# When Alerts Are Opportunities

## Planning and Building an Offensive SOC

# Who am I?

COO, Principal and Founder at River Security

Principal Instructor at SANS

Co-Author of SEC550 – Cyber Deception, Attack Detection, Disruption and Active Defense

Short summary:

I show how criminals break-in,
and I help throw them back out…

| | |
|---|---|
| **GCIH** | GIAC Certified Incident Handler |
| **GPEN** | GIAC Certified Penetration Tester |
| **GSLC** | GIAC Security Leadership |
| **GIAC** | Mobile Device Security Analyst |
| **GDAT** | GIAC Defending Advanced Adversaries |
| **GCTI** | GIAC Cyber Threat Intelligence |
| **GCFA** | GIAC Certified Forensic Analyst |

# WHY DO WE DO PENETRATION TESTING?

What is the goal of a penetration test?
(legit question)

# Common problems with traditional pentests...

Receiving a Pentest

Providing a Pentest

# Do Attackers Care About Scope?

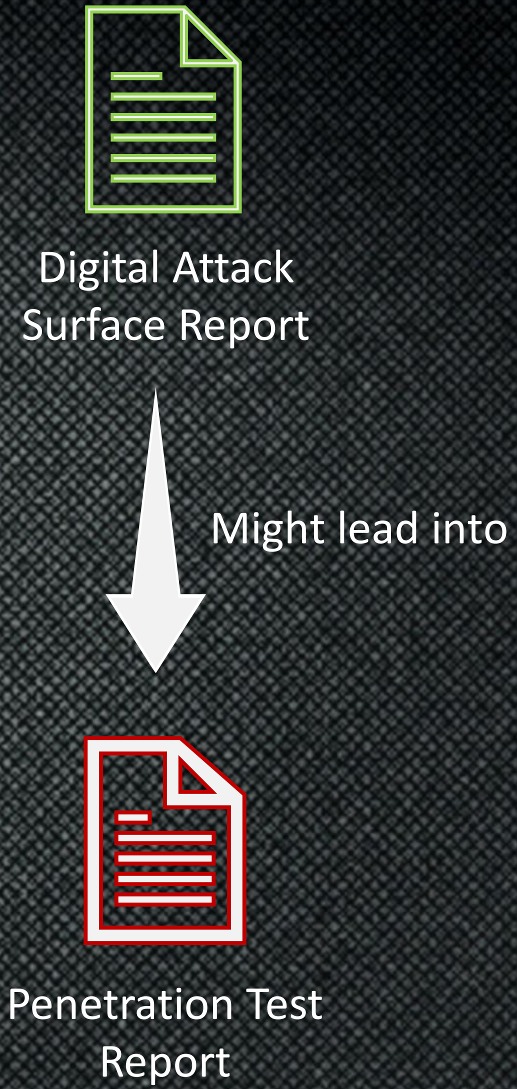
# How Can Testers Supply Value Sooner?

| | |
|---|---|
| Know The Target | Learn who the customer is, what they represent |
| Find Value | Find interesting and prioritize which systems to attack |
| Know Themselves | Let the customer know themselves |

# Digital Footprint Assessment

## Mapping Attack Surface First

- Immediate **value** by just having hackers LOOK at you
- Smaller investment up front
- Easier to guarantee that the entire (or just some) of the scope has been tested
    - Customer and Provider knows what has been left out of scope
- Find shadow IT, unmanaged data
- Bottom-up approach!



Digital Attack Surface Report

Might lead into

Penetration Test Report

Digital Footprint Report

Focus Points and Summary

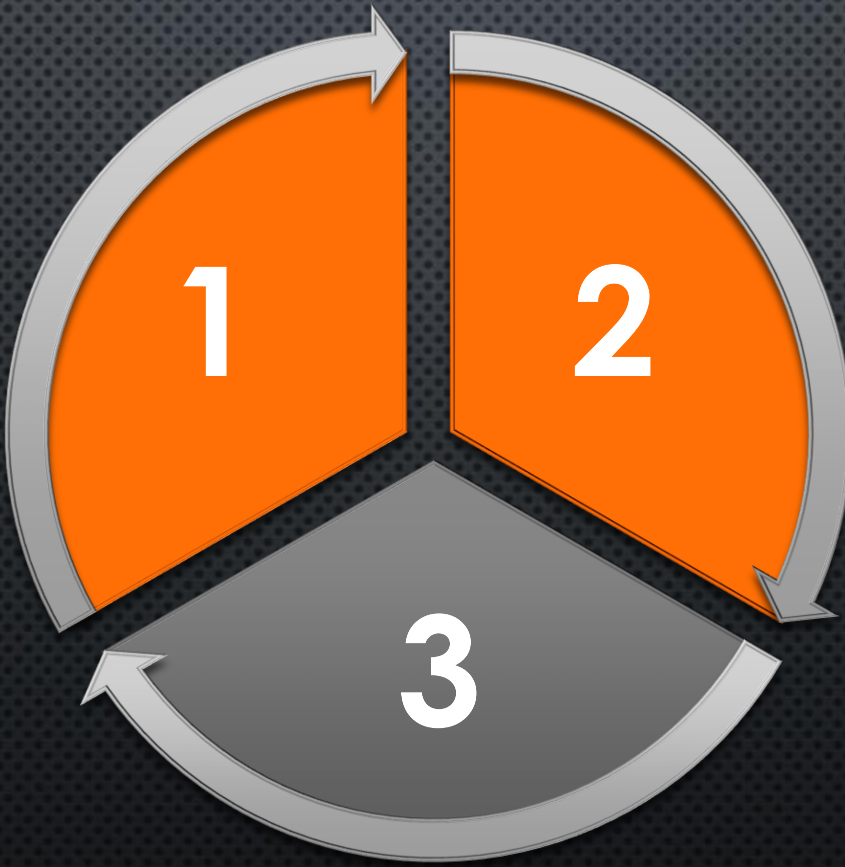
Overview of Applications, status and attractiveness

Lists of leaks, vulnerabilities and everything else a customer may find useful.

Value, value, value!

# WHAT IS ATTACK SURFACE MANAGEMENT?

# HIGH LEVEL PENTEST METHODOLOGY



Reconnaissance

Discovery & Scanning

Exploitation & Verification

# The road-less travelled

- How to find the roads less travelled?
- Have the best recon
  - The best recon process
  - The best wordlists
  - Continuous and always-on
- Be inspired by bug-bounty hunters
- Everyone runs automated tools
  - Innovate
  - Change
  - Win

# The Digital Footprint Dilemma

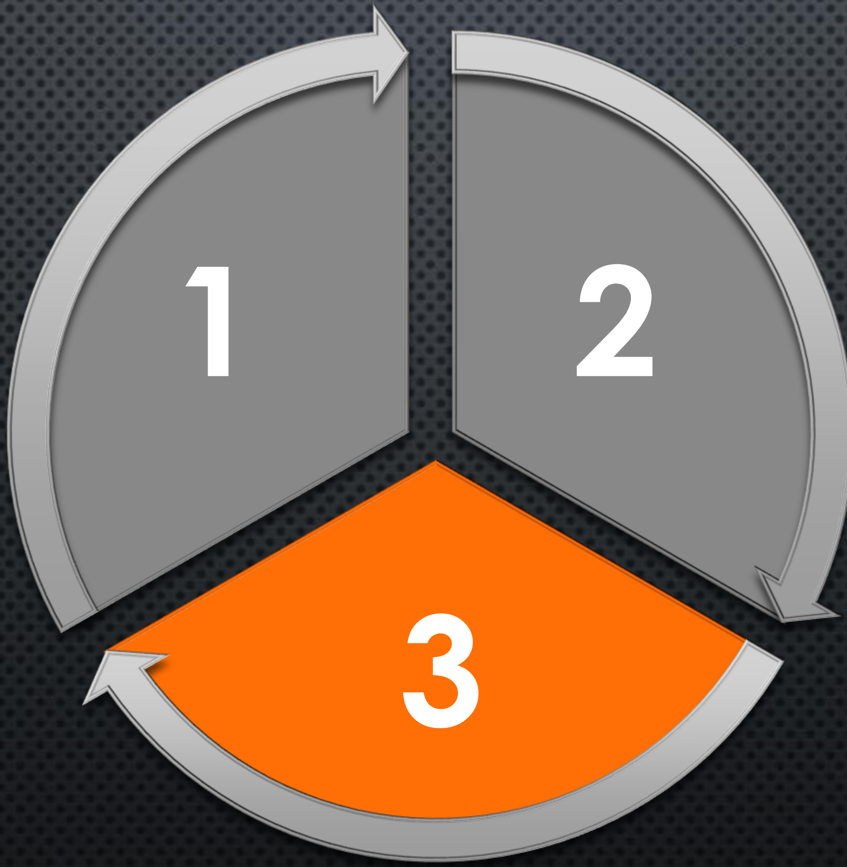
- Businesses want an increased digital footprint and presence
- From a Cyber Security point of view, we want a small footprint
- Continuous Attack Surface Management helps mitigate the problem

Cyber Security Team

Organizations Direction

# WHAT IS ALWAYS-ON PENTESTING?

# HIGH LEVEL PENTEST METHODOLOGY

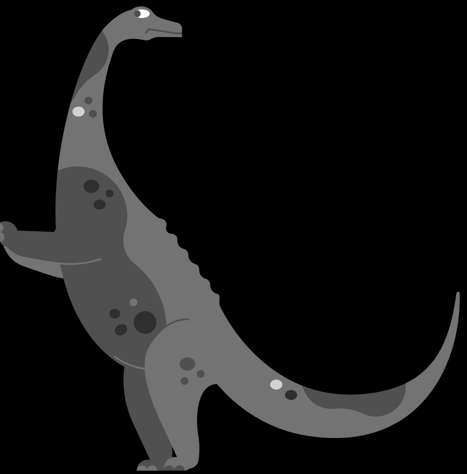


Reconnaissance

Discovery & Scanning

Exploitation & Verification

# With Traditional Penetration testing – Are we playing the same game as attackers?



# OODA LOOPS

Beating Attackers At Their Own Game

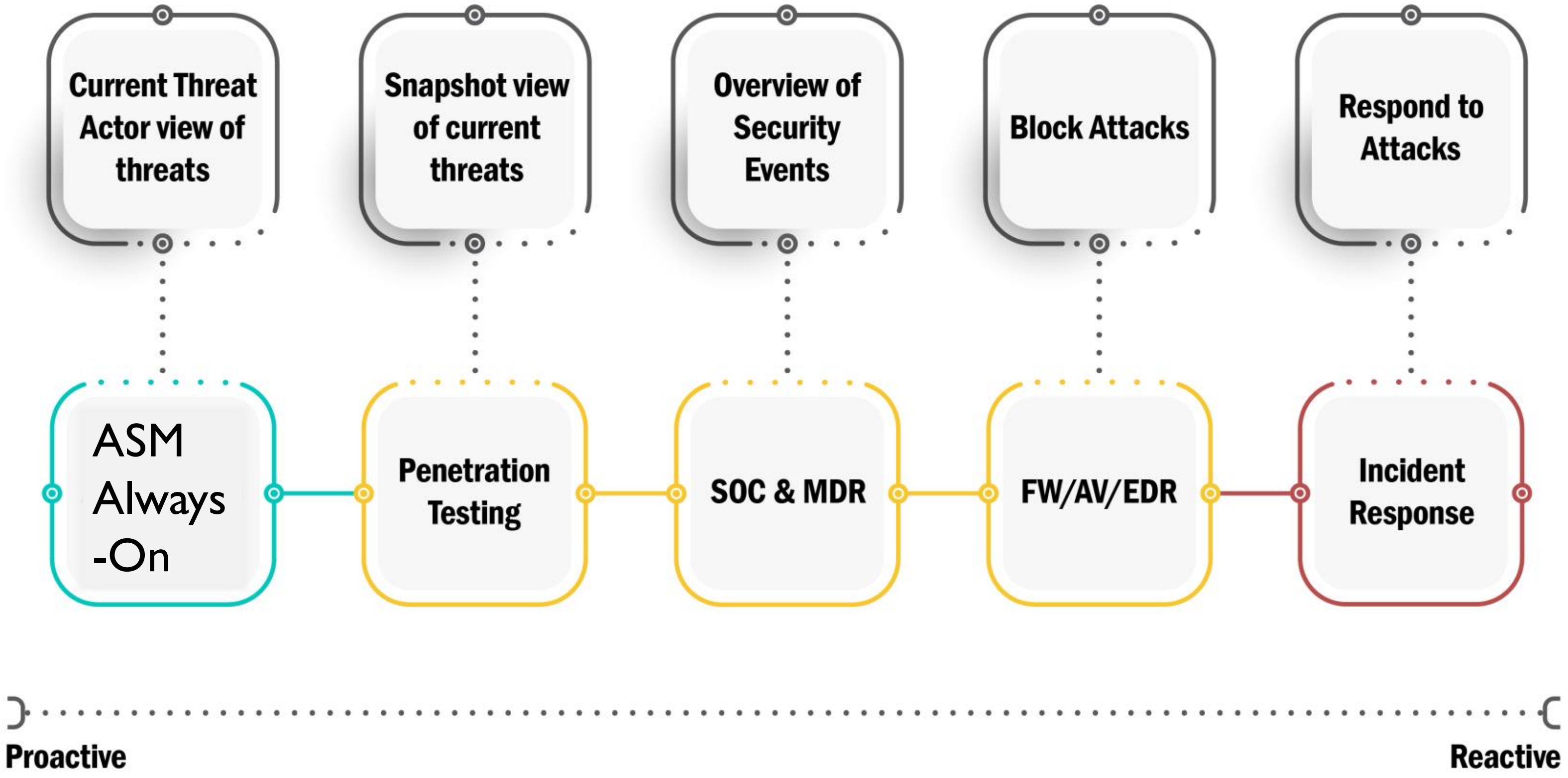
OBSERVE change to Attack Surface

ORIENT ourselves

DECIDE to develop working exploit and notify customer

Customer ACT based on recommendation

# Proactive vs. Reactive



Current Threat Actor view of threats

Snapshot view of current threats

Overview of Security Events

Block Attacks

Respond to Attacks

ASM Always -On

Penetration Testing

SOC & MDR

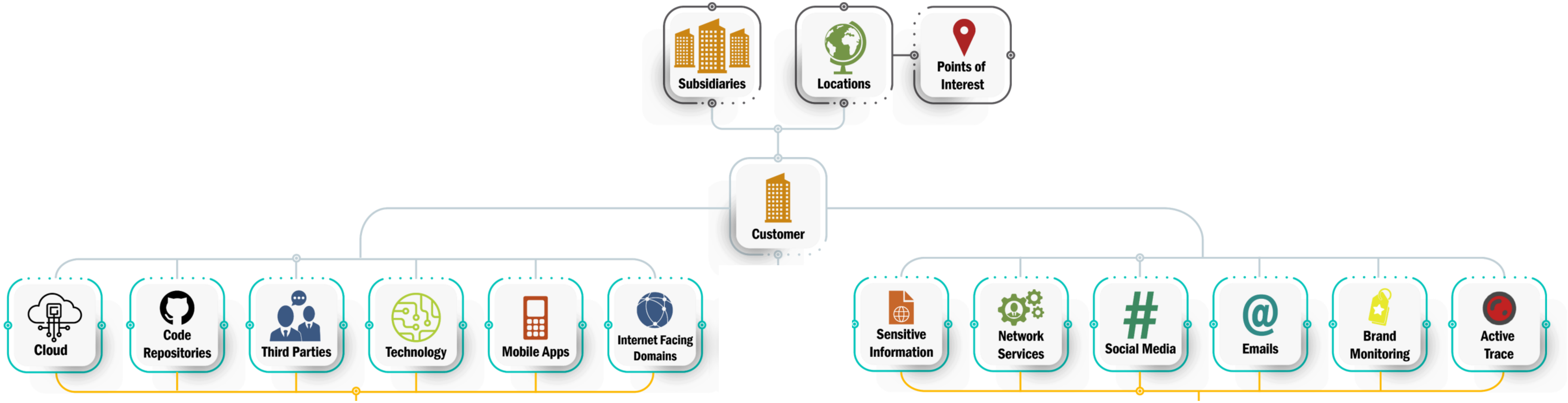
FW/AV/EDR

Incident Response

Proactive

Reactive

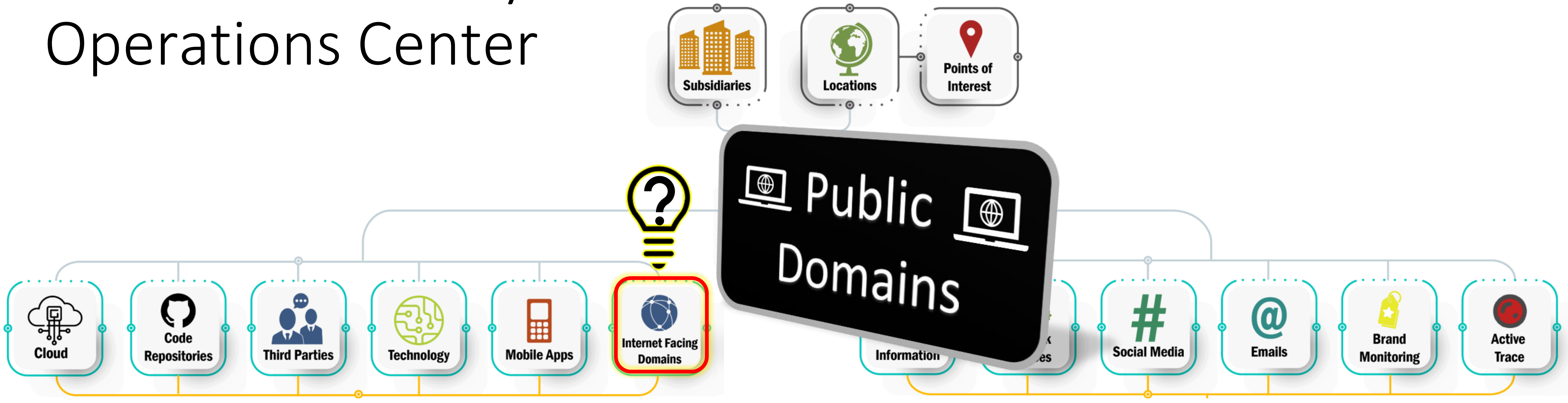
# Building an Offensive Security Operations Center



**!**

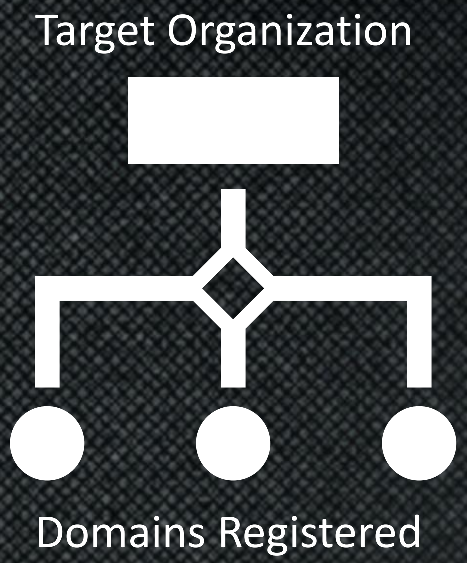
**Next slides are for reference, inspiration and review**

# Building an Offensive Security Operations Center

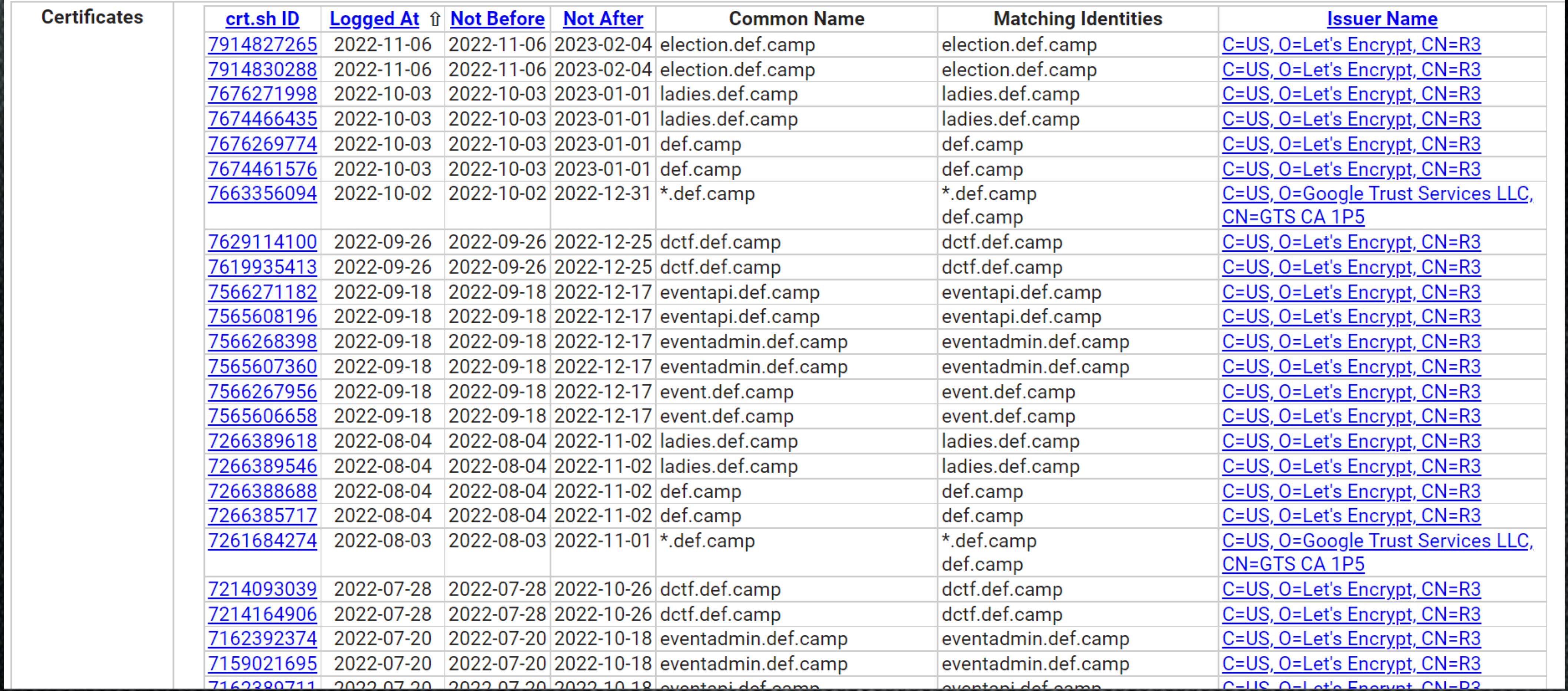


# Domains

- Domains is typically the main focus for hunting for attack vectors
- When are new domains provisioned?
- Who registered it?
- Certificate Transparency Logs
  - Wildcard certificates
- DNS Brute Forcing
- Targeted Word Lists for finding new domains
- Malicious domains



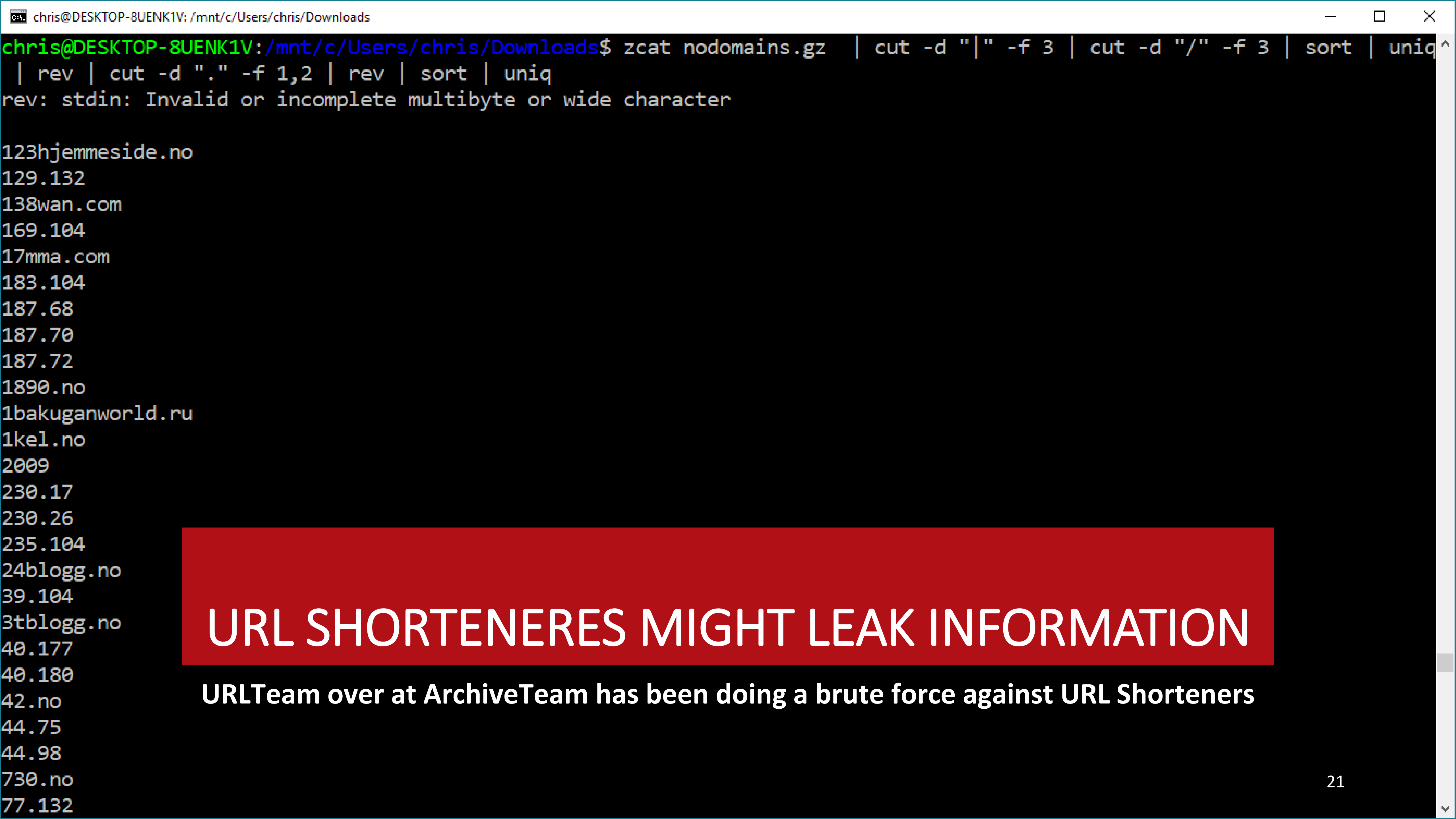
# CTL - Certificate Transparency Log



Certificates

| crt.sh ID | Logged At ⇧ | Not Before | Not After | Common Name | Matching Identities | Issuer Name |
|---|---|---|---|---|---|---|
| 7914827265 | 2022-11-06 | 2022-11-06 | 2023-02-04 | election.def.camp | election.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7914830288 | 2022-11-06 | 2022-11-06 | 2023-02-04 | election.def.camp | election.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7676271998 | 2022-10-03 | 2022-10-03 | 2023-01-01 | ladies.def.camp | ladies.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7674466435 | 2022-10-03 | 2022-10-03 | 2023-01-01 | ladies.def.camp | ladies.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7676269774 | 2022-10-03 | 2022-10-03 | 2023-01-01 | def.camp | def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7674461576 | 2022-10-03 | 2022-10-03 | 2023-01-01 | def.camp | def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7663356094 | 2022-10-02 | 2022-10-02 | 2022-12-31 | *.def.camp | *.def.camp<br>def.camp | C=US, O=Google Trust Services LLC, CN=GTS CA 1P5 |
| 7629114100 | 2022-09-26 | 2022-09-26 | 2022-12-25 | dctf.def.camp | dctf.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7619935413 | 2022-09-26 | 2022-09-26 | 2022-12-25 | dctf.def.camp | dctf.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7566271182 | 2022-09-18 | 2022-09-18 | 2022-12-17 | eventapi.def.camp | eventapi.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7565608196 | 2022-09-18 | 2022-09-18 | 2022-12-17 | eventapi.def.camp | eventapi.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7566268398 | 2022-09-18 | 2022-09-18 | 2022-12-17 | eventadmin.def.camp | eventadmin.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7565607360 | 2022-09-18 | 2022-09-18 | 2022-12-17 | eventadmin.def.camp | eventadmin.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7566267956 | 2022-09-18 | 2022-09-18 | 2022-12-17 | event.def.camp | event.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7565606658 | 2022-09-18 | 2022-09-18 | 2022-12-17 | event.def.camp | event.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7266389618 | 2022-08-04 | 2022-08-04 | 2022-11-02 | ladies.def.camp | ladies.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7266389546 | 2022-08-04 | 2022-08-04 | 2022-11-02 | ladies.def.camp | ladies.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7266388688 | 2022-08-04 | 2022-08-04 | 2022-11-02 | def.camp | def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7266385717 | 2022-08-04 | 2022-08-04 | 2022-11-02 | def.camp | def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7261684274 | 2022-08-03 | 2022-08-03 | 2022-11-01 | *.def.camp | *.def.camp<br>def.camp | C=US, O=Google Trust Services LLC, CN=GTS CA 1P5 |
| 7214093039 | 2022-07-28 | 2022-07-28 | 2022-10-26 | dctf.def.camp | dctf.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7214164906 | 2022-07-28 | 2022-07-28 | 2022-10-26 | dctf.def.camp | dctf.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7162392374 | 2022-07-20 | 2022-07-20 | 2022-10-18 | eventadmin.def.camp | eventadmin.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7159021695 | 2022-07-20 | 2022-07-20 | 2022-10-18 | eventadmin.def.camp | eventadmin.def.camp | C=US, O=Let's Encrypt, CN=R3 |
| 7162389711 | 2022-07-20 | 2022-07-20 | 2022-10-18 | eventapi.def.camp | eventapi.def.camp | C=US, O=Let's Encrypt, CN=R3 |

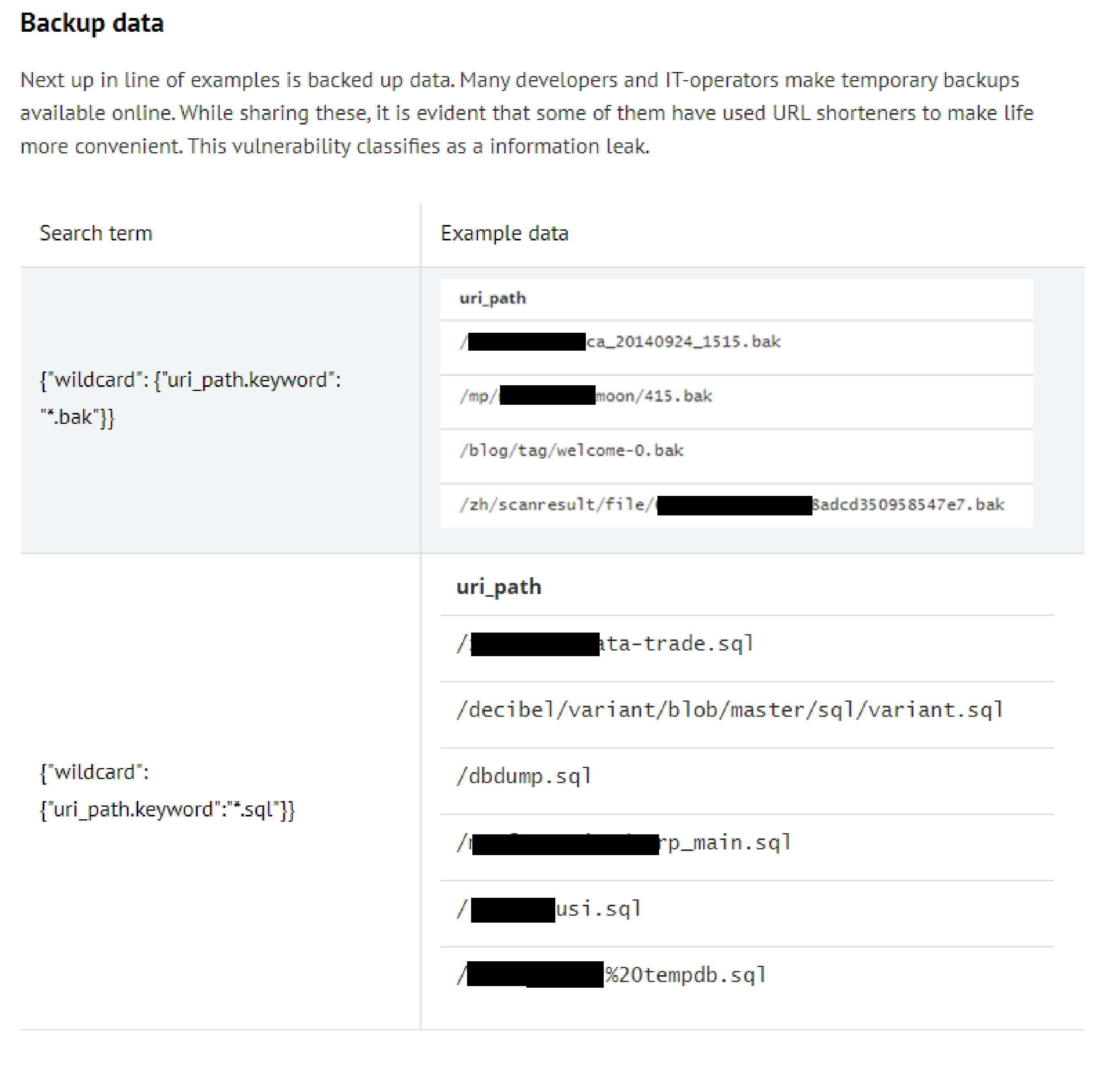
- https://transparencyreport.google.com/https/certificates
- https://certstream.calidog.io
- https://crt.sh
- https://developers.facebook.com/tools/ct/search/
- …



```
chris@DESKTOP-8UENK1V:/mnt/c/Users/chris/Downloads$ zcat nodomains.gz  | cut -d "|" -f 3 | cut -d "/" -f 3 | sort | uniq
 | rev | cut -d "." -f 1,2 | rev | sort | uniq
rev: stdin: Invalid or incomplete multibyte or wide character

123hjemmeside.no
129.132
138wan.com
169.104
17mma.com
183.104
187.68
187.70
187.72
1890.no
1bakuganworld.ru
1kel.no
2009
230.17
230.26
235.104
24blogg.no
39.104
3tblogg.no
40.177
40.180
42.no
44.75
44.98
730.no
77.132
```

# URL SHORTENERES MIGHT LEAK INFORMATION

**URLTeam over at ArchiveTeam has been doing a brute force against URL Shorteners**



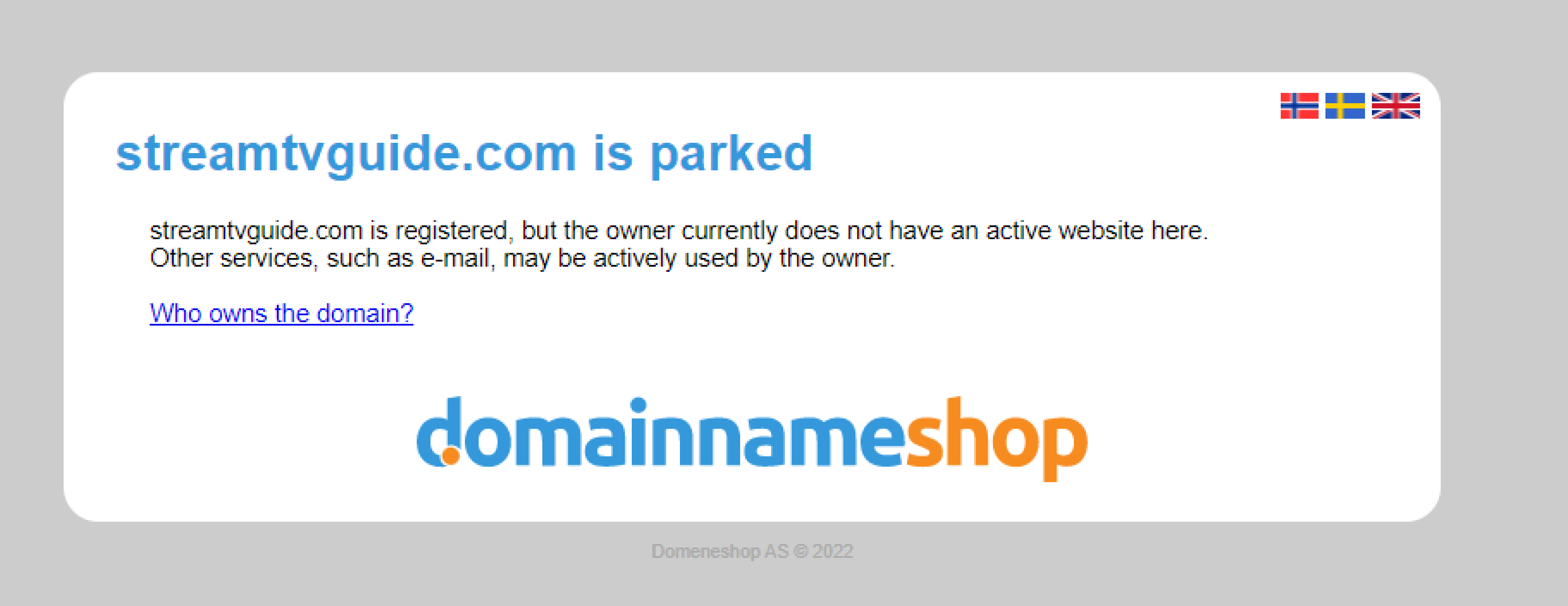
## Backup data

Next up in line of examples is backed up data. Many developers and IT-operators make temporary backups available online. While sharing these, it is evident that some of them have used URL shorteners to make life more convenient. This vulnerability classifies as a information leak.

| Search term | Example data |
|---|---|
| {"wildcard": {"uri_path.keyword": "*.bak"}} | **uri_path**<br>/[redacted]ca_20140924_1515.bak<br>/mp/[redacted]moon/415.bak<br>/blog/tag/welcome-0.bak<br>/zh/scanresult/file/[redacted]adcd350958547e7.bak |
| {"wildcard": {"uri_path.keyword":"*.sql"}} | **uri_path**<br>/[redacted]ata-trade.sql<br>/decibel/variant/blob/master/sql/variant.sql<br>/dbdump.sql<br>/[redacted]rp_main.sql<br>/[redacted]usi.sql<br>/[redacted]%20tempdb.sql |

https://www.sans.org/blog/the-secrets-in-url-shortening-services/

# Parked Domains



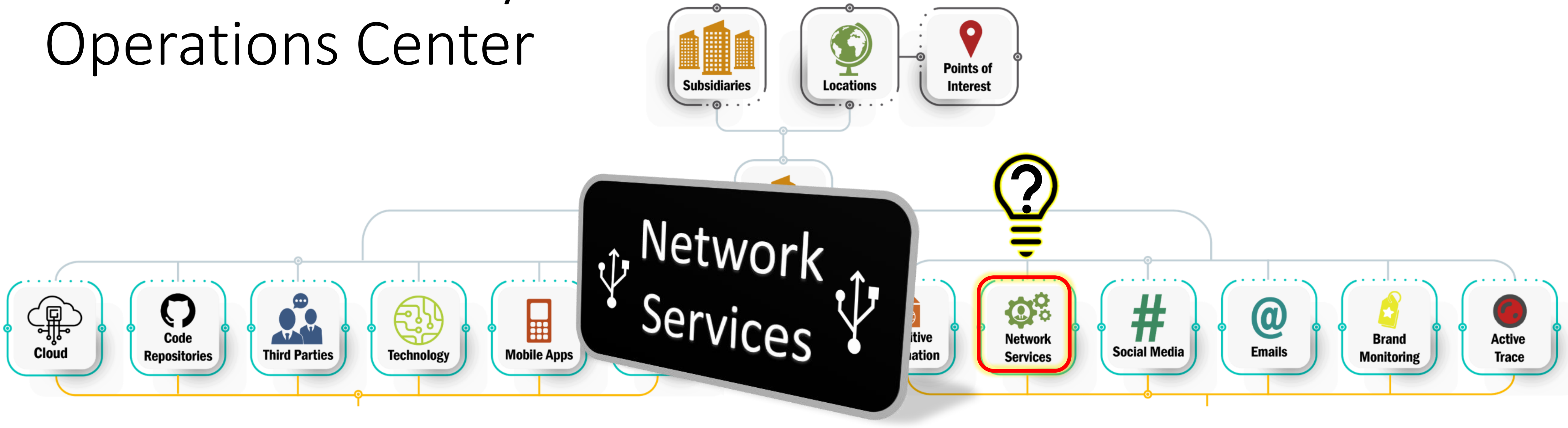
## streamtvguide.com is parked

streamtvguide.com is registered, but the owner currently does not have an active website here.
Other services, such as e-mail, may be actively used by the owner.

Who owns the domain?

Domeneshop AS © 2022

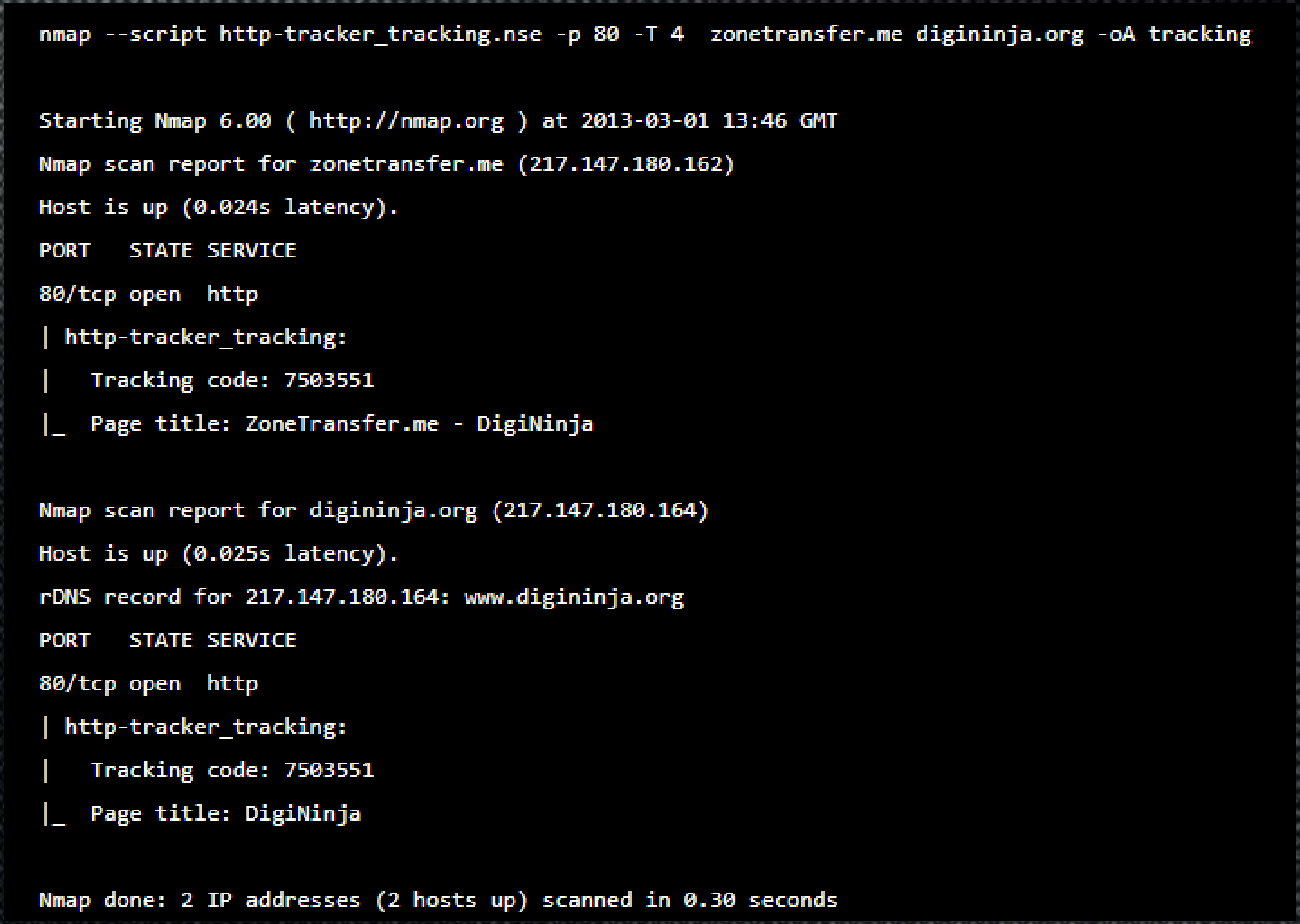
# Building an Offensive Security Operations Center



# Network Services – TCP and UDP

- When does a port open?
- Oscillating ports
- Service detection
- 65536 ports
  - But 90% of most common TCP ports pertain only 576 ports
- New port? New attack surface!
  - Better assess, attack and protect before anyone else…
- Scan in different configurations
  - Attackers have time, we can scan over long durations

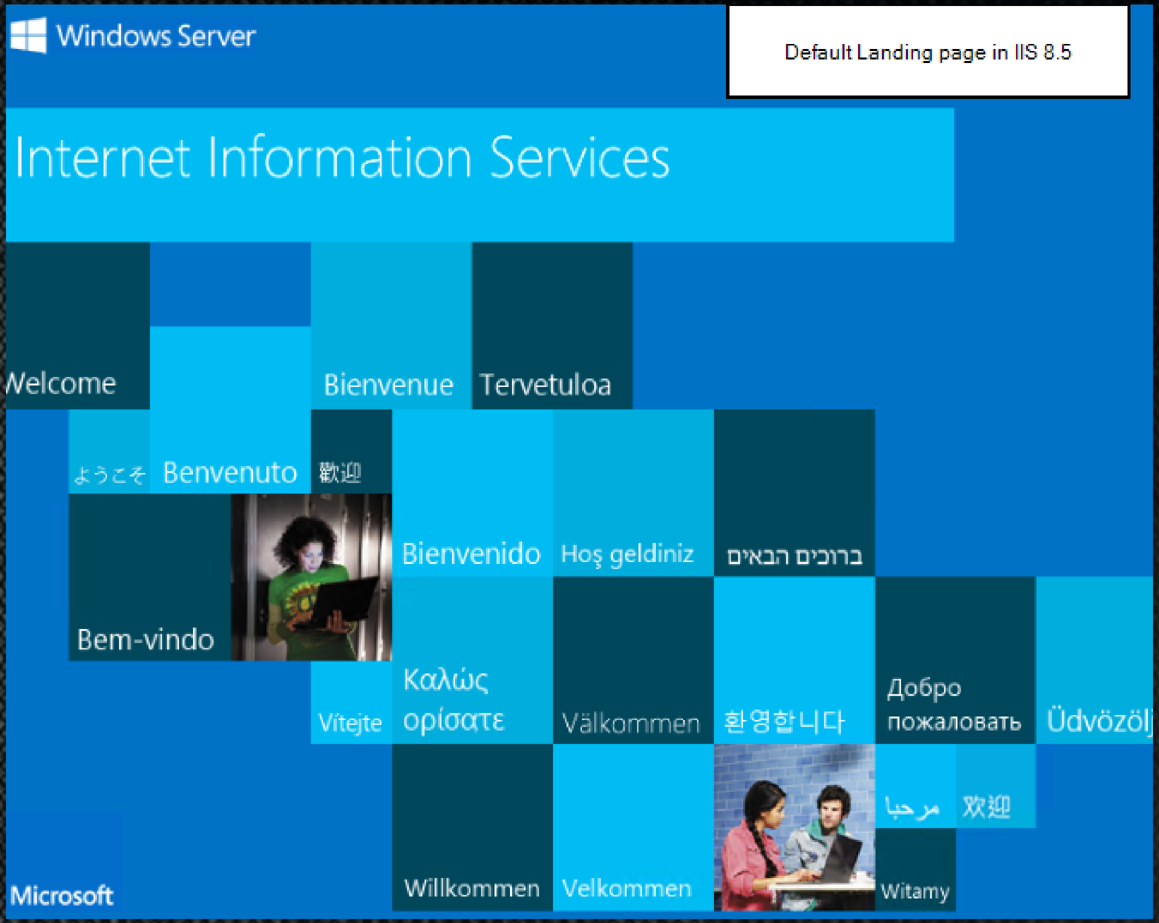
# Using trackers to expand the attack surface



```
nmap --script http-tracker_tracking.nse -p 80 -T 4  zonetransfer.me digininja.org -oA tracking


Starting Nmap 6.00 ( http://nmap.org ) at 2013-03-01 13:46 GMT
Nmap scan report for zonetransfer.me (217.147.180.162)
Host is up (0.024s latency).
PORT   STATE SERVICE
80/tcp open  http
| http-tracker_tracking:
|   Tracking code: 7503551
|_  Page title: ZoneTransfer.me - DigiNinja

Nmap scan report for digininja.org (217.147.180.164)
Host is up (0.025s latency).
rDNS record for 217.147.180.164: www.digininja.org
PORT   STATE SERVICE
80/tcp open  http
| http-tracker_tracking:
|   Tracking code: 7503551
|_  Page title: DigiNinja

Nmap done: 2 IP addresses (2 hosts up) scanned in 0.30 seconds
```

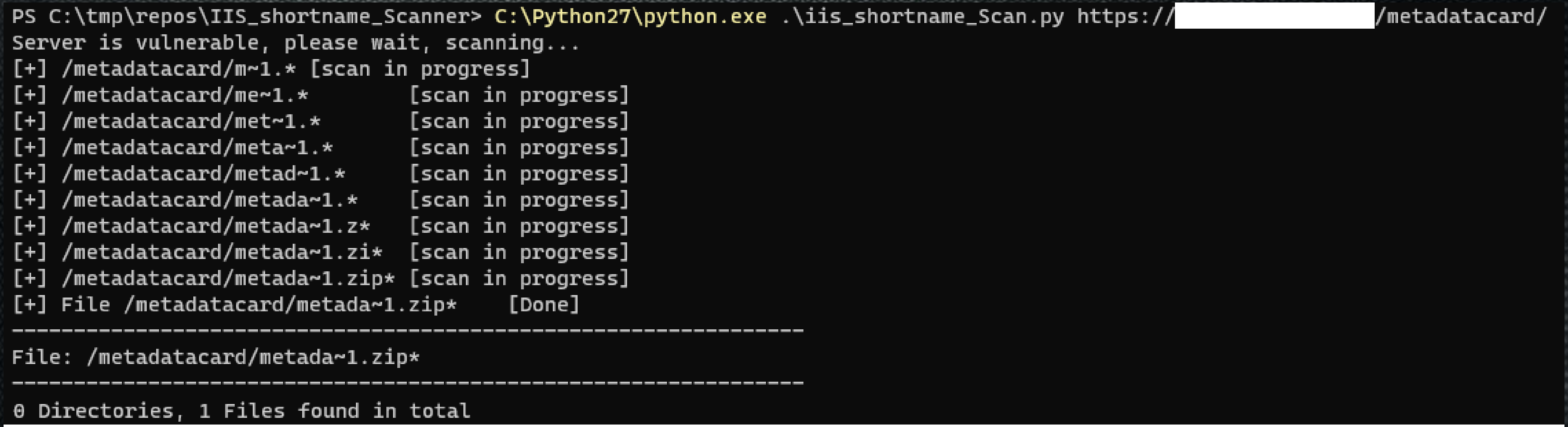
# 403/404/Splash-Pages

- Building great wordlists
  - CEWL  is extremely useful
- DNS enumeration
- Content enumeration
- Indexed information in search engines
- VHOST enumeration
- IIS short name scanning



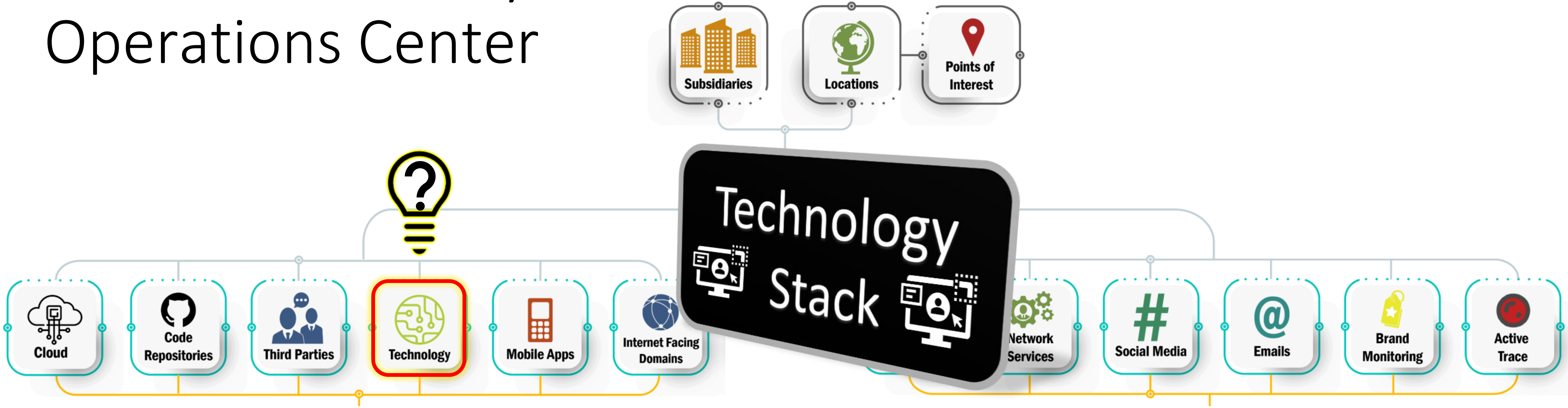
Default Landing page in IIS 8.5

# Short Name Scanning Example



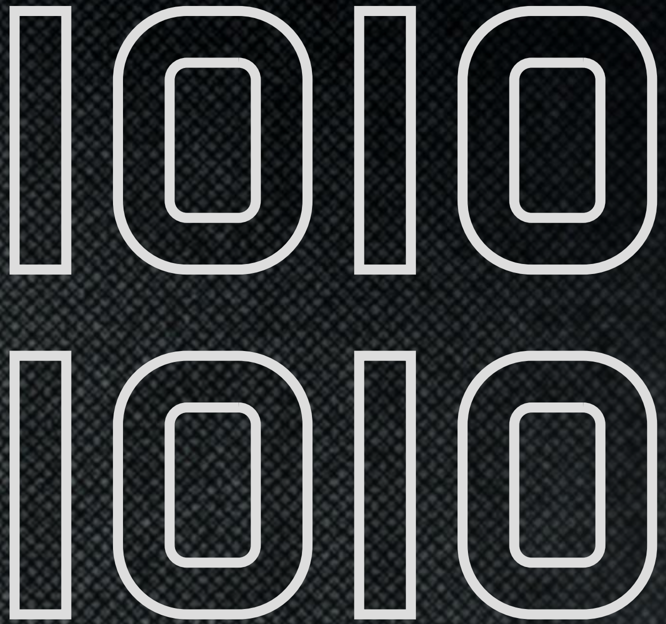
```
PS C:\tmp\repos\IIS_shortname_Scanner> C:\Python27\python.exe .\iis_shortname_Scan.py https://[redacted]/metadatacard/
Server is vulnerable, please wait, scanning...
[+] /metadatacard/m~1.* [scan in progress]
[+] /metadatacard/me~1.*        [scan in progress]
[+] /metadatacard/met~1.*       [scan in progress]
[+] /metadatacard/meta~1.*      [scan in progress]
[+] /metadatacard/metad~1.*     [scan in progress]
[+] /metadatacard/metada~1.*    [scan in progress]
[+] /metadatacard/metada~1.z*   [scan in progress]
[+] /metadatacard/metada~1.zi*  [scan in progress]
[+] /metadatacard/metada~1.zip* [scan in progress]
[+] File /metadatacard/metada~1.zip*    [Done]
----------------------------------------------------------------
File: /metadatacard/metada~1.zip*
----------------------------------------------------------------
0 Directories, 1 Files found in total
```

# Building an Offensive Security Operations Center

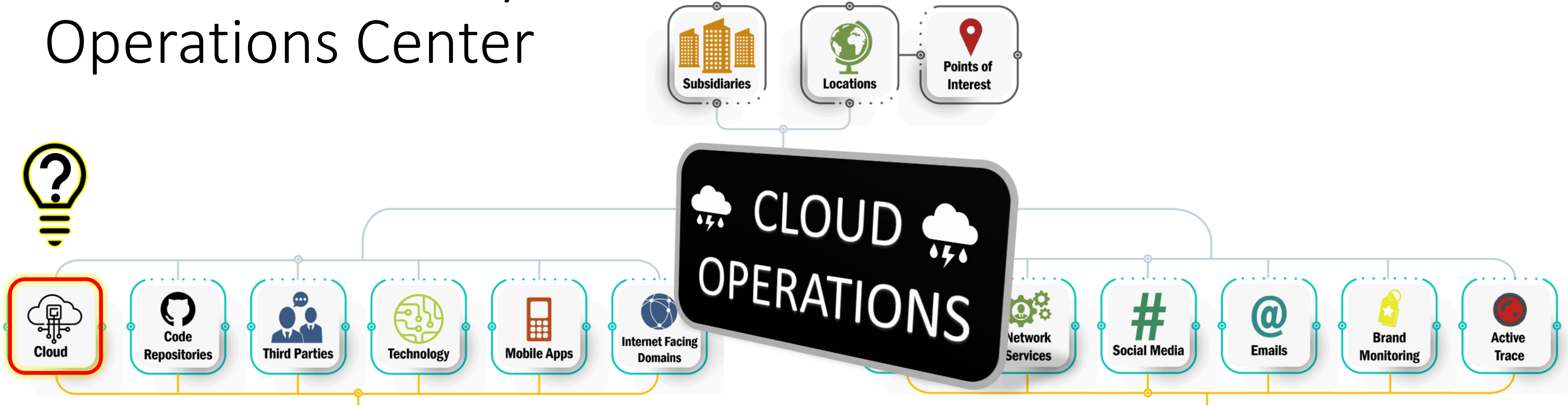


# Technology Stack

- Libraries might be vulnerable
  - JavaScript, dependencies, plugins, themes and more…
- Vulnerabilities
  - A vulnerability scanner finds a new vulnerability
  - Is it exploitable?
  - Can we hack the customer now?
  - Can we weaponize the CVE?
  - Local, authenticated or configuration-based vulnerabilities
- Log4j / OpenSSL / Next Big Thing happens
  - How do you react?



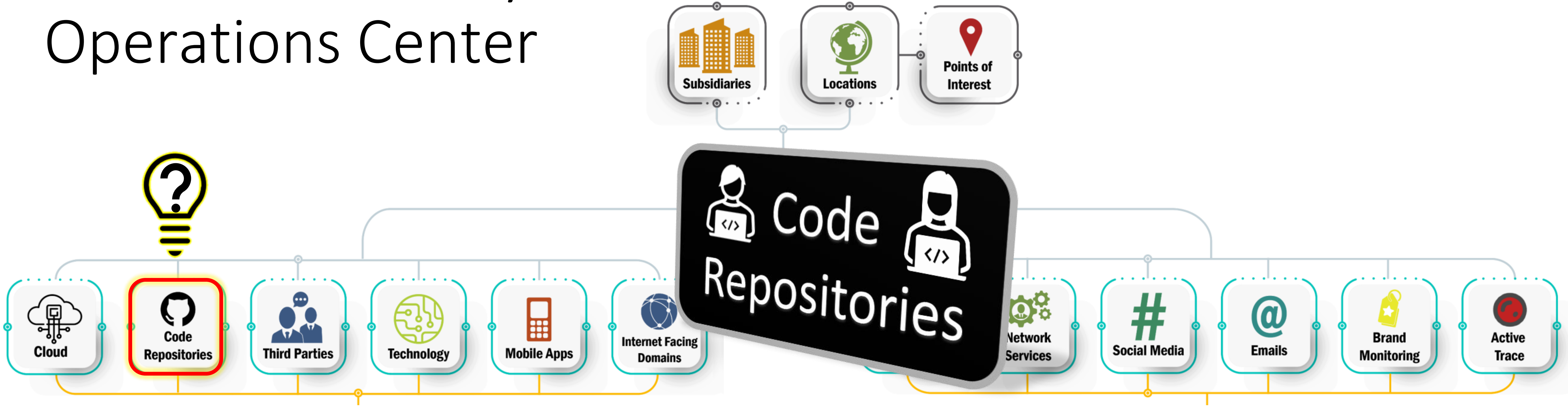
# Building an Offensive Security Operations Center



# Cloud Operations

- You can scan from the outside AND inside of target customer cloud providers
  - TLS-Scan and other techniques help in attributing assets to customer
- Many OSINT sources enumerate and scan clouds
  - Check out: Grayhatwarfare.com
- Brute-force with targeted wordlists
- You can ask for an identity with list-*, describe-*, security-audit privileges
  - Scan, test and assess risk as new assets are provisioned and changed
- Anytime a customer deploy a cloud service:
  - Add it to monitoring
  - Start attacking it
  - Detect when it changes

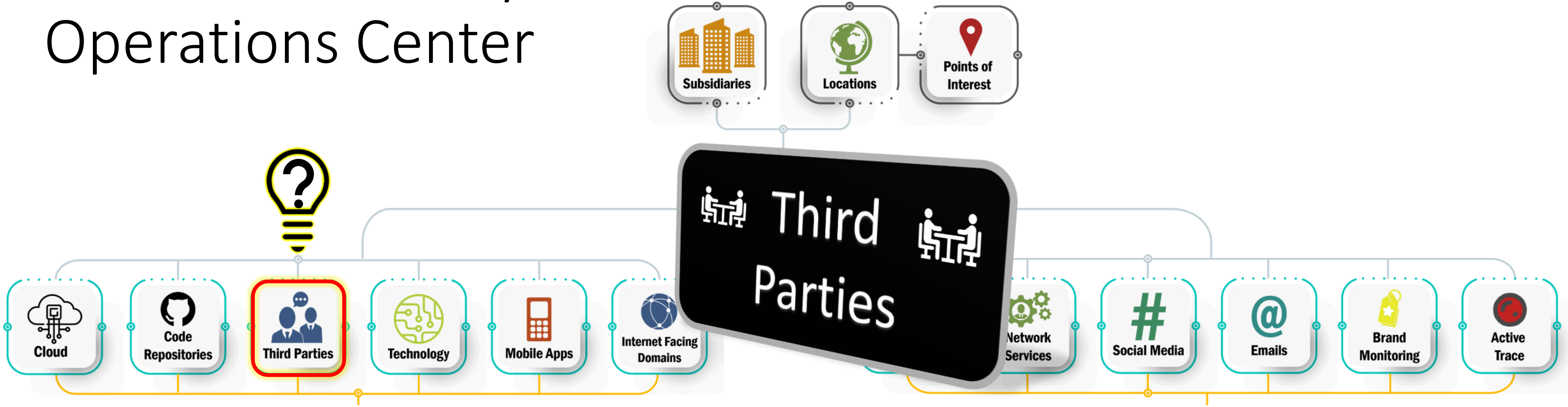
# Building an Offensive Security Operations Center



# Code Repositories – They exist

- Many are public
  - Trufflehog
- Use search engines on GitHub, BitBucket, etc.
- GIST's for users on employees
  - Users private email addresses might be used
- Company "real names" are great for searching and identifying
  - Real name – Company name synonyms
    - E.g. riversecurity, rivsec, riversec
  - Can you find them attack surface when using company "real names"?

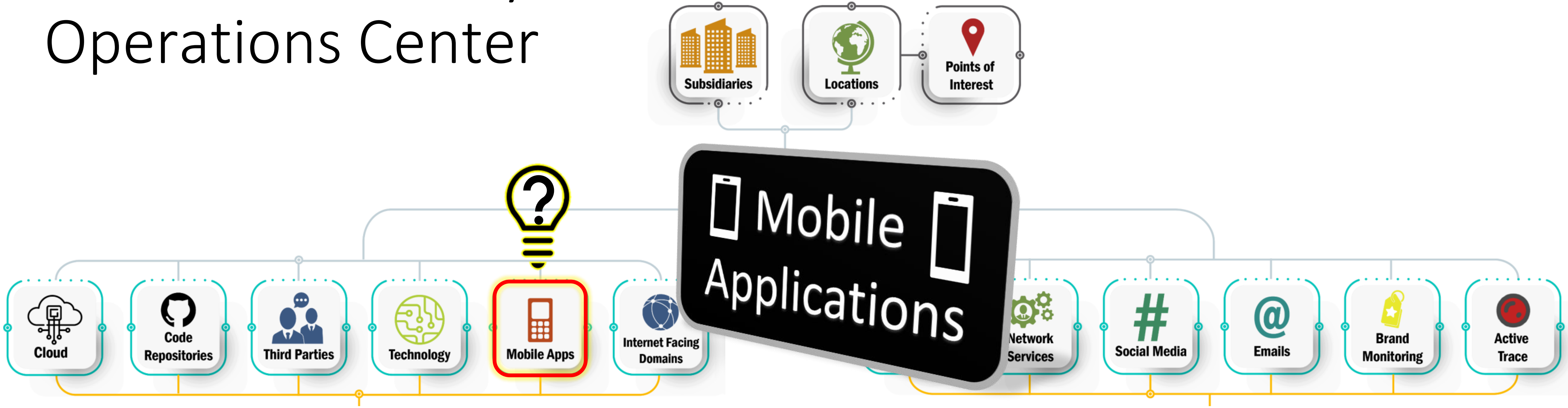
# Building an Offensive Security Operations Center



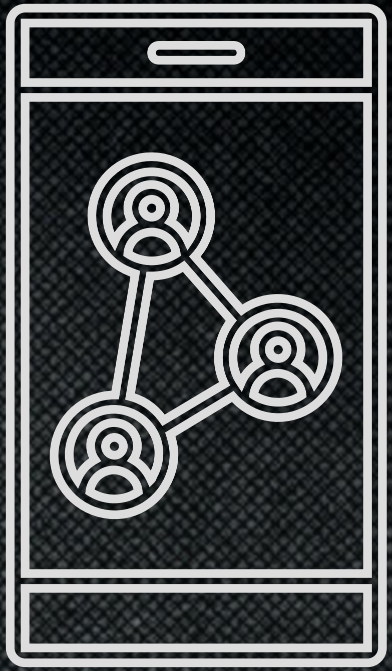
# Third Parties

- Monitor Third Parties breaches and notable events
- Companies typically has a lot of SaaS
    - Does breached credentials work across them?
- Supply Chains
    - Useful for our CTI and understanding the paths towards target
- What if a third party is breached?
- Can we identify concerns when third party users are breached, possibly abusing our platform if we don’t contain it?

# Building an Offensive Security Operations Center

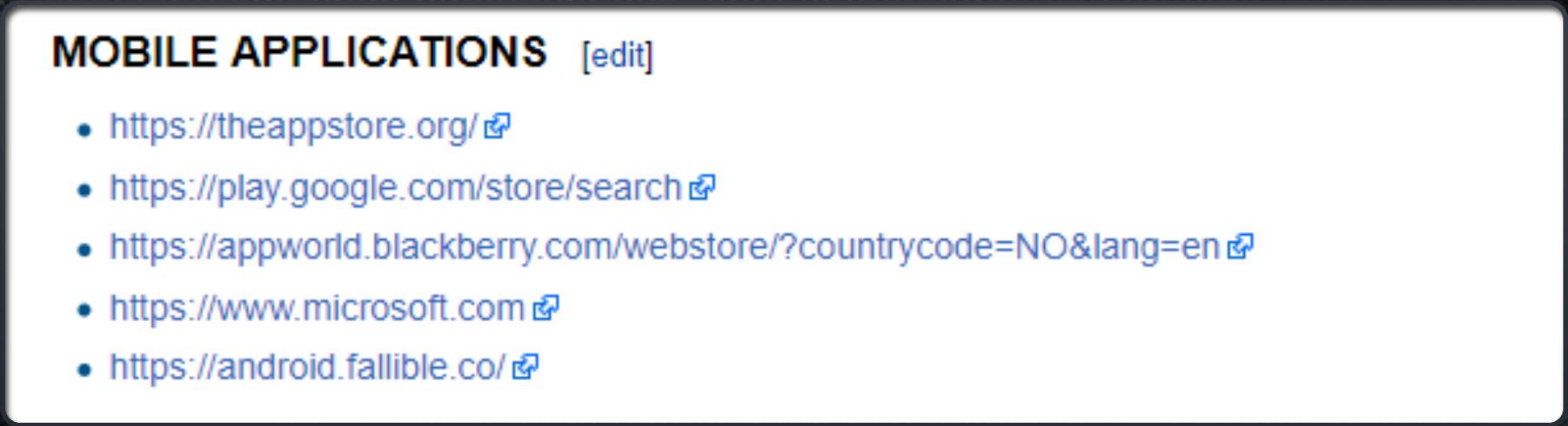


# Mobile Applications



- Typically communicates with API’s
- May have secrets embedded in them
- Contains valuable information for building:
  - Wordlists
  - Intelligence
- Monitor for new versions
  - Check delta
- Monitor for new applications
  - Detect when existing application vendors provision a new application
  - When customer name is represented in a new application

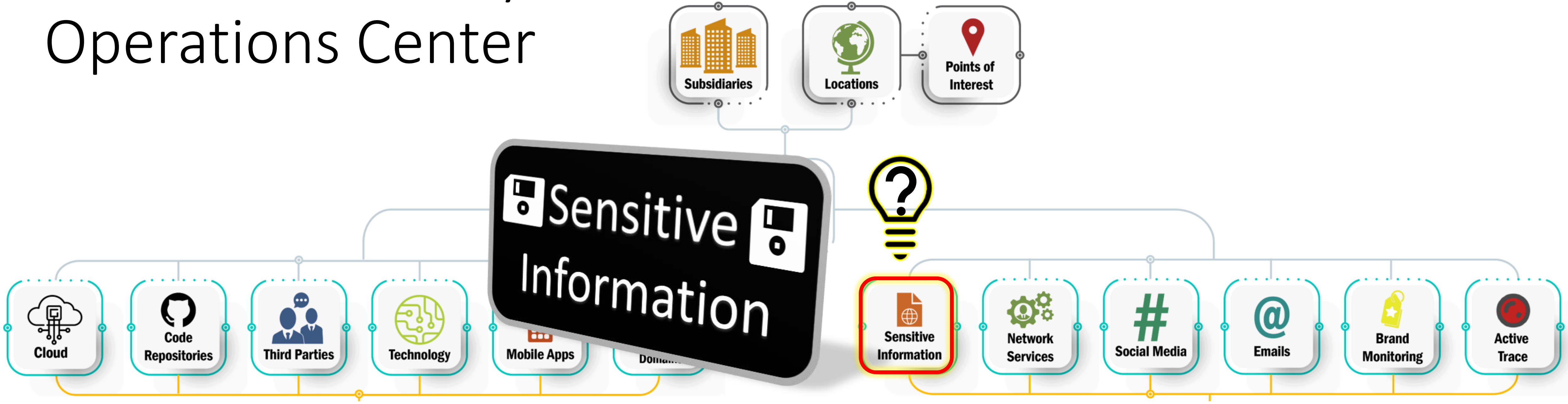
# Mobile Applications



MOBILE APPLICATIONS [edit]

- https://theappstore.org/
- https://play.google.com/store/search
- https://appworld.blackberry.com/webstore/?countrycode=NO&lang=en
- https://www.microsoft.com
- https://android.fallible.co/

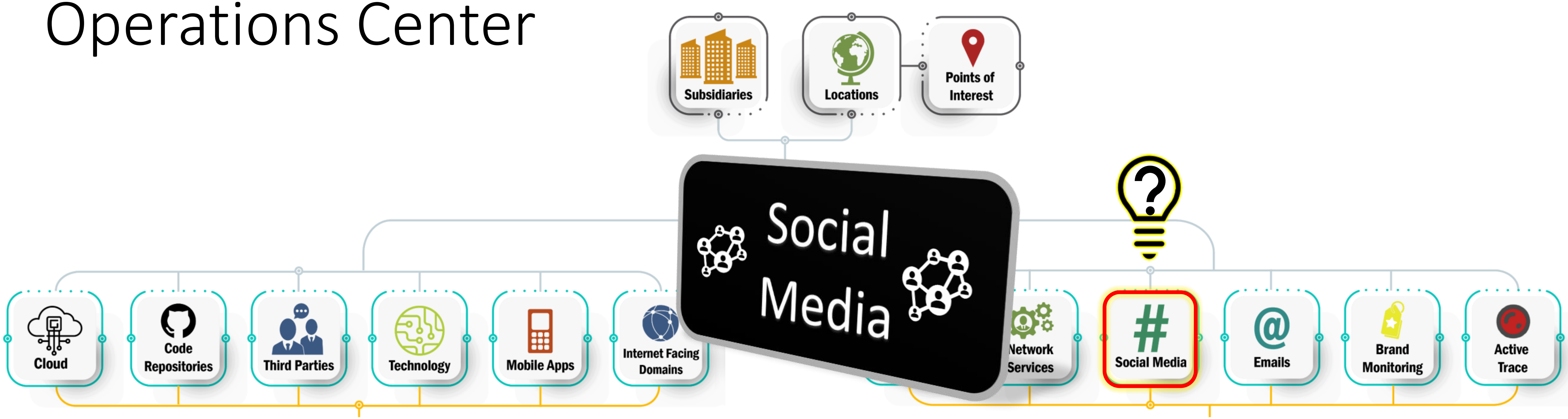
# Building an Offensive Security Operations Center



# Sensitive Information – i.e. Dark Data

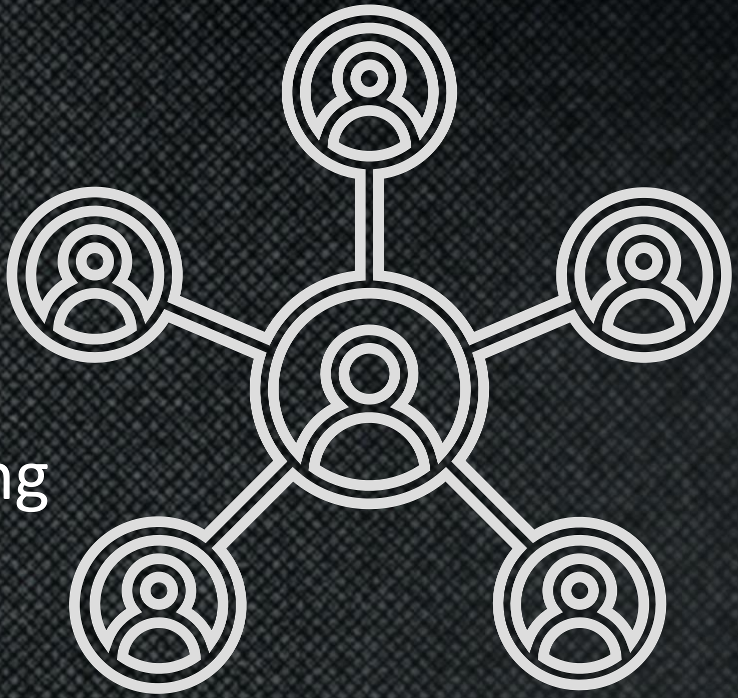
- Google Dorking
- Automating querying through search engines
- Abusing CMS API’s
- Discovering file uploads
- Leveraging OSINT
- Purchasing access to vendor API’s
- Brute-forcing storage buckets, files, etc.

# Building an Offensive Security Operations Center

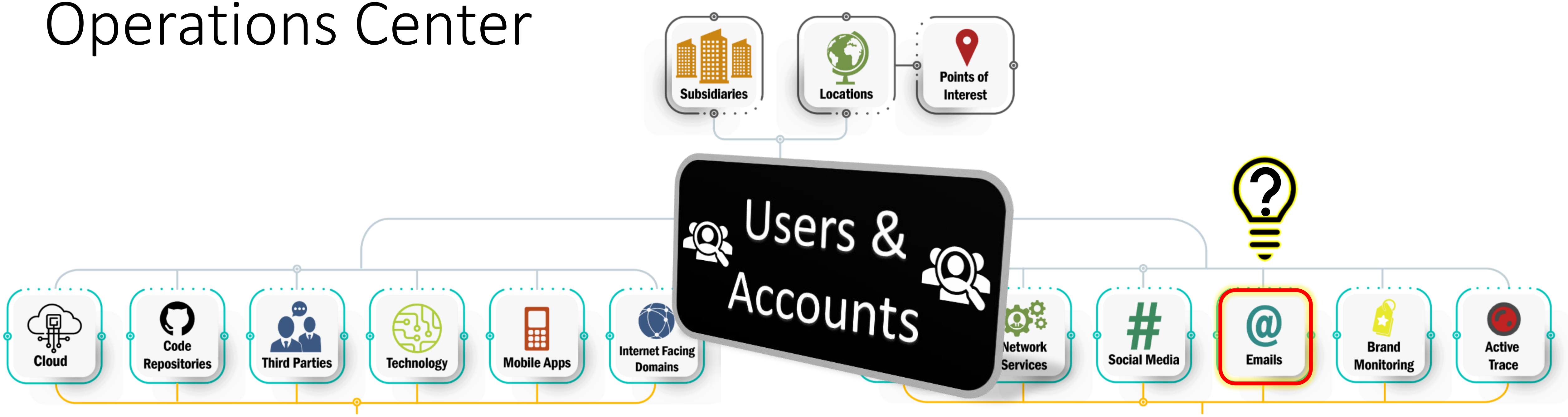


# Hacking Social Media and Monitoring

- Would your company suffer if Social Media is compromised?
- Can personal accounts be targeted to get into company accounts?
  - Credential stuffing, phishing, smishing, vishing
  - Social Engineering
- A few SoME has shared logins
  - Often stupid passwords
  - Memorable passwords which can be guessed
- Identify SoME accounts and do sentiment monitoring
  - AI/ML helps in this aspect

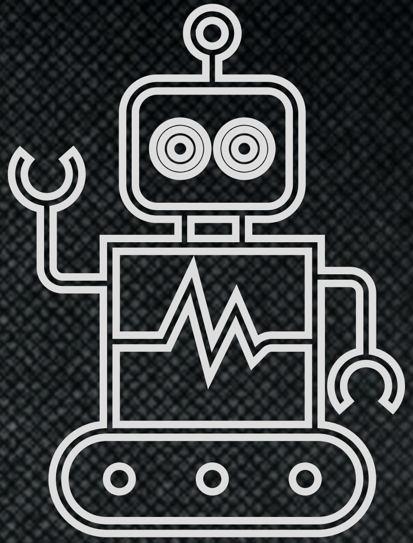


# Building an Offensive Security Operations Center

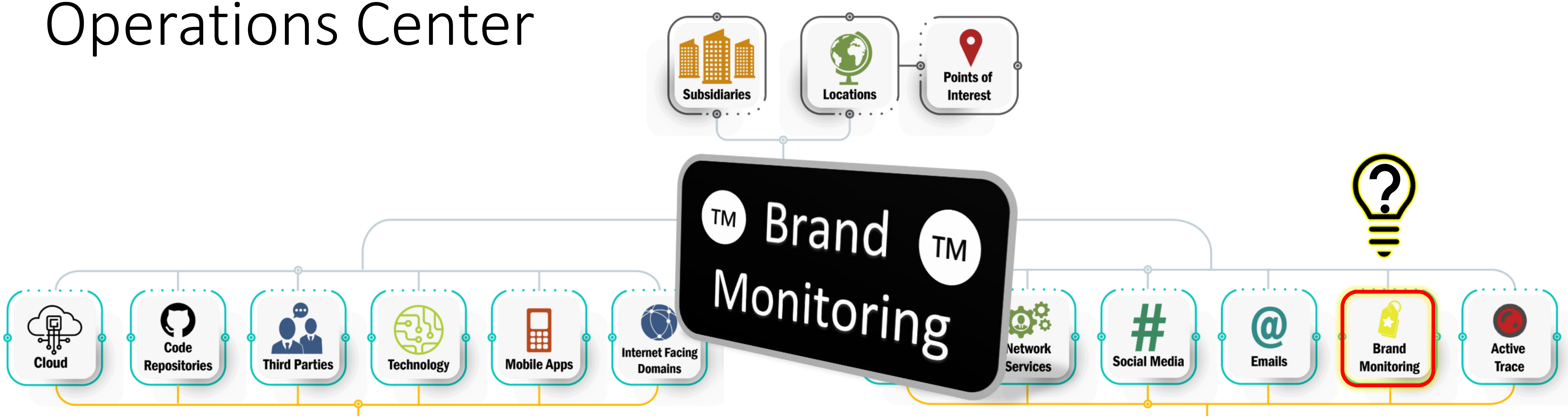


# Users, Accounts and Emails

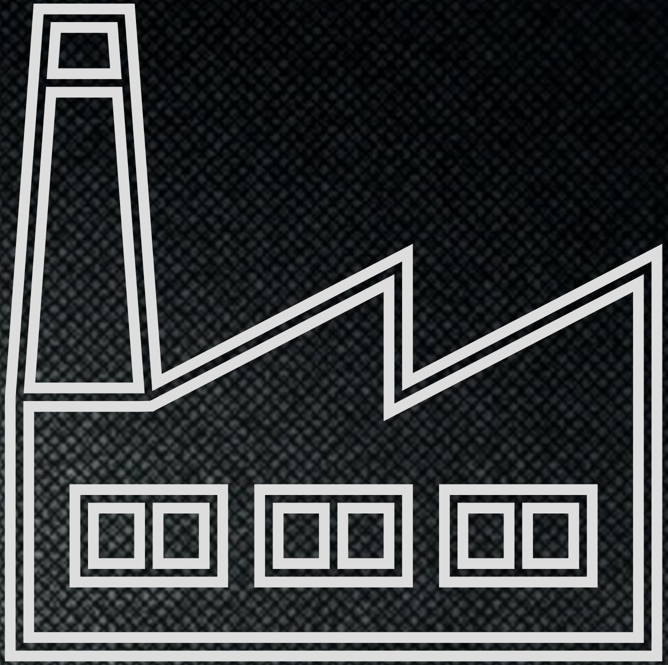
- Often all we have to do is simply **log-on** and the customer is breached
- What is an email? What can it be targeted for?
  - Phishing?
  - What about password spraying?
    - Email is often a username
  - How many logins does a company have?
    - Might be a weak password…
    - They register accounts left and right
    - Guest accounts in target tenant (e.g. Azure AD)
- When a system is compromised, credentials are leaked
  - Credential stuffing
- Every week we have multiple reports through CTI about compromised systems
  - We do our best to get a hold of the databases and credentials



# Building an Offensive Security Operations Center

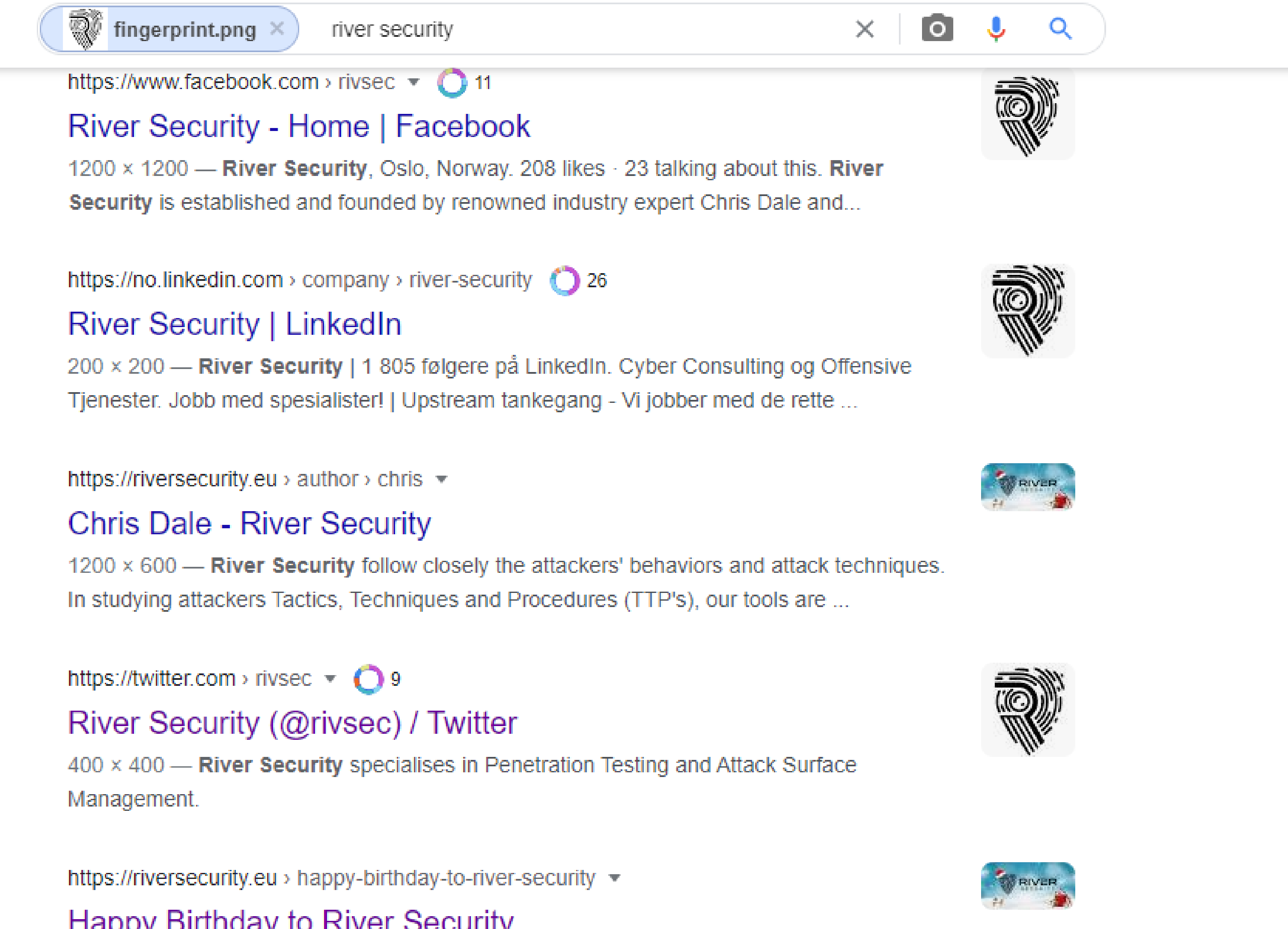


# Leverage The Brand



- Reverse image searching
  - Logos
  - Company specific images
- Company catch phrases and mottos
  - “Nike, just do it”
- You can automate querying for some of these things
  - It returns 1.000.000 hits, that is fine
  - But can we check and verify 1.000.001?
  - Is it easy? Is it doable?

# Reverse Image Searching



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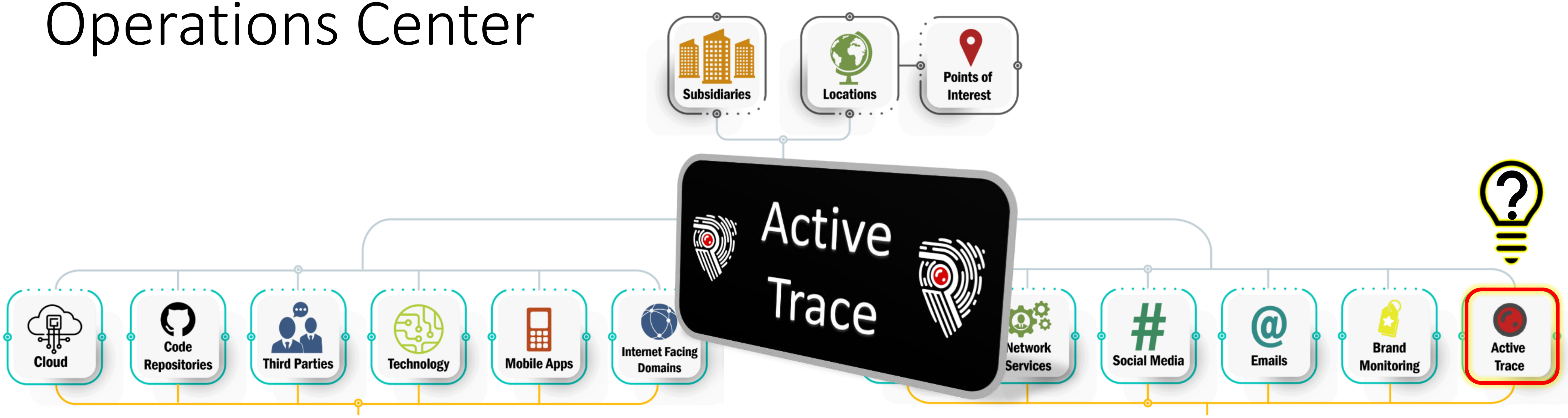
Happy Birthday to River Security

# Building an Offensive Security Operations Center



# Active Trace – Adding Deception

- We can embed code which triggers when a code has been cloned
- SVG with callbacks
- JavaScript which only returns when website runs outside of original domain
- It doesn’t have to be complex, but it adds to pro-activeness

# Reporting

- Do we want yet another dashboard?
- Most organizations can consume from API’s today
  - I.e., a defensive SOC
- Human to human interaction is valuable
  - It provides knowledge transfer
  - Collaboration stimulates solutions
- What we suggest and practice:
  - Report where customers can process the information
  - Make API’s and data accessible
  - Adapt and innovate

# Defend Forward

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# CIS TOP 18

- **CIS 1**: Inventory and Control of Enterprise Assets
- **CIS 2**: Inventory and Control of Software Assets
- CIS 3: Data Protection
- CIS 4: Secure Configuration of Enterprise Assets and Software
- CIS 5: Account Management
- CIS 7: Continuous Vulnerability Management
- CIS 12: Network Infrastructure Management
- CIS 13 Network Monitoring and Defense
- CIS 14: Security Awareness and Skills Training
- CIS 15: Service Provider Management
- **CIS 16**: Application Software Security
- **CIS 18**: Penetration Testing

# NSM CORE PRINCIPALS FOR INFORMATION SECURITY

- **1. Identify and Map**
- **1.1 Map governance, deliveries, supply chain, and supporting systems**
- **1.2 Map assets and software**
- 1.3 Map users and need for access and privileges
- **Protect and Maintain**
- 2.1 Maintain security in procurement and development processes
- **2.2 Establish a secure IT infrastructure**
- **2.3 Ensure a secure configuration**
- **2.4 Protect the organizations networks**
- 2.5 Control the flow of data
- **2.6 Ensure control of identities and accesses**
- **2.7 Protect data at rest and data in transit**
- **2.8 Protect email and browser**
- 2.9 Establish routes and skill to recover data
- **2.10 Integrate security into processes for Change Management**
- **Detect**
- **3.1 Detect and remove known vulnerabilities and threats**
- **3.2 Establish security monitoring**
- 3.3 Analyze data from security monitoring
- **3.4 Perform penetration tests**
- **Handle and restore**
- 4.1 Prepare the business for handling incident response
- 4.2 Evaluate and categorize incidents
- 4.3 Control and handle incidents
- 4.4 Evaluate and learn from incidents

# Cyber Warfare vs. Traditional Warfare

"Know yourself, know your enemy, you will not fear the result of a hundred battles"
Sun Tzu, The Art of War

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# APT – Advanced Persistent Threat

Does not have to be advanced, just persistent

RIVER SECURITY

# Thank You For Your Attention!

https://into.bio/chrisdale & https://into.bio/rivsec
Download slides here!

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WE’RE HIRING!

Active Focus