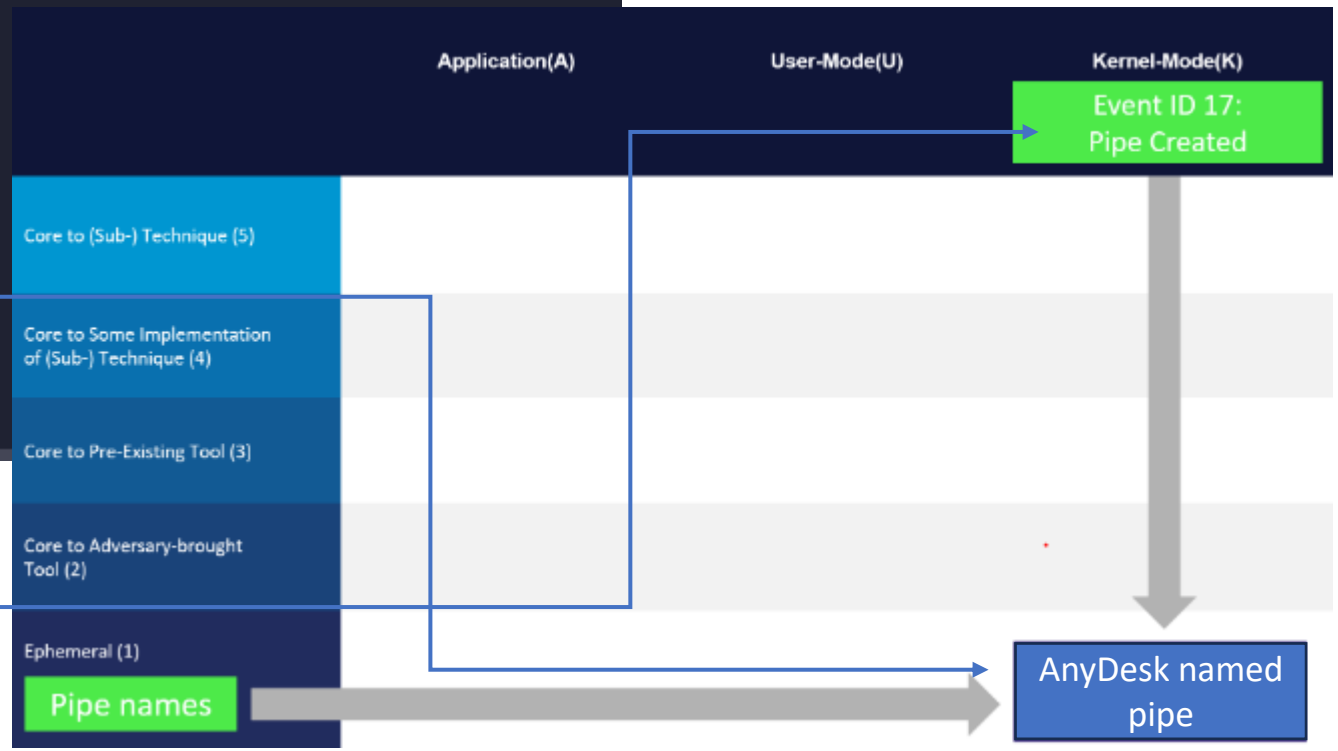
```yaml
title: AnyDesk Suspicious Pipe Creation
id: f7784b57-a6f1-4113-9d84-1c92f02ca078
status: experimental
description: Detects the creation of a pipe specific related to AnyDesk
references:
   - https://www.hybrid-analysis.com/sample/99dcdda32ee45835489890b3bcc273116bdcf6c263e0cf6f74542ea3d56b78a1
       /60e21d53d4e6ff722e5617e6
author: Simone Kraus (Orange Cyberdefense)
date: 2023/10/05
tags:
   - attack.command_and_control
   - attack.attack.t1219 #Remote Access Software
logsource:
   product: windows
   category: pipe_created
detection:
   selection:
      - PipeName|startswith:
            - '\adprinterpipe'
   condition: selection
falsepositives:
   - Legitimate use of AnyDesk
level: high
```

Step 1: Scoring the analytic's sensor data

Step 2: Break down each of the observables

Step 3: Analyze the selection or condition of the analytic

Step 4: Give the analytic a final score



Event 17, Sysmon

General | Details

```
Pipe Created:
RuleName: -
EventType: CreatePipe
UtcTime: 2023-10-04 19:48:19.920
ProcessGuid: {bd6ed866-c183-651d-cc02-000000000d00}
ProcessId: 2376
PipeName: \adprinterpipe
Image: C:\Program Files (x86)\AnyDesk\AnyDesk.exe
User: DESKTOP-[redacted]
```

Use Case Ransomware - LockBit

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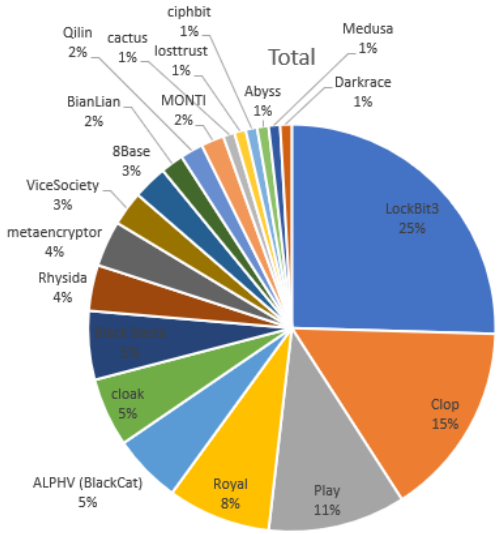
USE CASE LockBit – Joint Cybersecurity Advisory with the BSI

- Multilayering approach using the latest Threat Intelligence
- Prioritize your Cybersecurity Threat Profile enterprise-centric

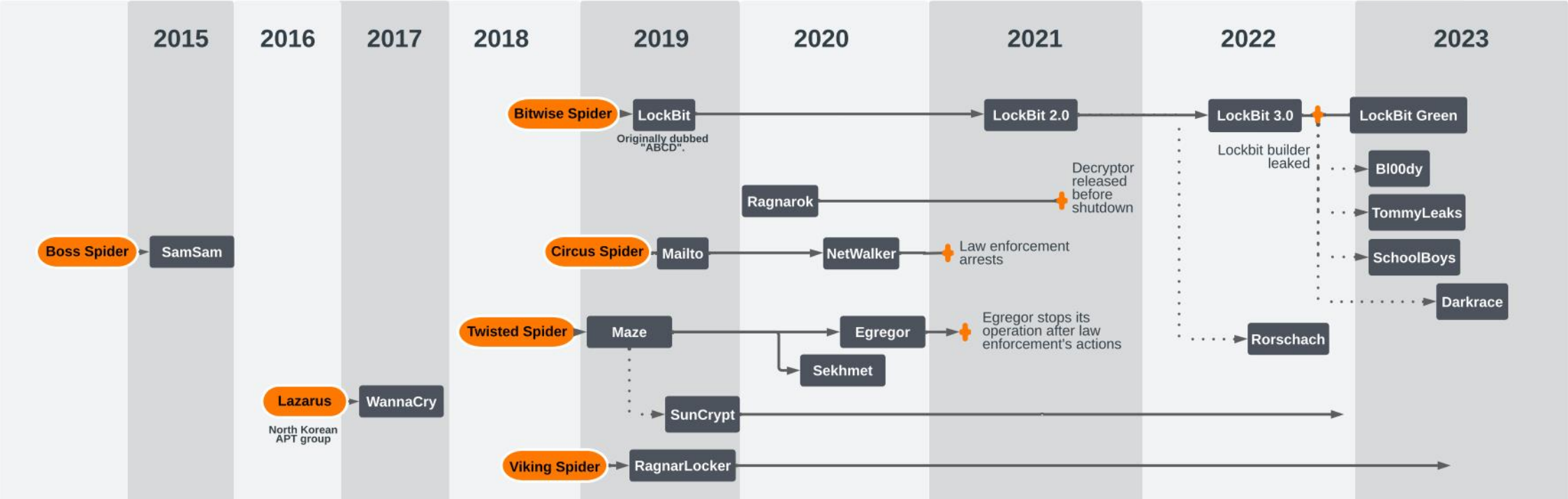
The Cy-X group LockBit as Use Case – Latest Ransomware & Extortion operation

General Information:

- In 2022, LockBit was the most deployed ransomware and again in July 2023 (Tidal Research)
- The BSI has currently classified the ransomware group as the most dangerous cybercrime player in the world.
- Organizations of all sizes are among the victims of LockBit.



Lockbit in the Ransomware Ecosystem

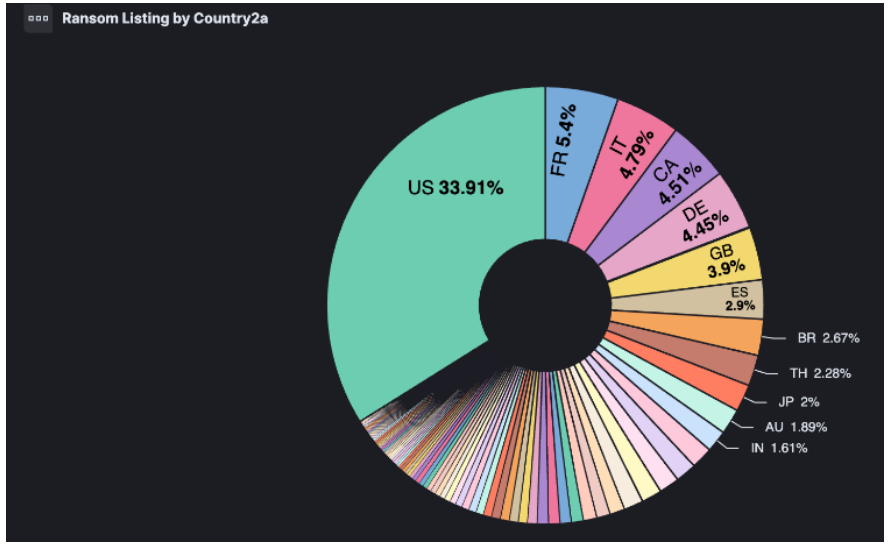


Methods of LockBit

- Assuring payment by allowing affiliates to receive ransom payments before sending a cut to the core group
- Disparaging other RaaS groups
- Engaging in publicity-generating activities
- Developing point-and-click interface for its ransomware

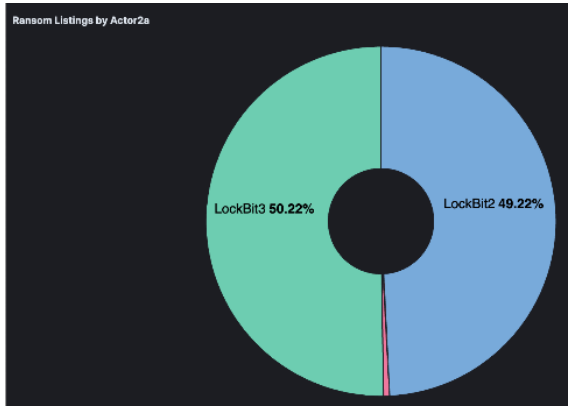
Different LockBit versions – OCD Research (64 events)

Name of the Strain*	Number of Inscances
Lockbit 2.0 (Lockbit Red)	26
Lockbit 3.0 (Lockbit Black)	23
Lockbit	21
Lockbit Green	1
Lockbit (pre-encrpytion)	1

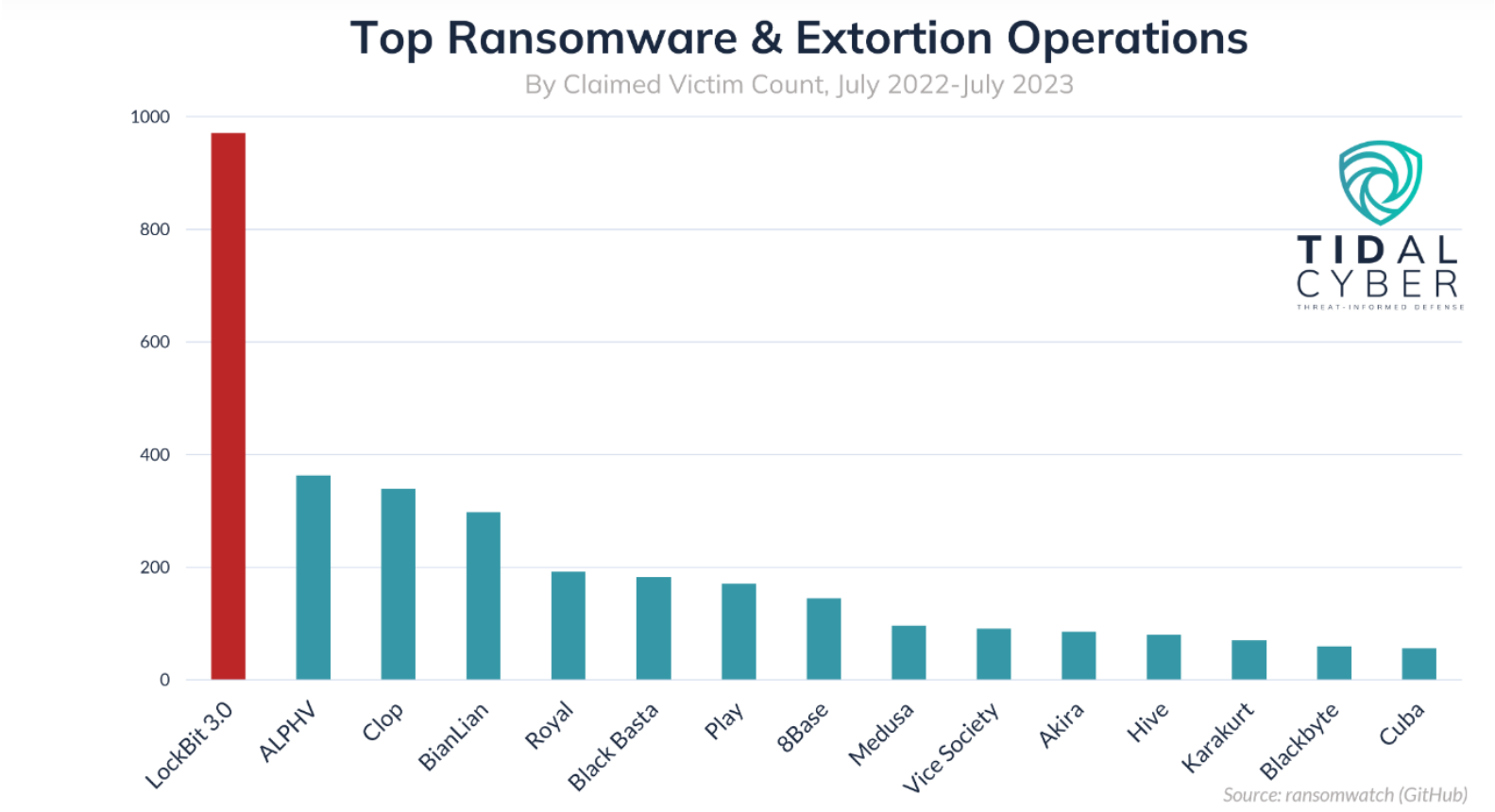


50:49 of all Lockbit attacks are Lockbit3.0 and Lockbit2.0

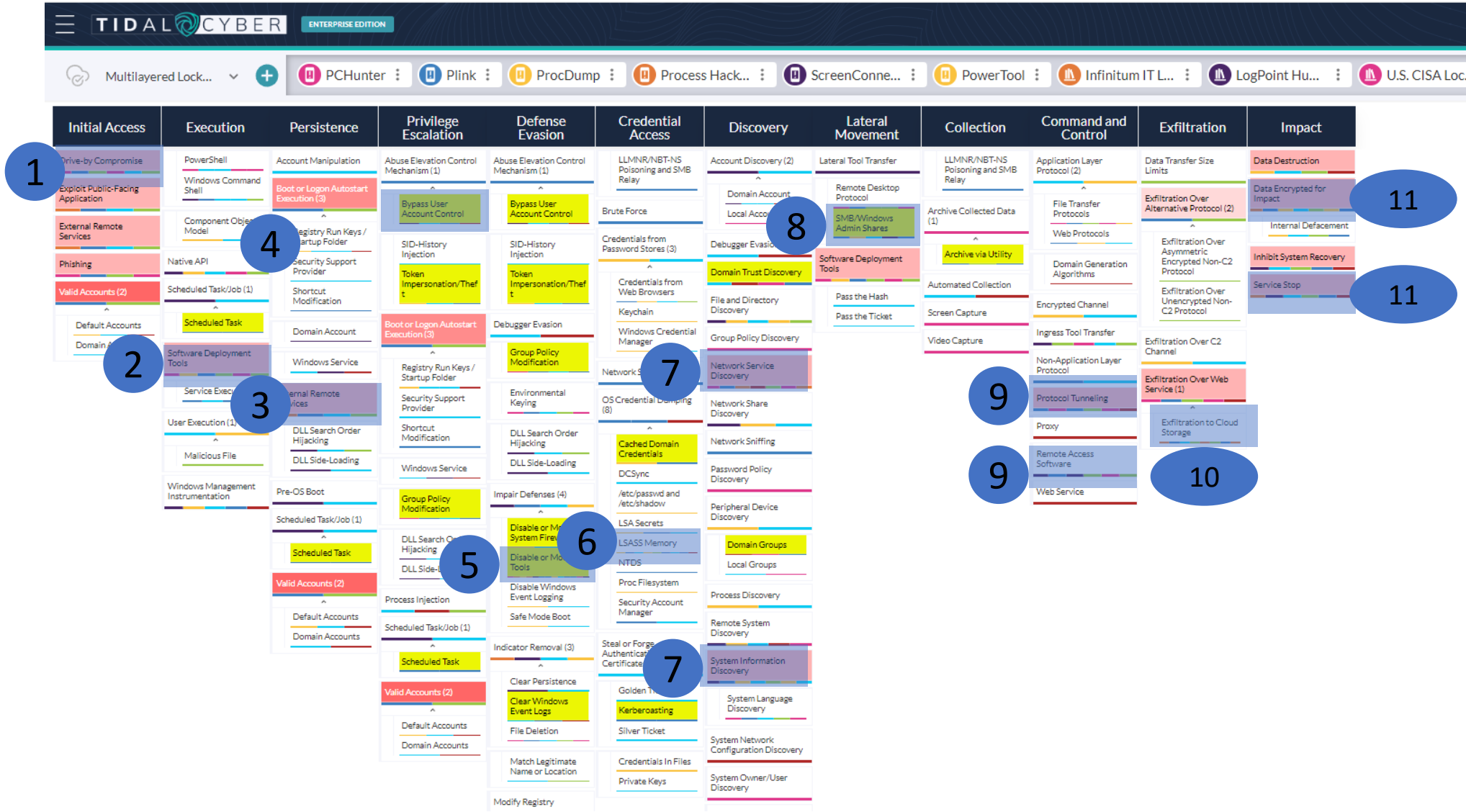
4.45% of all Lockbit attacks happen in Germany



Top Ransomware & Extortion Operations Tidal Cyber Research



Storytelling Multilayering – Latest LockBit Research & Tools



Compare multilayered capabilities of LockBit with the latest threat landscape OCD & top 10 ransomware techniques MITRE Engenuity Calculator techniques 1/2

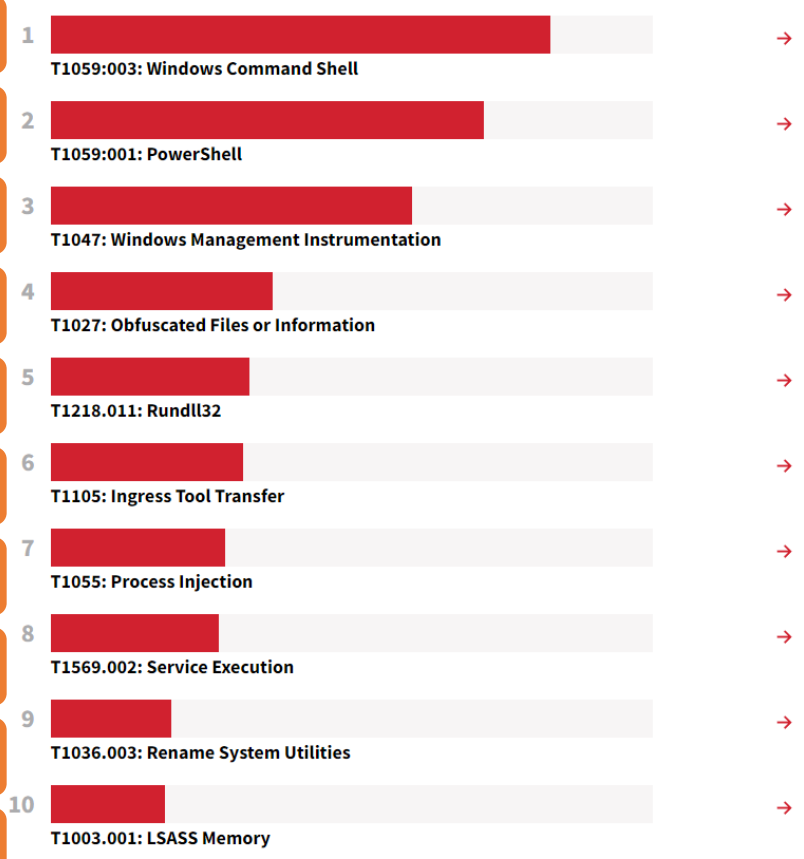
- T1189 Drive by Compromise
- T1072 Software Deployment Tools
- T1133 External Remote Services
- T1548.002 Abuse Elevation Control Mechanism
- T1562.001 Disable or Modify Tools
- T1003.001 OS Credential Dumping
- T1082 System Information Discovery
- T1046 Network Service Discovery
- T1572 Protocol Tunneling
- T1567 Exfiltration Over Web Service

1. Phishing - T1566 (73524)
2. Query Registry - T1012 (24030)
3. Native API - T1106 (14691)
4. Modify Registry - T1112 (12800)
5. Brute Force - T1110 (7692)
6. Software Discovery - T1518 (6534)
7. File Deletion - T1070.004 (5416)
8. Hidden Files and Directories -... (4720)
9. Domain Generation Algorithms -... (4481)
10. Credentials from Web Browsers... (4291)

1. T1003 - OS Credential Dumping
2. T1204 - User Execution
3. T1552 - Unsecured Credentials
4. T1072 - Software Deployment Tools
5. T1557 - Adversary-in-the-Middle
6. T1213 - Data from Information Repositories
7. T1539 - Steal Web Session Cookie
8. T1566 - Phishing
9. T1176 - Browser Extensions
10. T1185 - Browser Session Hijacking

Compare multilayered capabilities of LockBit with the latest threat landscape OCD & top 10 Red Canary, Picus 2/2

- T1189 Drive by Compromise
- T1072 Software Deployment Tools
- T1133 External Remote Services
- T1548.002 Abuse Elevation Control Mechanism
- T1562.001 Disable or Modify Tools
- T1003.001 OS Credential Dumping
- T1082 System Information Discovery
- T1046 Network Service Discovery
- T1572 Protocol Tunneling
- T1567 Exfiltration Over Web Service



Techniques (12)

Boot or Logon Autostart Execution
ID: T1547
Parent Technique: None
Tactics: Persistence, Privilege Escalation

Command and Scripting Interpreter
ID: T1059
Parent Technique: None
Tactics: Execution

Disable or Modify Tools
ID: T1562.001
Parent Technique: Impair Defenses
Tactics: Defense Evasion

Impair Defenses
ID: T1562
Parent Technique: None
Tactics: Defense Evasion

Masquerading
ID: T1036
Parent Technique: None
Tactics: Defense Evasion

OS Credential Dumping
ID: T1003
Parent Technique: None
Tactics: Credential Access

PowerShell
ID: T1059.001
Parent Technique: Command and Scripting Interpreter
Tactics: Execution

Process Injection
ID: T1055
Parent Technique: None
Tactics: Privilege Escalation, Defense Evasion

Registry Run Keys / Startup Folder
ID: T1547.001
Parent Technique: Boot or Logon Autostart Execution
Tactics: Persistence, Privilege Escalation

Scheduled Task/Job
ID: T1053
Parent Technique: None
Tactics: Execution, Persistence, Privilege Escalation

System Information Discovery
ID: T1082
Parent Technique: None
Tactics: Discovery

Windows Command Shell
ID: T1059.003
Parent Technique: Command and Scripting Interpreter
Tactics: Execution

MHHHHHH…WAIT A MINUTE…is the mulitlayering the wrong approach?

Or is LockBit succesful because we're hunting wrong ghosts?

How does LockBit use the top layered techniques – CISA AA23-165a 1/2

- T1189 Drive by Compromise
- T1072 Software Deployment Tools
- T1133 External Remote Services
- T1548.002 Abuse Elevation Control Mechanism
- T1562.001 Disable or Modify Tools
- T1003.001 OS Credential Dumping
- T1082 System Information Discovery
- T1046 Network Service Discovery
- T1572 Protocol Tunneling
- T1567 Exfiltration Over Web Service

T1189: LockBit affiliates gain access to a system through a user visiting a website over the normal course of browsing.

T1072: LockBit affiliates may use **Chocolatey**, a command line package manager for Windows

T1133: LockBit affiliates exploit RDP to gain access to victims' networks.

T1548.002: LockBit affiliates may use ucmDccwCOM Method in **UACMe**, a GitHub collection of User Account Control (UAC) bypass techniques.

T1562.001: Terminates antimalware-protected processes.

- Bypasses PowerShell execution policy.
- Disables Microsoft Defender.
- Terminates and removes EDR software.
- Terminates and circumvents EDR processes and services.

How does LockBit use the top layered techniques – CISA AA23-165a 2/2

- T1189 Drive by Compromise
- T1072 Software Deployment Tools
- T1133 External Remote Services
- T1548.002 Abuse Elevation Control Mechanism
- T1562.001 Disable or Modify Tools
- T1003.001 OS Credential Dumping
- T1082 System Information Discovery
- T1046 Network Service Discovery
- T1572 Protocol Tunneling
- T1567 Exfiltration Over Web Service

T1003.001: Obtains credentials by dumping the contents of Local Security Authority Subsystem Service (LSASS).

T1082: Performs numerous security-oriented checks to enumerate system information with the software **Seatbelt**

- LockBit affiliates will enumerate system information to include hostname, host configuration, domain information, local drive configuration, remote shares, and mounted external storage devices.

T1046: Maps a victim's network to identify potential access vectors with the **Advanced Internet Protocol Scanner**

T1572: Enables LockBit affiliate actors to avoid detection with **PuTTY**

T1567: LockBit affiliates use publicly available file sharing services to exfiltrate a target's data with tools like **Rclone, FreeFileSync, MEGA** and exfiltrates it to the **Cloud Storage**

Surprising Results Multilayering LockBits capabilities

Take care which websites you visit!

Implement Windows Defender Exploit Guard (WDEG) and Enhanced Mitigation Experience Toolkit (EMET)

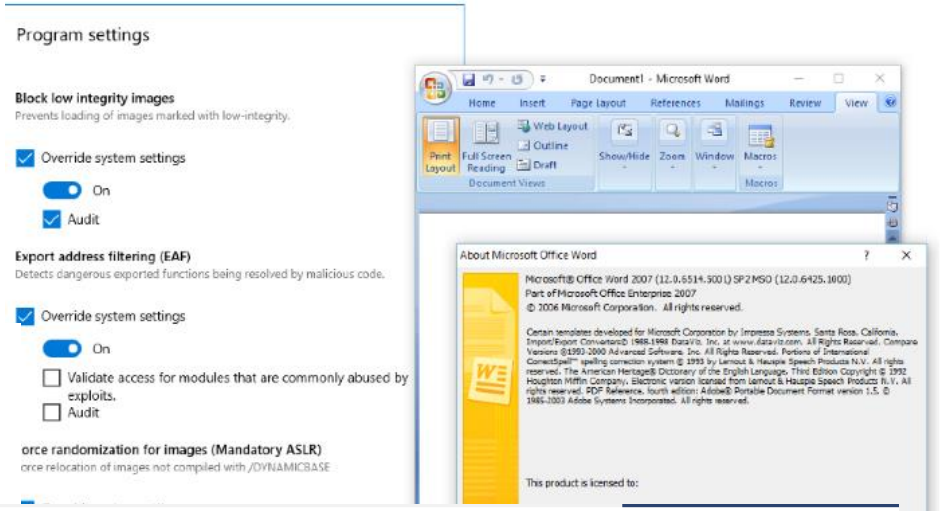
- Phishing is NOT THE MOST COMMON Initial Access but Drive by Compromise
- Software Deployment Tools are more common than PowerShell or WMI

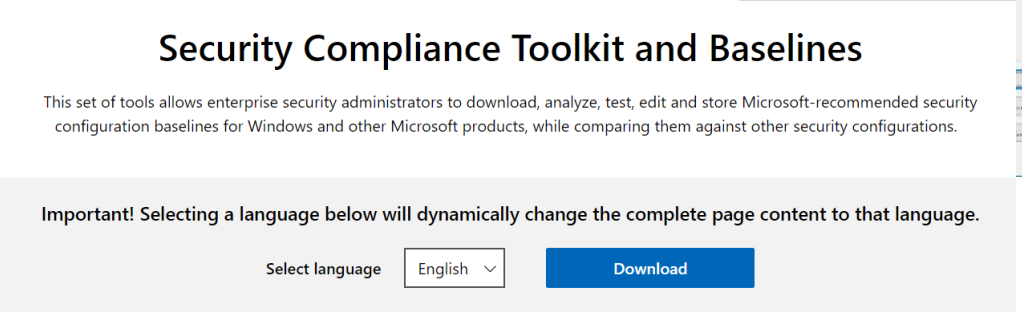
Establish an application allowlist of approved software applications and binaries that are allowed to be executed on a system. This measure prevents unwanted software to be run. Usually, application allowlist software can also be used to define blocklists so that the execution of certain programs can be blocked, for example `cmd.exe` or `PowerShell.exe` [CPG 2.Q].

- Remote Access Software is an important C2 technique for LockBit

Restrict service accounts from remotely accessing other systems. Configure group policy to `Deny log on locally`, `Deny log on through Terminal Services`, and `Deny access to this computer from the network for all service accounts` to limit the ability for compromised service accounts to be used for lateral movement.

- One of the most important choke point would be to prevent the software deployment of for e.g Chocolatey, Seabelt, UACMe (AWL, ACL)
- You can prevent the encryption if you detect service stop but also data destruction





Caldera and Atomic Red Team - Emulation or Simulation Example LockBit

Lockbit Adversary ID: d627004b-d

Lockbit Ransomware

+ Add Ability | + Add Adversary | Fact Breakdown | Objective: **default** | Change | Export | Save Profile | Delete Profile

defense-evasion 25.93% | discovery 7.41% | credential-access 14.82% | multiple 18.52% | lateral-movement 3.71% | impact 22.23%

Ordering	Name	Tactic	Technique	Executors	Requires	Unlocks
1	Rundll32 with Ordinal Value	defense-evasion	Signed Binary Proxy Execution: Rundll32			
2	Windows - Discover domain trusts with nltest	discovery	Domain Trust Discovery			
3	Basic Permission Groups Discovery Windows (Domain)	discovery	Permission Groups Discovery: Domain Groups			
4	Cached Credential Dump via Cmdkey	credential-access	OS Credential Dumping: Cached Domain Credentials			

infosecn1nja / red-team-scripts Public

Code | Issues | Pull requests | Actions | Projects | Security | Insights

Files

main

Go to file

- ASR Rules Bypass.vba
- BYOVD_kill_av_edr.c
- Generate-Mustang-Panda-LNK.p...
- Invoke-AtomicEnterpriseLayer.ps1
- LICENSE
- Lockbit_Ransomware_Atomic_Si...
- README.md
- gen-chm.py
- plugx.profile

red-team-scripts / Lockbit_Ransomware_Atomic_Simulation.ps1

infosecn1nja Update Lockbit_Ransomware_Atomic_Simulation.ps1

Code | Blame | 129 lines (97 loc) · 4.65 KB

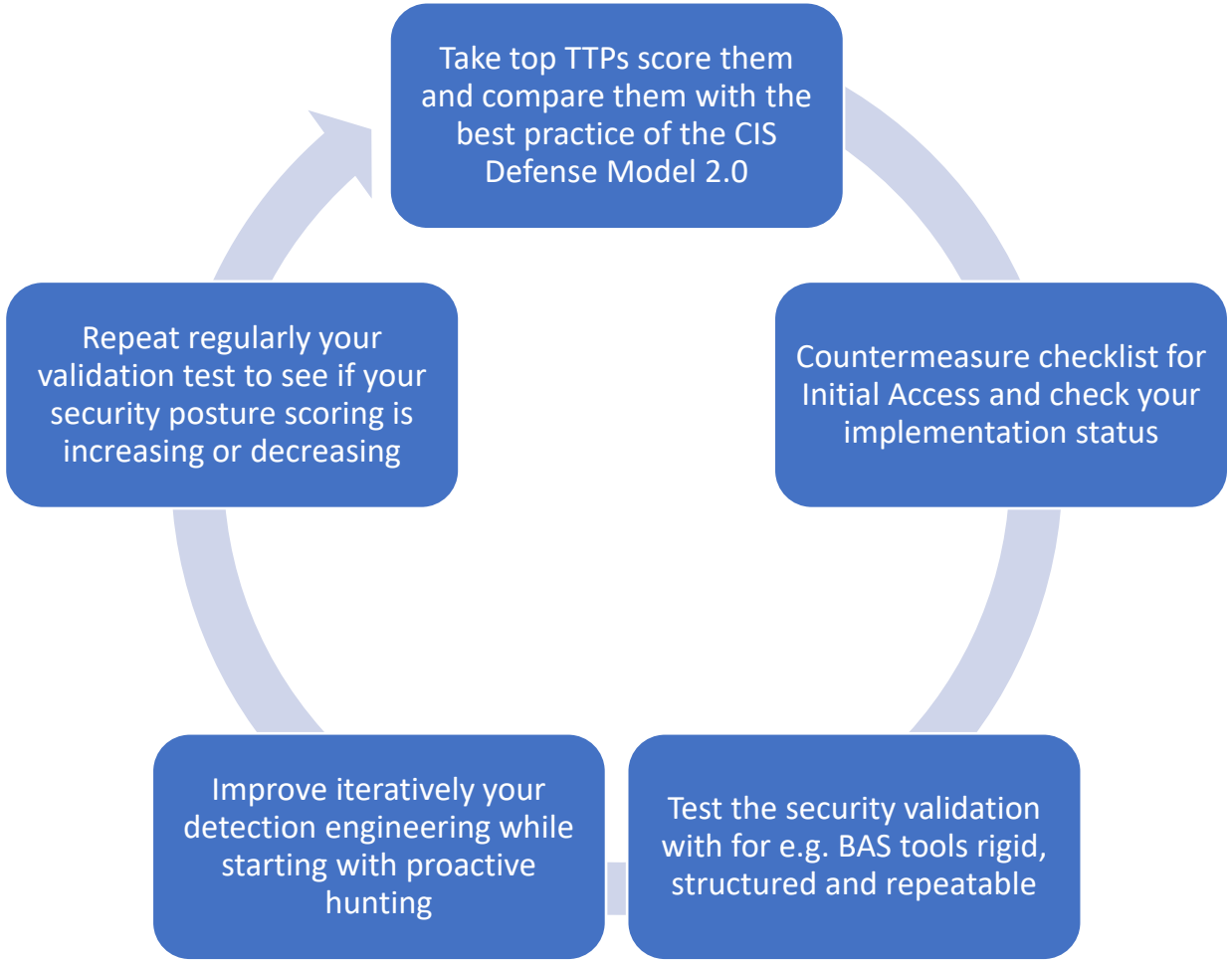
```
# Lockbit Ransomware Atomic Simulation
# Author : Rahmat Nurfauzi (@infosecn1nja)
# Date : 16/05/2023
# Simulate Lockbit Ransomware tactics, techniques, and procedures (TTP) with atomic red team to validate security controls
#
# References
# https://www.mandiant.com/resources/blog/unc2165-shifts-to-evade-sanctions
# https://www.cisa.gov/news-events/cybersecurity-advisories/aa23-075a
# https://research.nccgroup.com/2022/08/19/back-in-black-unlocking-a-lockbit-3-0-ransomware-attack/
# https://unit42.paloaltonetworks.com/lockbit-2-ransomware/
#

Set-ExecutionPolicy Bypass -Force
```

2 TTPs – CISA/BSI und Umsetzung in das Tabletop

Technique	CISA/BSI description Lockbit	Test
T1560.001 Archive via Utility	LockBit-Affiliates können 7-zip verwenden, um gesammelte Daten vor der Exfiltration zu komprimieren und/oder zu verschlüsseln.	Daten komprimieren und mit Passwort für Exfiltration mit 7zip sperren
T1548.002 Bypass User Account Control	LockBit-Affiliates können die ucmDccwCOM-Methode in UACMe verwenden, einer GitHub-Sammlung von Umgehungstechniken für die Benutzerkontensteuerung (User Account Control, UAC).	WinPwn - UAC-Umgehung der ccmstp-Technik
T1003.005 Cached Domain Credentials	LockBit-Affiliates bewegen sich lateral über Netzwerke hinweg und greifen auf Domänencontroller zu.	Zwischengespeicherter Anmeldedaten-Dump über Cmdkey
T1070.001 Clear Windows Event Logs	Die ausführbare LockBit-Datei löscht die Windows-Ereignisprotokolldateien.	Protokolle löschen
T1486 Data Encrypted for Impact	LockBit 3.0 verschlüsselt Daten auf Zielsystemen, um die Verfügbarkeit von System- und Netzwerkressourcen zu unterbrechen. LockBit-Affiliates können Windows- und Linux-Geräte sowie VMware-Instanzen verschlüsseln.	Daten verschlüsselt mit GPG4Win PureLocker Lösegeldforderung wird simuliert.

Threat Informed Defense - Measures example LockBit



Initial Access- LockBit Ransomware PREVENTION (1/4)

The following actions are general recommendations and counter measures for LockBit CISA Alert AA23_165A

Counter Measure	Description	Implementation Status
Consider implementing sandboxed browsers	Sandboxed browsers can protect systems from malware originating from web browsing. Sandboxed browsers isolate the host machine from malicious code.	
Require all accounts with password logins	with password logins (e.g., service account, admin accounts, and domain admin accounts) to comply with NIST standards for developing and managing password policies [CPG 2.L].	
Implement filters at the email gateway	to filter out emails with known malicious indicators, such as known malicious subject lines, and block suspicious IP addresses at the firewall [CPG 2.M].	
Install a web application firewall	and configure with appropriate rules to protect enterprise assets.	
Segment networks	to prevent the spread of ransomware. Network segmentation can help prevent the spread of ransomware by controlling traffic flows between—and access to— various subnetworks and by restricting adversary lateral movement.	

Initial Access- LockBit Ransomware PREVENTION (2/4)

The following actions are general recommendations and counter measures for LockBit CISA Alert AA23_165A

Counter Measure	Description	Implementation Status
Follow the least-privilege best practice	by requiring administrators to use administrative accounts for managing systems and use simple user accounts for non-administrative tasks [CPG 2.E].	
Enforce the management of and audit user accounts with administrative privileges.	Configure access controls according to the principle of least privilege [CPG 2.E].	
Implement time-based access for accounts set at the admin level and higher	For example, the Just-in-Time (JIT) access method provisions privileged access when needed and can support enforcement of the principle of least privilege (as well as the Zero Trust model). This is a process where a network-wide policy is set in place to automatically disable admin accounts at the Active Directory level when the account is not in direct need. Individual users may submit their requests through an automated process that grants them access to a specified system for a set timeframe when they need to support the completion of a certain task.	
Keep all operating systems, software, and firmware up to date	Timely patching is one of the most efficient and cost-effective steps an organization can take to minimize its exposure to cybersecurity threats.	

Initial Access- LockBit Ransomware PREVENTION (3/4)

The following actions are general recommendations and counter measures for LockBit CISA Alert AA23_165A

Counter Measure	Description	Implementation Status
Restrict service accounts from remotely accessing other systems.	Configure group policy to Deny log on locally, Deny log on through Terminal Services, and Deny access to this computer from the network for all service accounts to limit the ability for compromised service accounts to be used for lateral movement.	
Block direct internet access for administration interfaces	(e.g., application protocol interface (API)) and for remote access.	
Require phishing-resistant multifactor authentication (MFA)	for all services to the extent possible, particularly for webmail, virtual private networks, and privileged accounts that access critical systems [CPG 2.H].	
Consolidate, monitor, and defend internet gateways.		
Install, regularly update, and enable real-time detection for antivirus software	on all hosts.	
Raise awareness for phishing threats in your organization	Phishing is one of the primary infection vectors in ransomware campaigns, and all employees should receive practical training on the risks associated with the regular use of email.	

Initial Access- LockBit Ransomware PREVENTION (4/4)

The following actions are general recommendations and counter measures for LockBit CISA Alert AA23_165A

Counter Measure	Description	Implementation Status
Consider adding an external email warning banner	for emails sent to or received from outside of your organization [CPG 2.M].	
Review internet-facing services and disable any services that are no longer a business requirement	to be exposed or restrict access to only those users with an explicit requirement to access services, such as SSL, VPN, or RDP. If internet-facing services must be used, control access by only allowing access from an admin IP range [CPG 2.X].	
Review domain controllers, servers, workstations, and active directories	for new and/or unrecognized accounts.	
Regularly verify the security level of the Active Directory domain	by checking for misconfigurations.	

Summary – Taking action on your profile

What have we learned? WHERE TO START

- How to use Threat Informed Defense enterprise-centric for your cyber threat profile
- Operational Effectiveness with CTI Blueprint & the ransomware ecosytem graph
- What is multilayering and how can we avoid analytical errors
- How to extract and map a CTI Reports with the D3FEND example FIN12 for Healtcare CERT France
- Mapping and creating a Cyber Threat Profile for FIN12 – Scoring TTPs
- RMM Tools threat actors use against the Healtcare
- Threat Hunting with PEAK – T1219 with AnyDesk
- Detection Engineering with the MITRE CTID approach Summiting the pyramid
- Use Case LockBit – top TTPs, emulation and measures, recommendations

Resources

FIRST™
Improving Security Together

Relevant Existing Threat Profiling Frameworks & Methodologies

- Enterprise Threat Model Technical Report: https://www.mitre.org/sites/default/files/2021-11/pr-18-1613-ngci-enterprise-threat-model-technical-report.pdf
- Process for Attack Simulation and Threat Analysis (PASTA): https://versprite.com/blog/what-is-pasta-threat-modeling/
- Guide for Conducting Risk Assessments: https://nvlpubs.nist.gov/nistpubs/legacy/sp/nistspecialpublication800-30r1.pdf
- STRIDE: https://learn.microsoft.com/en-us/previous-versions/commerce-server/ee823878(v=cs.20)
- DREAD: https://adam.shostack.org/modsec08/Shostack-ModSec08-Experiences-Threat-Modeling-At-Microsoft.pdf
- LINDDUN: https://people.cs.kuleuven.be/~kim.wuyts/LINDDUN/LINDDUN.pdf
- Factor Analysis of Risk Information (FAIR™): https://www.fairinstitute.org/what-is-fair
- Trike: http://www.octotrike.org/
- Visual, Agile and Simple Threat (VAST): https://threatmodeler.com/threat-modeling-methodologies-vast/
- Operationally Critical Threat, Asset, and Vulnerability Evaluation (OCTAVE®): https://resources.sei.cmu.edu/library/asset-view.cfm?assetID=8419

Threat Informed Defense & Holistic Threat Modeling

- https://www.orangecyberdefense.com/de/resources/whitepaper-holistic-threat-modeling
- https://medium.com/@simone.kraus
- https://center-for-threat-informed-defense.github.io/attack-flow/ui/
- https://www.tidalcyber.com/blog
- https://github.com/center-for-threat-informed-defense/cti-blueprints/wiki
- https://github.com/SigmaHQ/sigma/blob/60b8e9b70fffaf49b17abfcae4a0ea08f2da7f71/rules/windows/dns_query/dns_query_win_remote_access_software_domains.yml
- https://center-for-threat-informed-defense.github.io/summiting-the-pyramid/scoringanalytic/
- https://www.cisa.gov/sites/default/files/2023-08/CSRB_Lapsus%24_508c.pdf
- https://github.com/redcanaryco/atomic-red-team/blob/master/atomics/T1219/T1219.md#atomic-test-2---anydesk-files-detected-test-on-windows
- https://www.cisa.gov/sites/default/files/2023-03/aa23-061a-stopransomware-royal-ransomware_0.pdf
- https://jsac.jpcert.or.jp/archive/2023/pdf/JSAC2023_1_1_yamashige-nakatani-tanaka_en.pdf
- https://www.cisa.gov/sites/default/files/2023-06/aa23-165a_understanding_TA_LockBit_0.pdf

Thank you

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