ESGI
école supérieure de génie informatique

INTRINSEC
Innovative by design

Les phases de reconnaissance : clef du succès d’un test d'intrusion interne

ESGI Security Day – 02/05/2023

Qui sommes-nous ?

INTRINSEC
Innovative by design

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Plan

Reconnaissance Anonyme

Conclusion

Introduction

Reconnaissance Authentifiée

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Reconnaissance dans un milieu Active Directory

- Test d’intrusion : reconnaissance / exploitation / post exploitation
- Phases de reconnaissance
- Anonyme VS Authentifié : intrusion physique / phishing ou collaborateur malveillant

Pourquoi la reconnaissance est-elle la clef pour réussir un test d'intrusion interne ?

Reconnaissance dans un milieu Active Directory

What's next

- Présentation d'un exemple de méthodologie
- Certains outils seront évoqués, il en existe beaucoup d'autres
- Les dimensions Azure et Microsoft 365 ne seront pas abordées
- Les exemples sont tirés du lab d'Intrinsec

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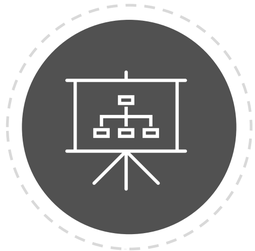
Conclusion



Introduction

Reconnaissance Authentifiée

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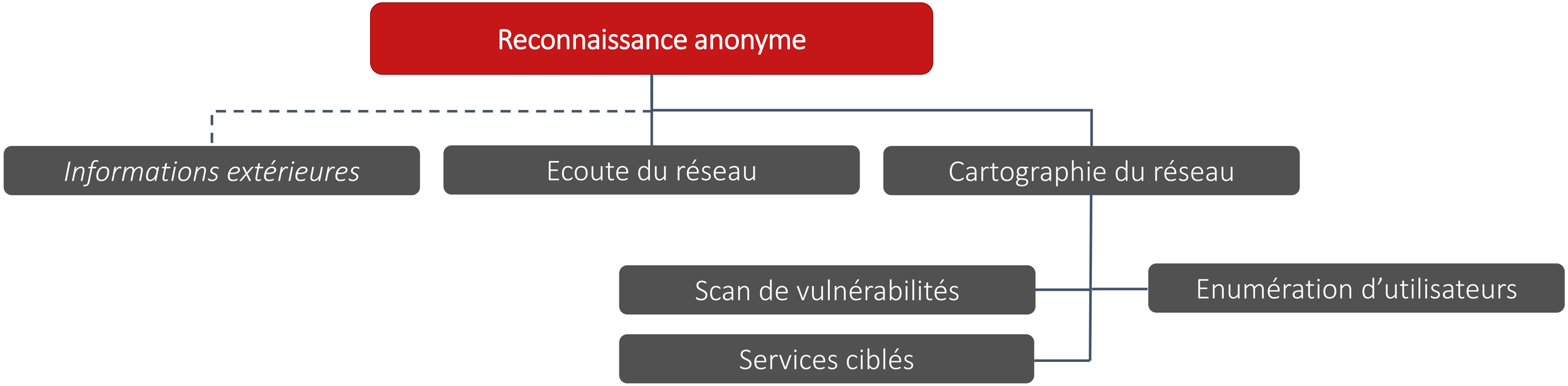
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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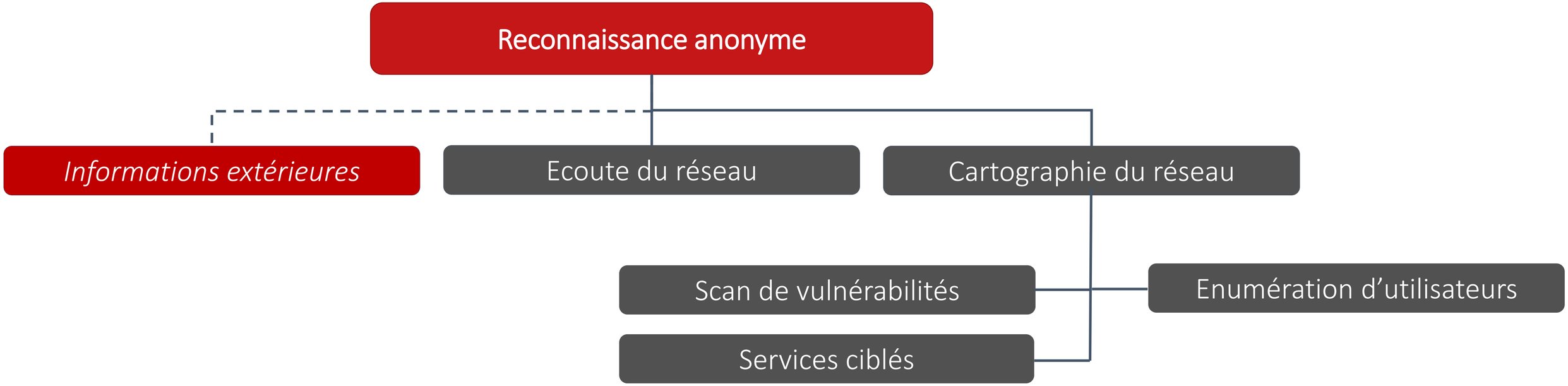
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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Reconnaissance dans un milieu Active Directory

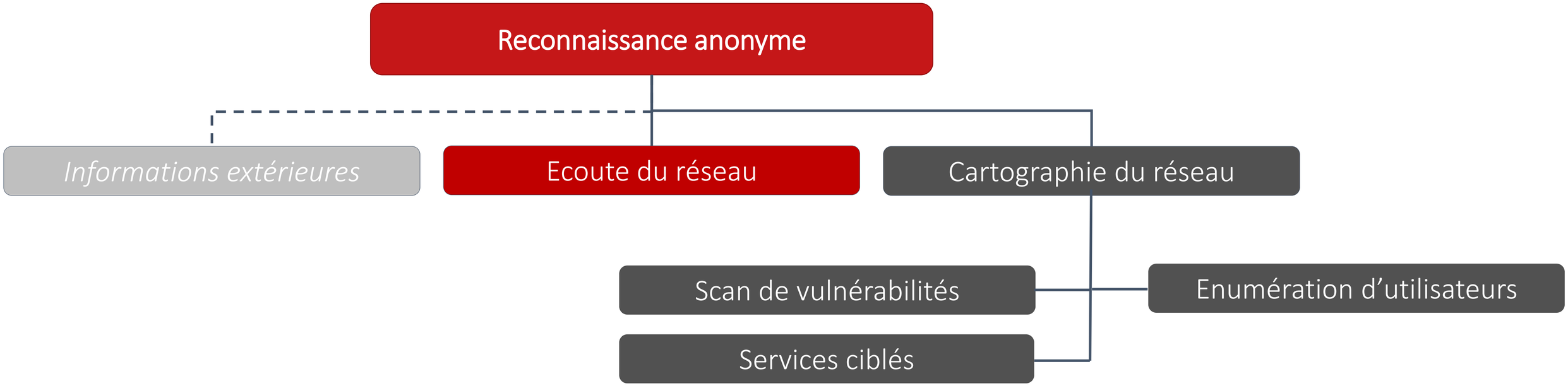
Reconnaissance anonyme – Informations extérieures

- **Informations recherchées**
  - Utilisateurs VIP
  - Données techniques / métiers

- **Les recherches regroupent de multiples sources**
  - Site vitrine
  - Réseaux professionnels
  - Fuites de données
  - Outils de collecte
  - …

Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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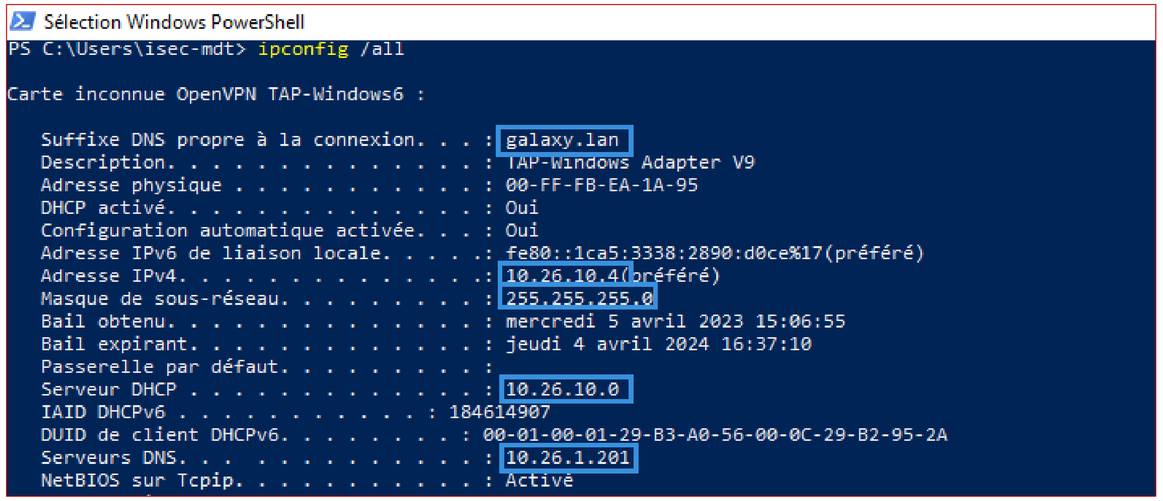
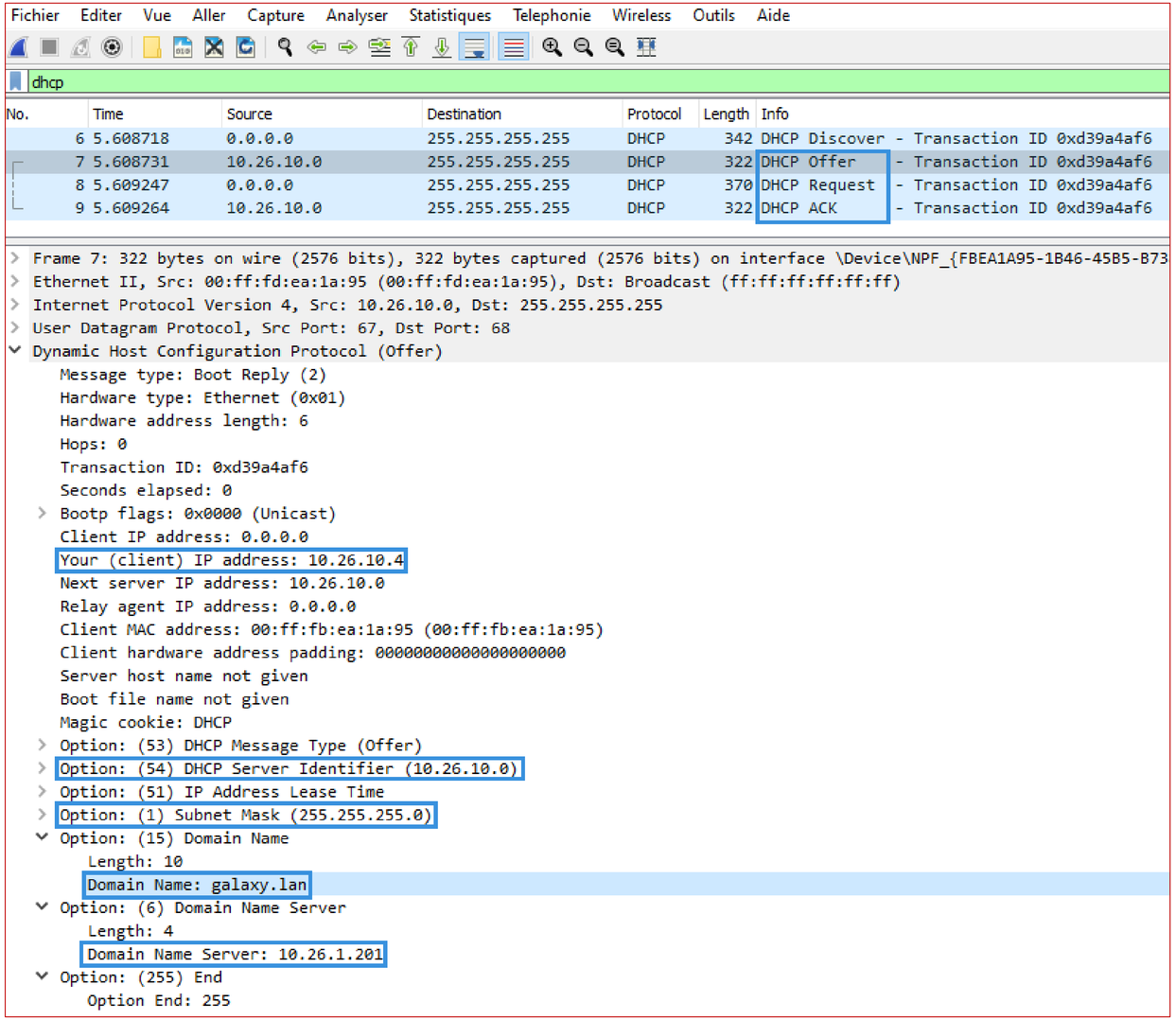
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Ecoute du réseau

- **Ecoute passive**
- **Ecoute active** (man-in-the-middle)
  - ✓ Mode silencieux
  - ✓ Redirection des flux
- **Outils** : Wireshark, Responder, Mitm6, …





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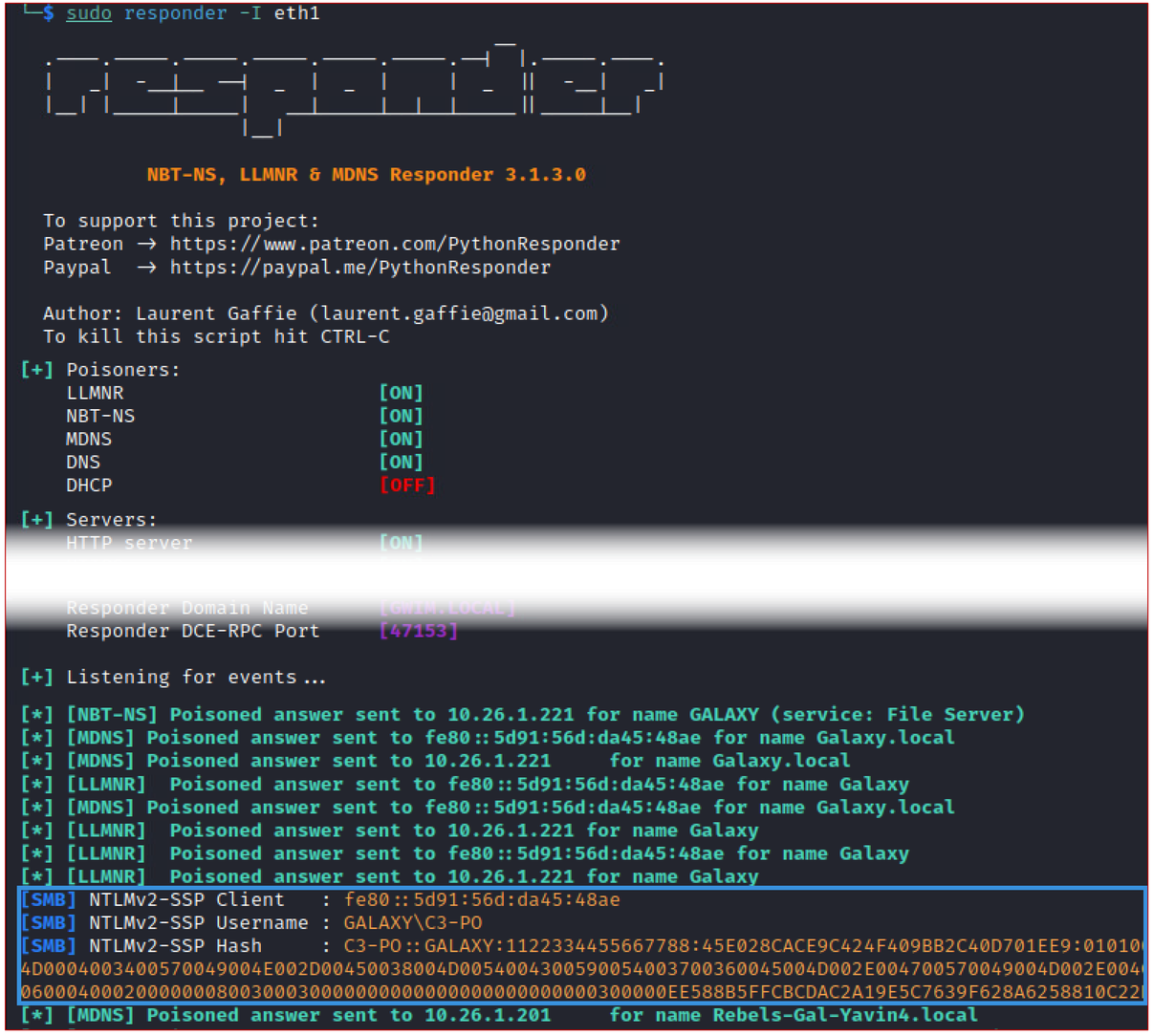
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Ecoute du réseau

- **Ecoute passive**
- **Ecoute active** (man-in-the-middle)
  - ✓ Redirection des flux
    - Protocoles non sécurisés
    - Interceptions les flux et empoisonnement
    - Demande d'authentification
    - Récupération des challenges (générés à partir du mot de passe)
    - Exploitation de la pile IPv6
- **Outils** : Wireshark, Responder, Mitm6, …



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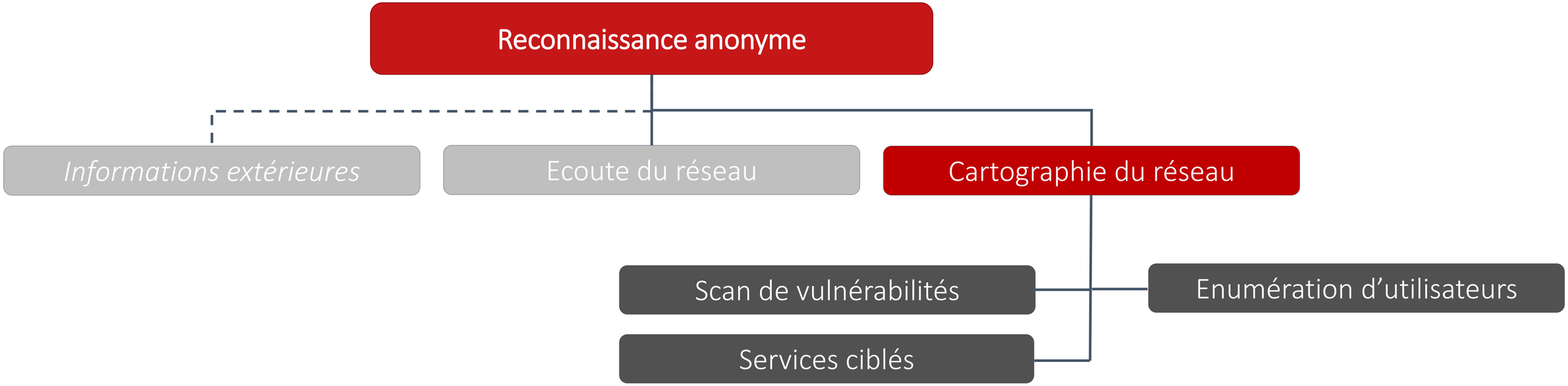
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Cartographie du réseau

- Scan du réseau
  - ✓ Découvertes des plages réseaux
  - ✓ Découvertes des machines
    - Système d'exploitation
    - Services et versions
- Outils : Arpscan, Nmap, …

```
└─$ nmap -T 5 -sV -A -oA ./tcp-output -p - 10.26.1.0/24
Nmap scan report for 10.26.1.212
Host is up (0.024s latency).
Scanned at 2023-04-15 18:56:57 CEST for 505s
Not shown: 65528 filtered tcp ports (no-response)
PORT     STATE SERVICE       VERSION
80/tcp   open  http          Microsoft IIS httpd 10.0
| http-methods:
|   Supported Methods: OPTIONS TRACE GET HEAD POST
|_  Potentially risky methods: TRACE
| http-cookie-flags:
|   /:
|     PHPSESSID:
|_      httponly flag not set
|_http-server-header: Microsoft-IIS/10.0
|_http-title: Site doesn't have a title (text/html; charset=UTF-8).
135/tcp  open  msrpc         Microsoft Windows RPC
445/tcp  open  microsoft-ds?
3389/tcp open  ms-wbt-server Microsoft Terminal Services
|_ssl-date: 2023-04-15T17:01:13+00:00; -4m06s from scanner time.
| ssl-cert: Subject: commonName=Gal-Kessel.galaxy.lan
| Issuer: commonName=Gal-Kessel.galaxy.lan
| Public Key type: rsa
| Public Key bits: 2048
|   Product_Version: 10.0.17763
|_  System_Time: 2023-04-15T16:57:43+00:00
5985/tcp open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
|_http-title: Not Found
|_http-server-header: Microsoft-HTTPAPI/2.0
5986/tcp open  ssl/http      Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
|_http-server-header: Microsoft-HTTPAPI/2.0
| tls-alpn:
| VmXP3HNXOFT/GaYIM+dSk/UFHvz6wCaOpvdEWLxVuJiWgClBODs6svSyaKa3iaLU
| gg==
|_-----END CERTIFICATE-----
8080/tcp open  http          Apache Tomcat 9.0.70
| http-methods:
|_  Supported Methods: GET HEAD POST OPTIONS
|_http-favicon: Apache Tomcat
|_http-title: Apache Tomcat/9.0.70
Service Info: OS: Windows; CPE: cpe:/o:microsoft:windows

Host script results:
| smb2-time:
|   date: 2023-04-15T16:57:50
```


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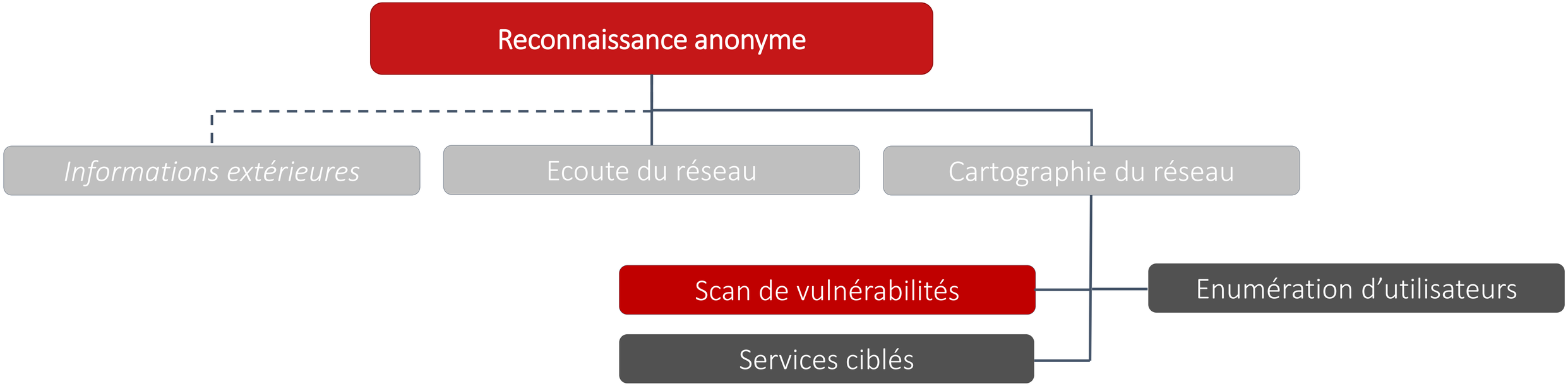
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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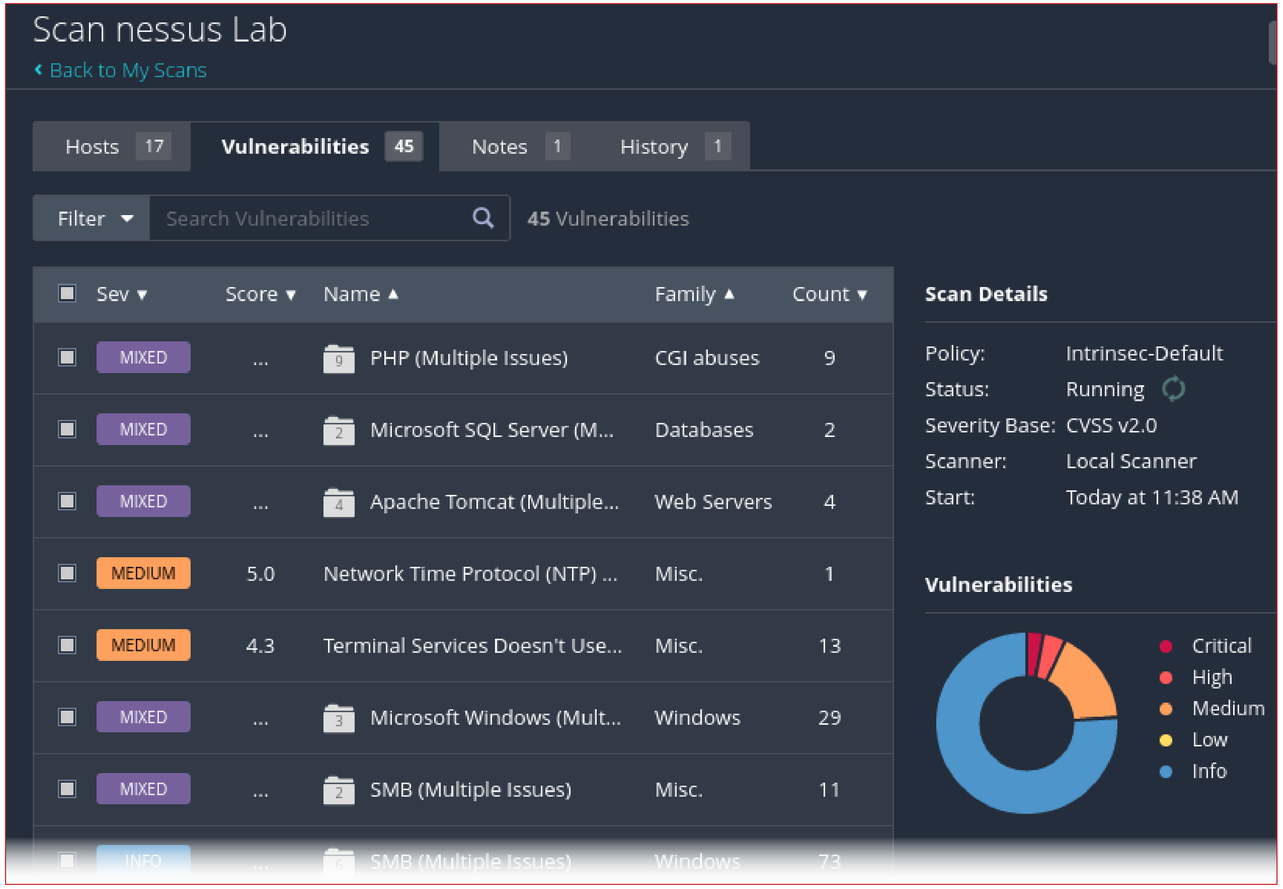
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Scan de vulnérabilités

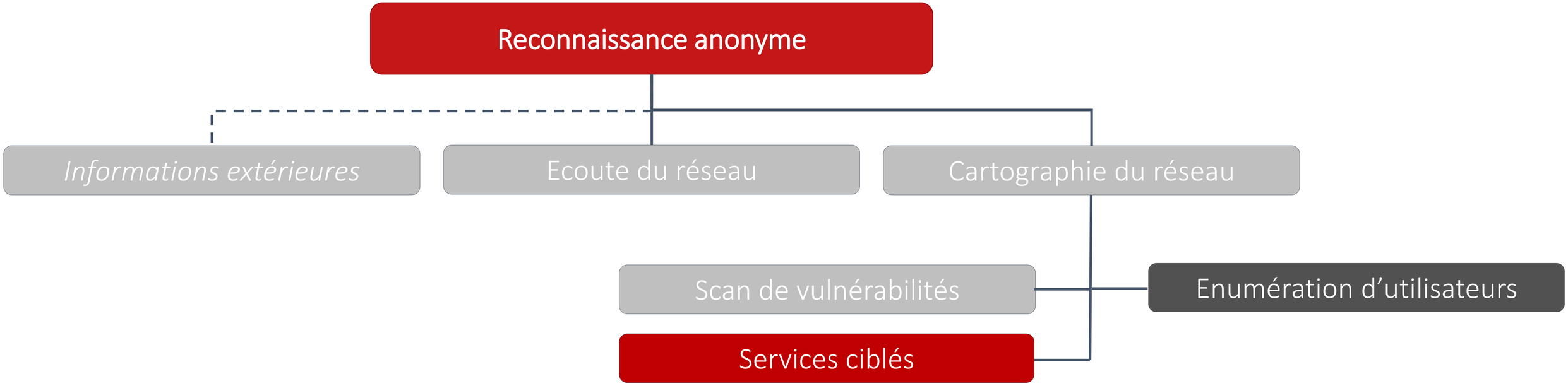
- Scan de vulnérabilités
  - En fonction des versions
  - Basé sur des vulnérabilités connues
  - Non intrusif

- Outils : Nmap, Metasploit, Nessus, Nuclei, …



Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Services ciblés

- Services / Protocoles
  - FTP
  - SSH
  - Telnet
  - HTTP(S)
  - SMB
  - SQL
  - …

- Outils : Nmap, Impacket, Burp, CrackMapExec, netscan, aquatone, ssh-audit, …

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Reconnaissance anonyme – Services ciblés

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  - SQL
  - …

- Outils : Nmap, Impacket, Burp, CrackMapExec, netscan, aquatone, ssh-audit, …

```
└─$ ftp 10.26.10.2
Connected to 10.26.10.2.
220 (vsFTPd 3.0.3)
Name (10.26.10.2:isec-mdt): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> dir
229 Entering Extended Passive Mode (|||53857|)
150 Here comes the directory listing.
```

```
└─$ nmap -p22 10.26.1.254 --script ssh-auth-methods --script-args="ssh.user=root"
Nmap scan report for 10.26.1.254
Host is up (0.025s latency).

PORT   STATE SERVICE
22/tcp open  ssh
| ssh-auth-methods:
|   Supported authentication methods:
|     publickey
|     password
|_    keyboard-interactive

Nmap done: 1 IP address (1 host up) scanned in 0.89 seconds
```


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Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Services ciblés

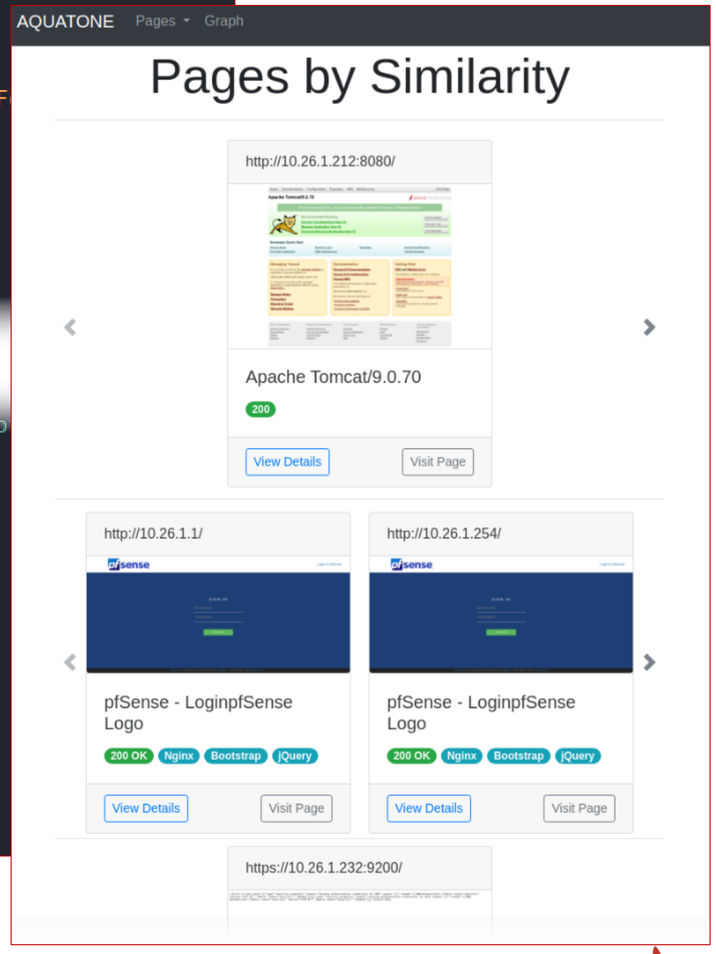
- Services / Protocoles
  - FTP
  - SSH
  - Telnet
  - **HTTP(S)**
  - SMB
  - SQL
  - …
- Outils : Nmap, Impacket, Burp, CrackMapExec, netscan, aquatone, ssh-audit, …

```
└─$ cat ../../tcp-output.xml | ./aquatone -nmap

Targets    : 20
Threads    : 8
Ports      : 80, 443, 8000, 8080, 8443
Output dir : .

http://GAL-KEPLER452B.GALAXY.LAN:5985/: 404 Not Found
http://10.26.1.1/: 200 OK
http://10.26.1.212:5985/: 404 Not Found
https://10.26.1.214:5986/: 404 Not Found
https://GAL-KEPLER452B.GALAXY.LAN:5986/: 404 Not F
https://10.26.1.232/: 401 Unauthorized
http://10.26.1.232/: 200 OK
https://10.26.1.212:5986/: 404 Not Found
https://10.26.1.232:9200/: 401 Unauthorized
http://10.26.1.254/: 200 OK
https://10.26.1.214:8172/: 404 Not Found
http://10.26.1.214:5985/: 404 Not Found
http://10.26.1.212:8080/: 200

https://10.26.1.214:5986/: screenshot successful
https://GAL-KEPLER452B.GALAXY.LAN:5986/: screensho
https://10.26.1.232/: screenshot successful
http://10.26.1.232/: screenshot successful
https://10.26.1.212:5986/: screenshot successful
https://10.26.1.232:9200/: screenshot successful
https://10.26.1.214:8172/: screenshot successful
http://10.26.1.254/: screenshot successful
http://10.26.1.214/: screenshot successful
http://10.26.1.214:5985/: screenshot successful
http://10.26.1.212:8080/: screenshot successful
http://10.26.1.214:81/: screenshot successful
https://10.26.1.214:444/: screenshot successful
Calculating page structures … done
Clustering similar pages … done
Generating HTML report … done
```



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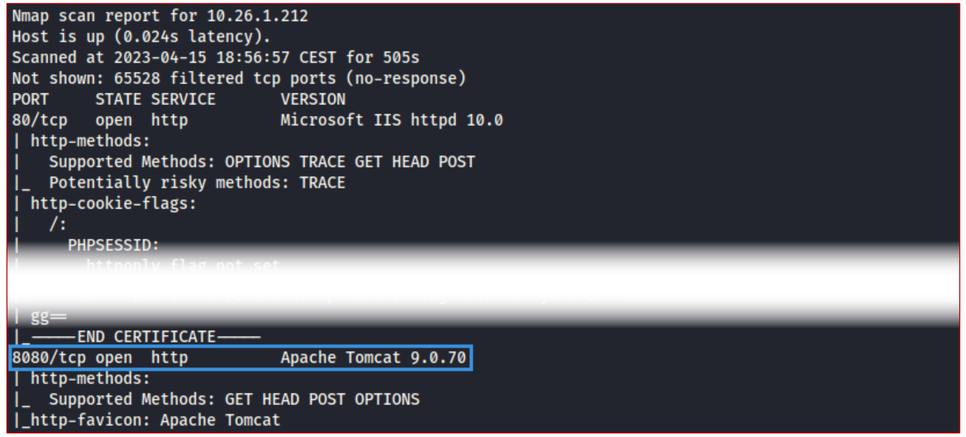
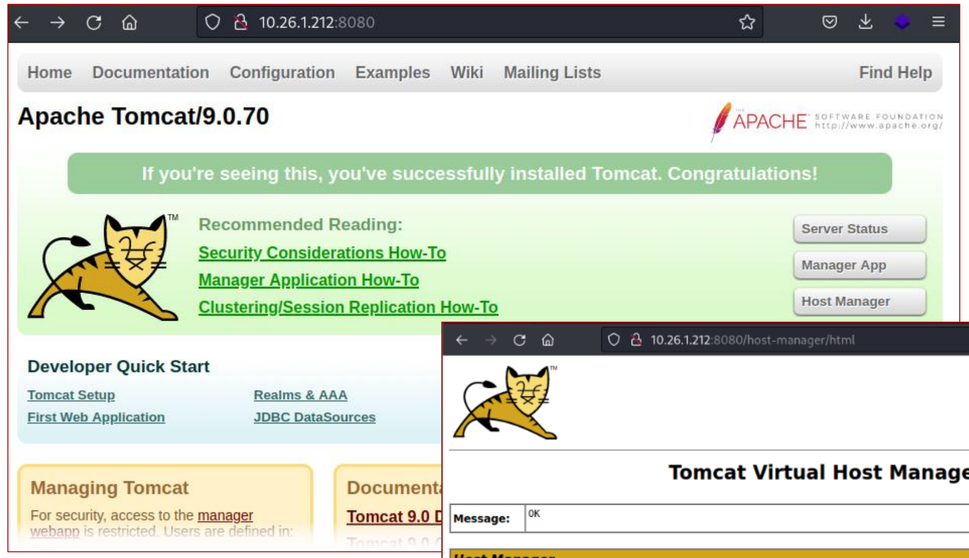
Reconnaissance dans un milieu Active Directory

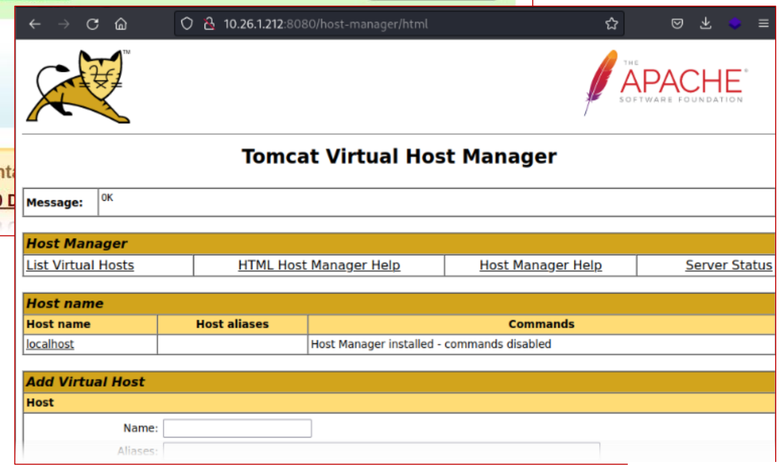
Reconnaissance anonyme – Services ciblés

- Services / Protocoles
  - FTP
  - SSH
  - Telnet
  - **HTTP(S)**
  - SMB
  - SQL
  - …

- Outils : Nmap, Impacket, Burp, CrackMapExec, netscan, aquatone, ssh-audit, …







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Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Services ciblés

- Services / Protocoles
  - FTP
  - SSH
  - Telnet
  - HTTP(S)
  - **SMB**
  - SQL
  - …

```
└─$ crackmapexec smb 10.26.1.0/24 --shares
SMB         10.26.1.53      445    GAL-KAMINO       [*] Windows 10.0 Build 19041 x64 (name:GAL-KAMINO) (domain:galaxy
.lan) (signing:False) (SMBv1:False)
SMB         10.26.1.52      445    GAL-CORELLIA     [*] Windows 10.0 Build 19041 x64 (name:GAL-CORELLIA) (domain:gala
xy.lan) (signing:False) (SMBv1:False)
SMB         10.26.1.53      445    GAL-KAMINO       [-] Error enumerating shares: [Errno 32] Broken pipe
SMB         10.26.1.52      445    GAL-CORELLIA     [-] Error enumerating shares: [Errno 32] Broken pipe
SMB         10.26.1.201     445    GAL-KORRIBAN     [*] Windows 10.0 Build 17763 x64 (name:GAL-KORRIBAN) (domain:gala
xy.lan) (signing:True) (SMBv1:False)
SMB         10.26.1.202     445    REBELS-GAL-YAVI  [*] Windows 10.0 Build 17763 x64 (name:REBELS-GAL-YAVI) (domain:r
ebels4.galaxy.lan) (signing:True) (SMBv1:False)
SMB         10.26.1.201     445    GAL-KORRIBAN     [-] Error enumerating shares: STATUS_USER_SESSION_DELETED
SMB         10.26.1.202     445    REBELS-GAL-YAVI  [-] Error enumerating shares: STATUS_USER_SESSION_DELETED
SMB         10.26.1.205     445    KAAMELOTT        [*] Windows 10.0 Build 17763 x64 (name:KAAMELOTT) (domain:logres.
lan) (signing:True) (SMBv1:False)
SMB         10.26.1.205     445    KAAMELOTT        [-] Error enumerating shares: STATUS_USER_SESSION_DELETED
SMB         10.26.1.214     445    GAL-MARIDUN      [*] Windows Server 2016 Standard Evaluation 14393 x64 (name:GAL-M
ARIDUN) (domain:galaxy.lan) (signing:False) (SMBv1:True)
SMB         10.26.1.214     445    GAL-MARIDUN      [-] Error enumerating shares: [Errno 32] Broken pipe
SMB         10.26.1.213     445    GAL-KEPLER452B   [*] Windows 10.0 Build 17763 x64 (name:GAL-KEPLER452B) (domain:ga
laxy.lan) (signing:False) (SMBv1:False)
SMB         10.26.1.213     445    GAL-KEPLER452B   [-] Error enumerating shares: [Errno 32] Broken pipe
SMB         10.26.1.212     445    GAL-KESSEL       [*] Windows 10.0 Build 17763 x64 (name:GAL-KESSEL) (domain:galaxy
.lan) (signing:False) (SMBv1:False)
```

- Outils : Nmap, Impacket, Burp, CrackMapExec, netscan, aquatone, ssh-audit, …

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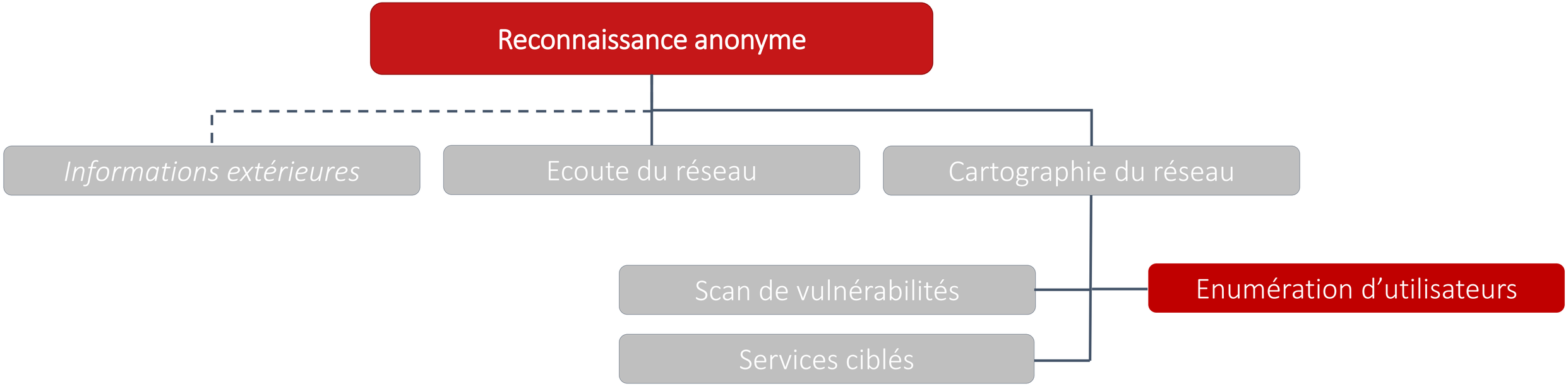
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme – Enumération d'utilisateurs

- Recherche basée sur une *wordlist*
  - Liste générique
  - Liste personnalisée
- ⚠ *Politique de mot de passe encore inconnue à ce stade*

```
└─$ ./kerbrute_linux_amd64 userenum -d galaxy.lan --dc 10.26.1.201 usernames_starwars.txt

    __             __               __
   / /_____  _____/ /_  _______  __/ /____
  / //_/ _ \/ ___/ __ \/ ___/ / / / __/ _ \
 / ,< /  __/ /  / /_/ / /  / /_/ / /_/  __/
/_/|_|\___/_/  /_.___/_/   \__,_/\__/\___/

Version: v1.0.3 (9dad6e1) - 04/15/23 - Ronnie Flathers @ropnop

2023/04/15 16:51:42 >  Using KDC(s):
2023/04/15 16:51:42 >   10.26.1.201:88

2023/04/15 16:51:42 >  [+] VALID USERNAME:       anakin-skywalker@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       r2-d2@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       c3-po@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       jar-jar-binks@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       han-solo@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       leia-organa@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       comte-dooku@galaxy.lan
2023/04/15 16:51:42 >  [+] VALID USERNAME:       sheev-palpatine@galaxy.lan
2023/04/15 16:51:42 >  Done! Tested 30 usernames (8 valid) in 0.194 seconds
```

- Outils : CrackMapExec, Enum4linux, Kerbrute

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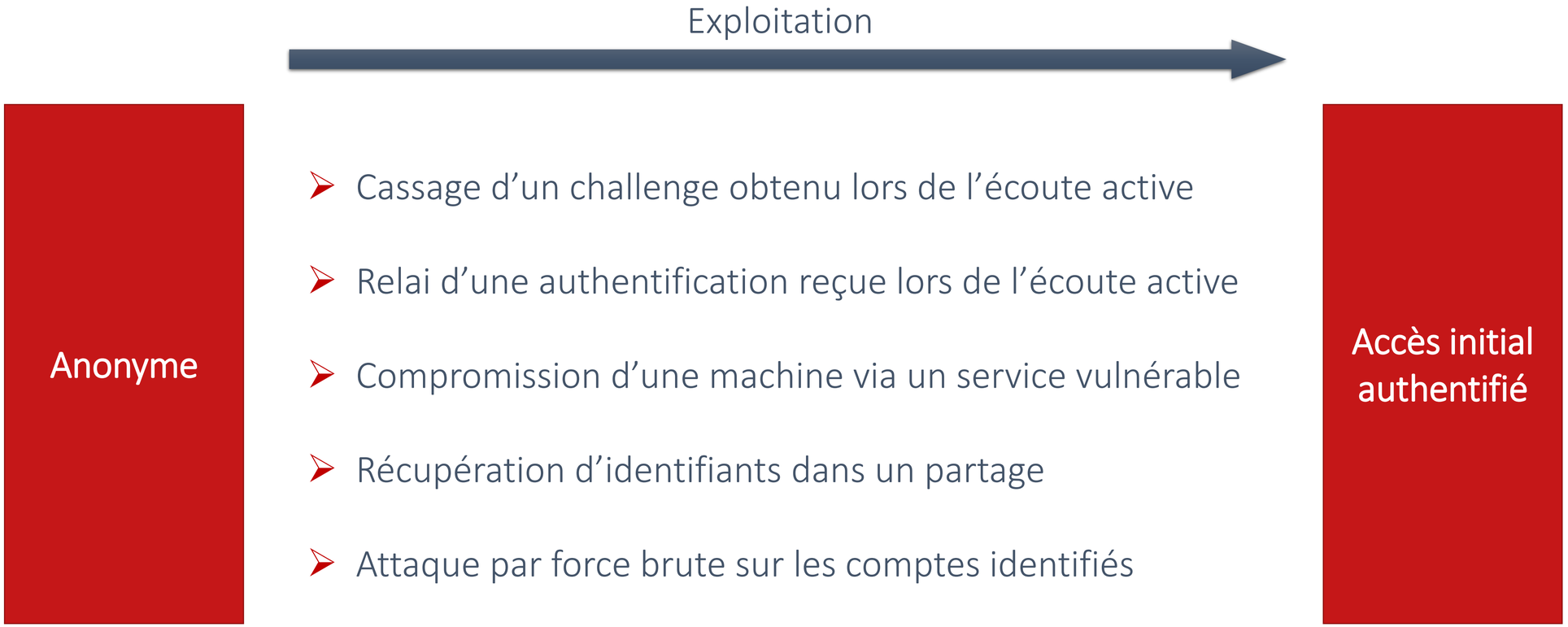
Reconnaissance dans un milieu Active Directory

Reconnaissance anonyme



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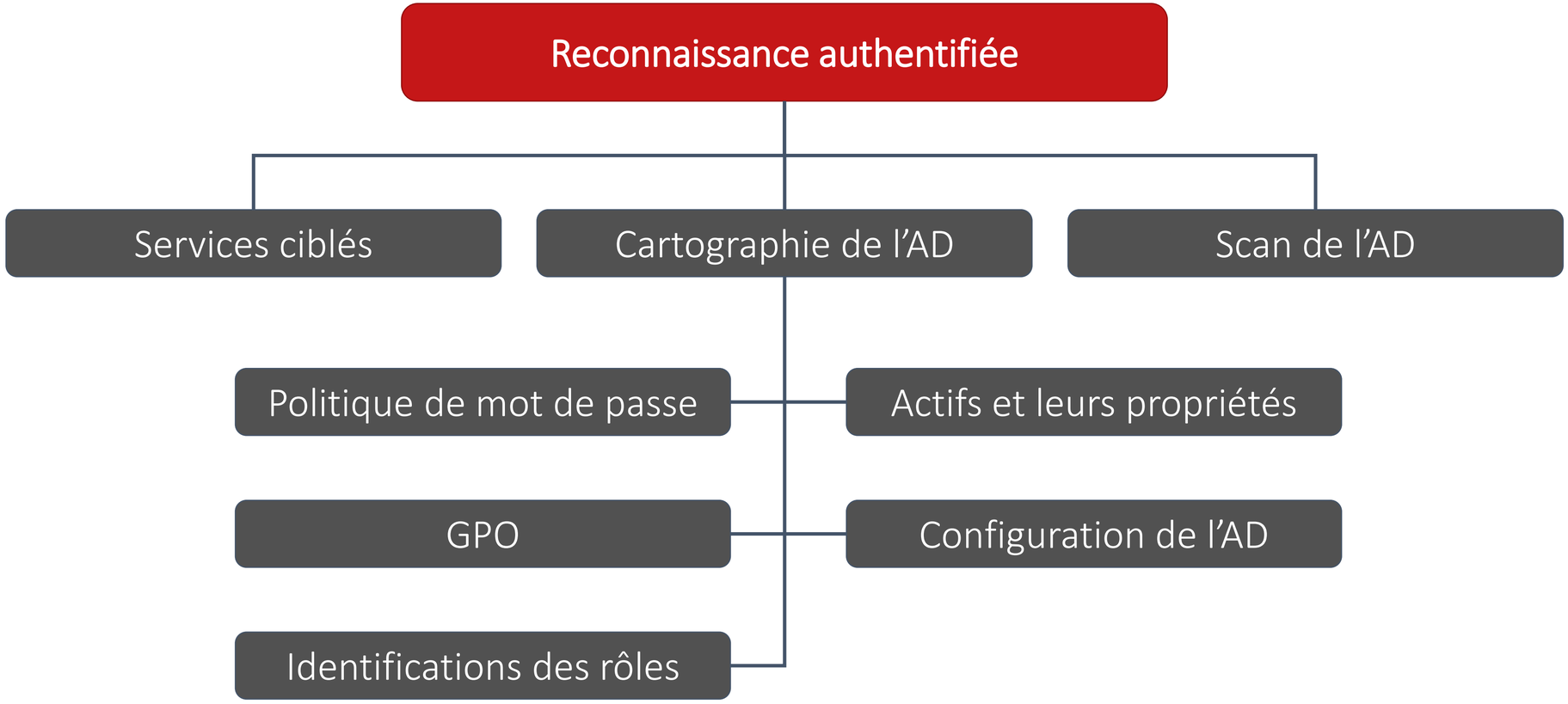
Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



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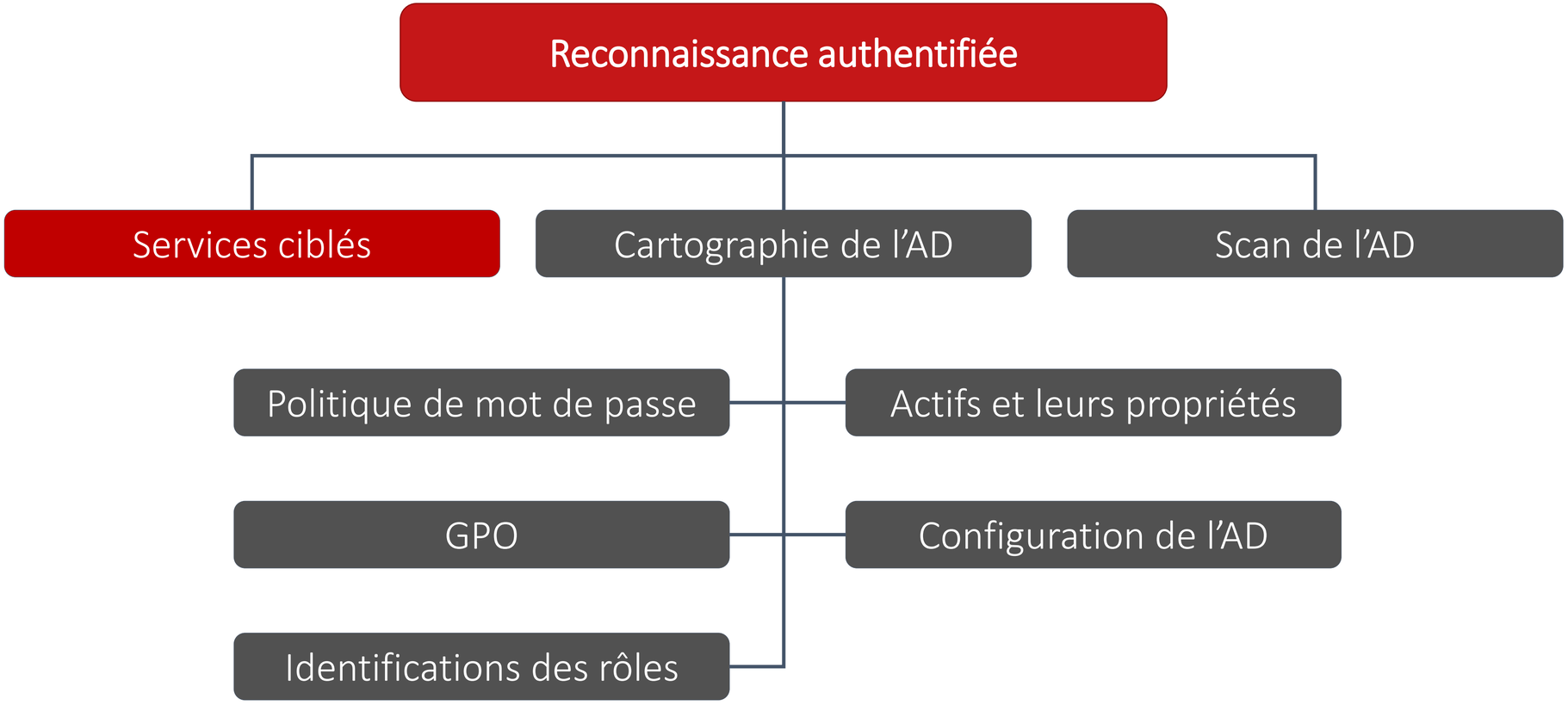
Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



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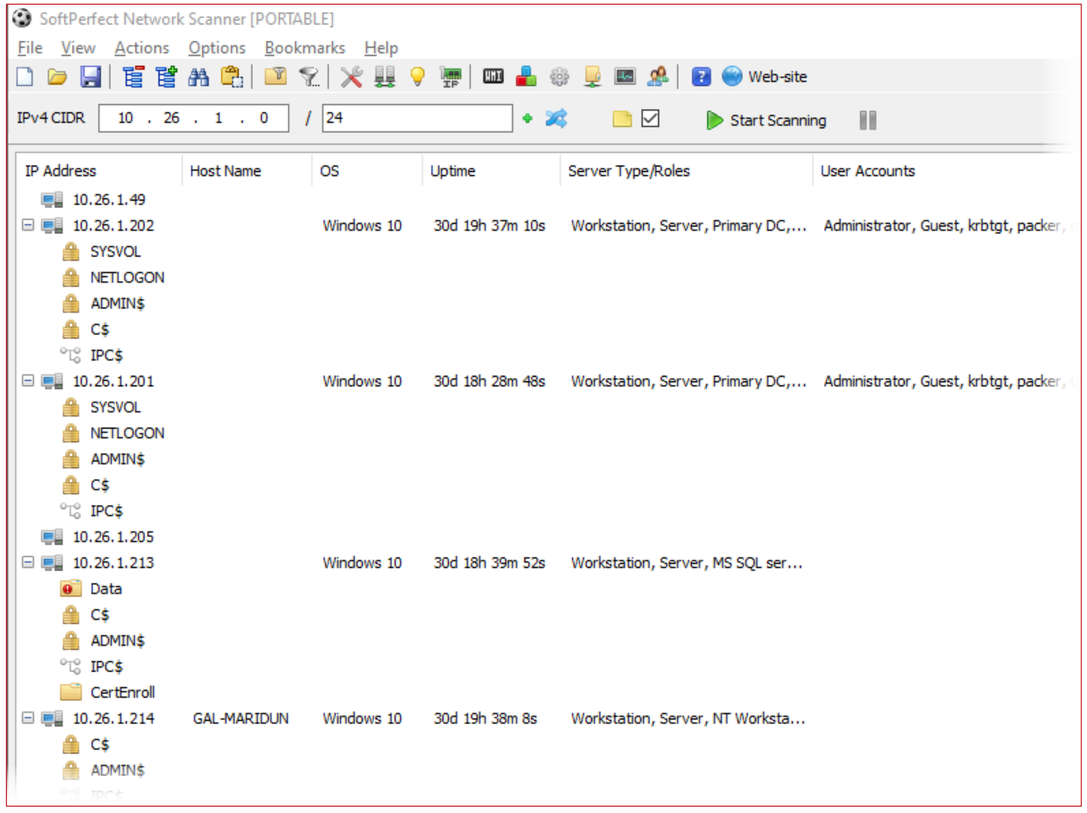
Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Services ciblés / Partages accessibles

- Réitération de l'étape anonyme
- Accès supplémentaires à l'aide des identifiants




```
└─$ smbmap -u C3-PO -p [redacted] -d galaxy.lan -H 10.26.1.0/24
[!] 445 not open on 10.26.1.0....
[!] 445 not open on 10.26.1.1....
[!] 445 not open on 10.26.1.2....
[!] 445 not open on 10.26.1.3....
[!] 445 not open on 10.26.1.4....

        C$                                                      NO ACCESS       Default share
        IPC$                                                    READ ONLY       Remote IPC
[+] IP: 10.26.1.52:445  Name: 10.26.1.52
        Disk                                                    Permissions     Comment
        ----                                                    -----------     -------
        ADMIN$                                                  NO ACCESS       Remote Admin
        C$                                                      NO ACCESS       Default share
        IPC$                                                    READ ONLY       Remote IPC
[+] IP: 10.26.1.53:445  Name: 10.26.1.53
        Disk                                                    Permissions     Comment
        ----                                                    -----------     -------
        ADMIN$                                                  NO ACCESS       Remote Admin
        C$                                                      NO ACCESS       Default share
        IPC$                                                    READ ONLY       Remote IPC
[+] IP: 10.26.1.201:445 Name: galaxy.lan
        Disk                                                    Permissions     Comment
        ----                                                    -----------     -------
        ADMIN$                                                  NO ACCESS       Remote Admin
        C$                                                      NO ACCESS       Default share
        IPC$                                                    READ ONLY       Remote IPC
        NETLOGON                                                READ ONLY       Logon server share
        SYSVOL                                                  READ ONLY       Logon server share
[+] IP: 10.26.1.202:445 Name: 10.26.1.202
        Disk                                                    Permissions     Comment
        ----                                                    -----------     -------
        ADMIN$                                                  NO ACCESS       Remote Admin
        C$                                                      NO ACCESS       Default share
        IPC$                                                    READ ONLY       Remote IPC
        NETLOGON                                                READ ONLY       Logon server share
        SYSVOL                                                  READ ONLY       Logon server share
[+] IP: 10.26.1.212:445 Name: 10.26.1.212
        Disk                                                    Permissions     Comment
        ----                                                    -----------     -------
        ADMIN$                                                  NO ACCESS       Remote Admin
        C$                                                      NO ACCESS       Default share
        IPC$                                                    READ ONLY       Remote IPC
```


INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Services ciblés

- Réitération de l'étape anonyme
- Accès supplémentaires à l'aide des identifiants

```
PS C:\Users\isec-mdt\Documents> Get-SQLInstanceDomain


ComputerName     : Gal-Kepler452b.galaxy.lan
Instance         : Gal-Kepler452b.galaxy.lan,1433
DomainAccountSid : 150000052100033252122582212232323623519020624488400
DomainAccount    : r5-d4
DomainAccountCn  : R5-D4
Service          : MSSQLSvc
Spn              : MSSQLSvc/Gal-Kepler452b.galaxy.lan:1433
LastLogon        : 16/04/2023 15:13
Description      : R5-D4 était un droïde astromécano de série R5 fabriqué par Industrial Auto
```

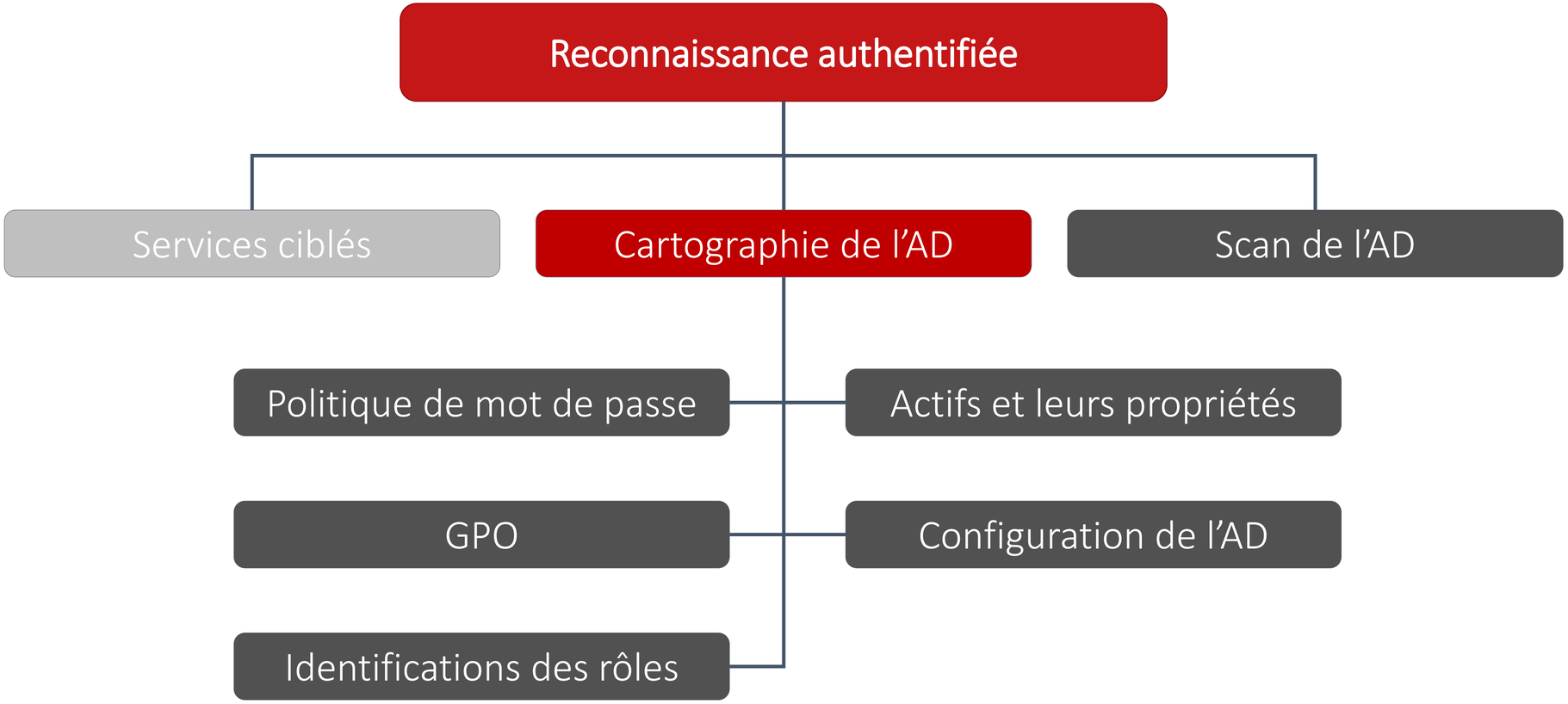
```
PS C:\Users\isec-mdt\Documents> Get-SQLInstanceDomain | Get-SQLConnectionTest

ComputerName               Instance                                Status
------------               --------                                ------
Gal-Kepler452b.galaxy.lan Gal-Kepler452b.galaxy.lan,1433          Accessible
Gal-Kepler452b.galaxy.lan Gal-Kepler452b.galaxy.lan\SQLEXPRESS    Accessible
```

- Outils : Nmap, Impacket, CrackMapExec, PowerUPSQL, SMBMap, Netscan Portable, …

INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



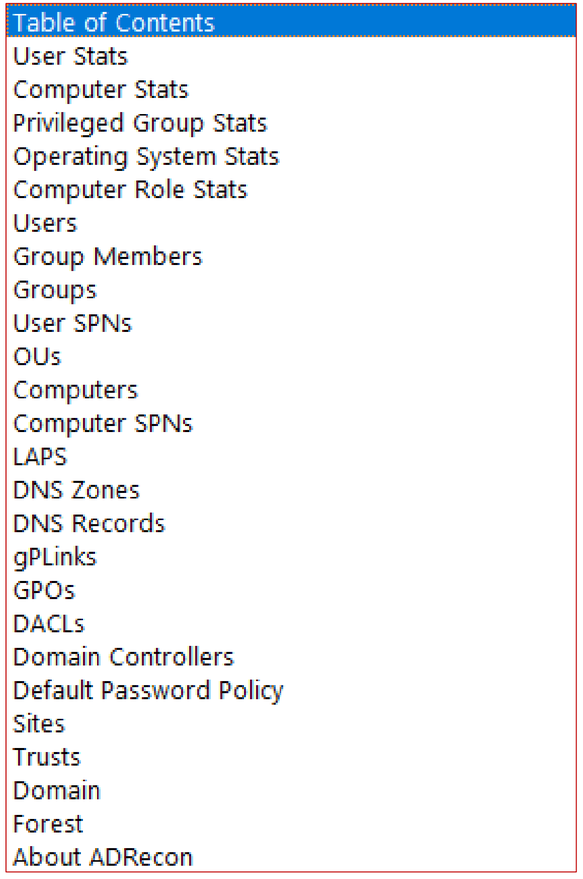
INTRINSEC

Reconnaissance dans un milieu Active Directory

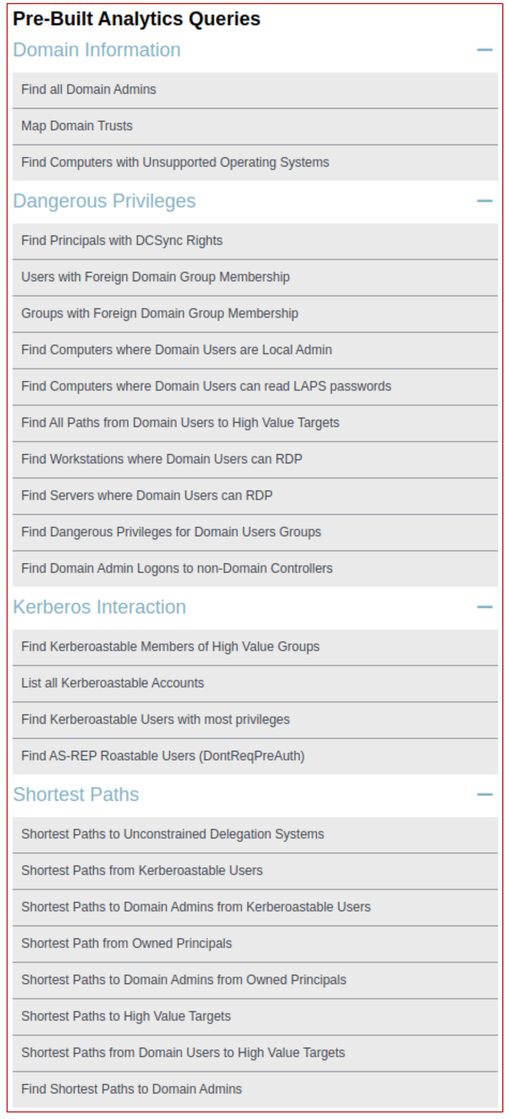
Reconnaissance authentifiée – Cartographie de l'AD

- Collecte d'informations globale de l'AD
- Représentations des données

- Outils : BloodHound, ADRecon, PowerView …



Classement des informations retrouvées à grâce à ADRecon

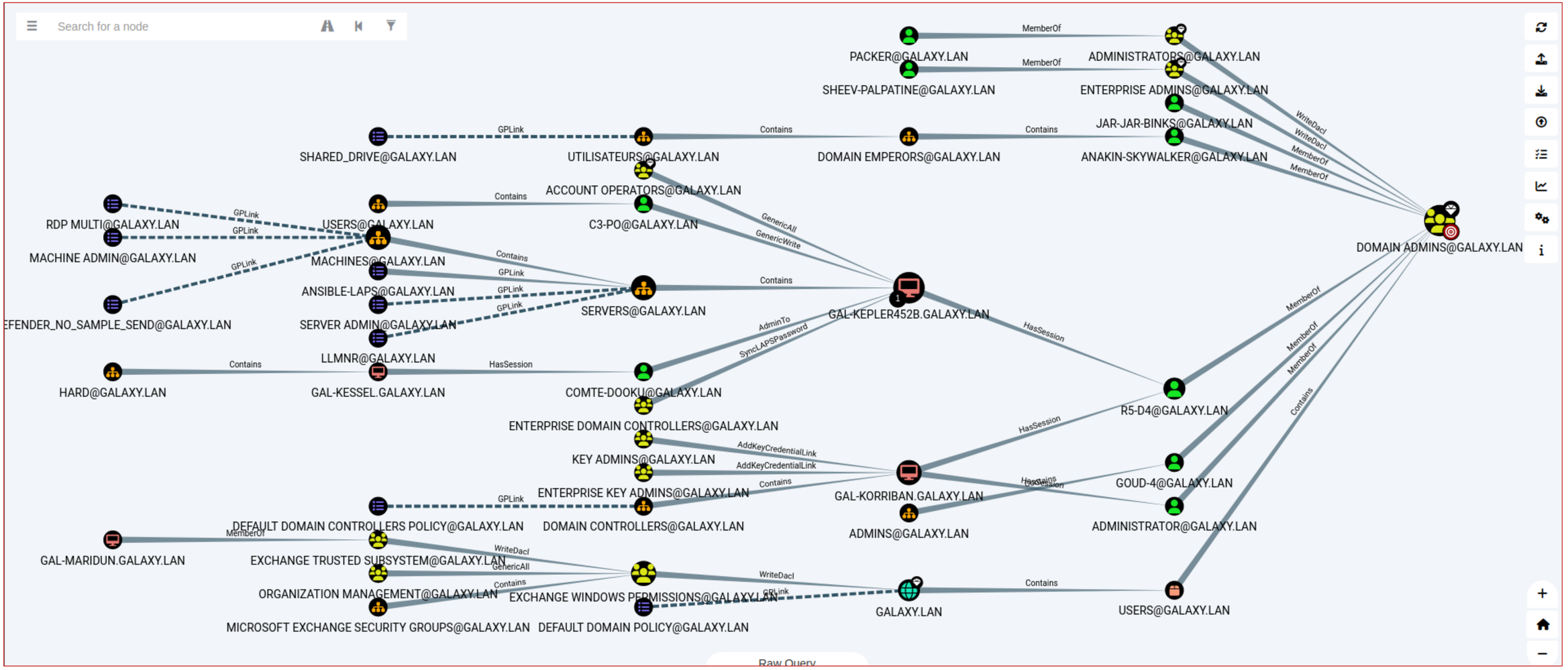


Traitements des données avec Bloodhound (pre-built queries)

INTRINSEC

Reconnaissance dans un milieu Active Directory

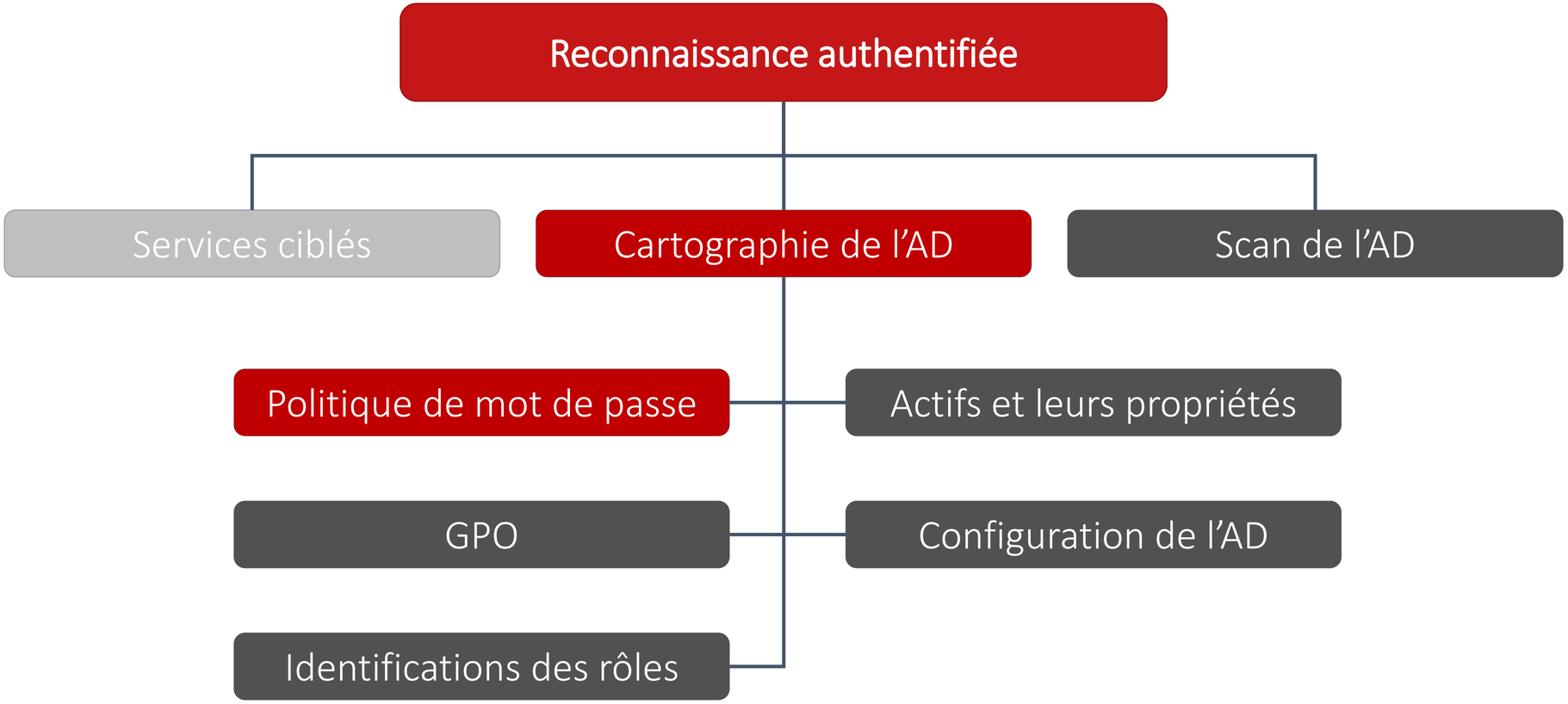
Reconnaissance authentifiée – Cartographie de l'AD



« Find shortest paths to domain admin »

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Politique de mot de passe

- Politique par défaut de l'Active Directory
  - Get-ADDefaultDomainPasswordPolicy
- ⚠ Politique de mot de passe affinée
  - Get-ADFineGrainedPasswordPolicy

- Outils : BloodHound, ADRecon, …

	A	B
1	**Policy**	**Current Value**
2	Enforce password history (passwords)	24
3	Maximum password age (days)	42
4	Minimum password age (days)	1
5	Minimum password length (characters)	7
6	Password must meet complexity requirements	VRAI
7	Store password using reversible encryption for all users in the domain	FAUX
8	Account lockout duration (mins)	30
9	Account lockout threshold (attempts)	0
10	Reset account lockout counter after (mins)	30

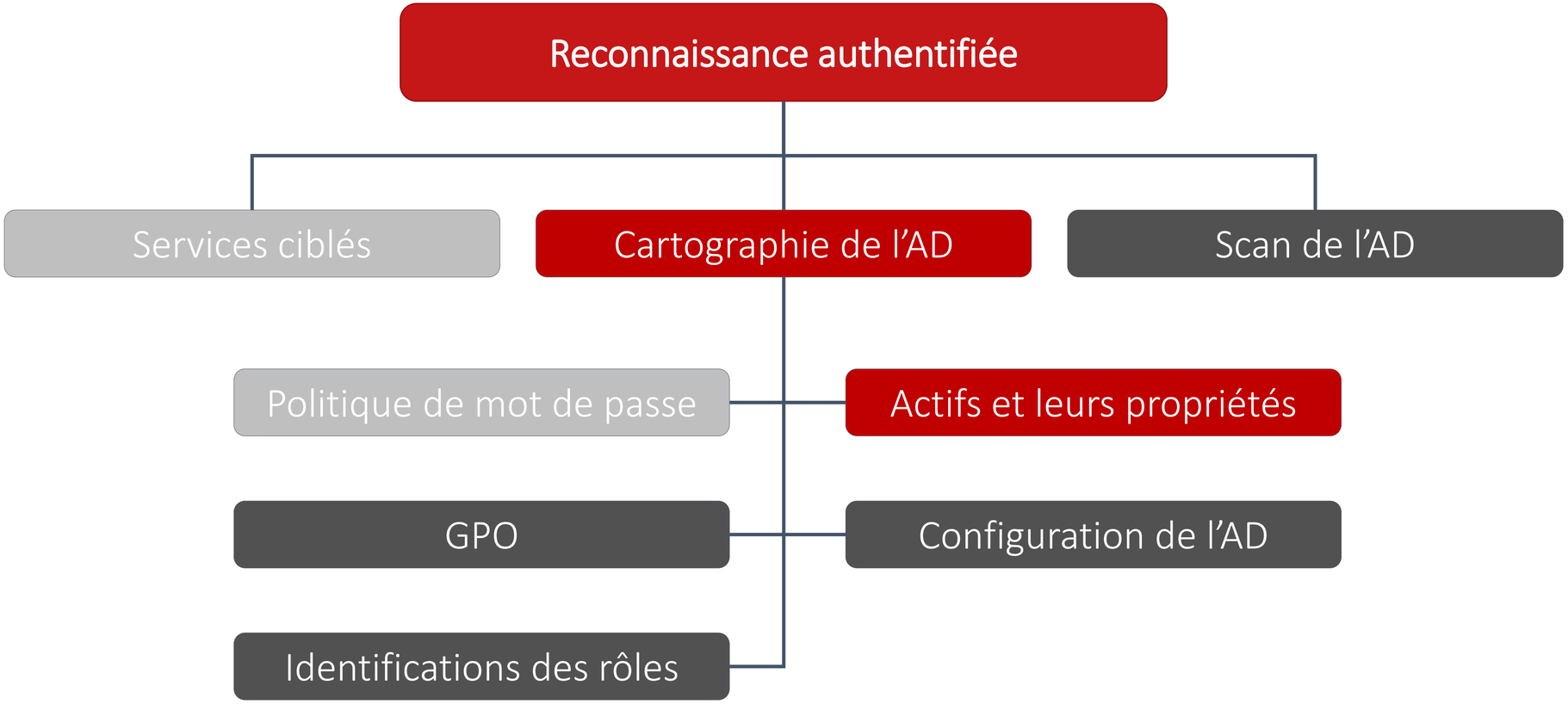
```
PS C:\Windows\system32> Get-ADDefaultDomainPasswordPolicy


ComplexityEnabled           : True
DistinguishedName           : DC=galaxy,DC=lan
LockoutDuration             : 00:30:00
LockoutObservationWindow    : 00:30:00
LockoutThreshold            : 0
MaxPasswordAge              : 42.00:00:00
MinPasswordAge              : 1.00:00:00
MinPasswordLength           : 7
objectClass                 : {domainDNS}
objectGuid                  : 4b30365a-46f6-4f87-9238-9d14da7e560c
PasswordHistoryCount        : 24
ReversibleEncryptionEnabled : False
```

```
PS C:\Windows\system32>  Get-ADFineGrainedPasswordPolicy -filter *


AppliesTo                   : {CN=Domain Users,CN=Users,DC=galaxy,DC=lan}
ComplexityEnabled           : True
DistinguishedName           : CN=Test Fine Grained Password Policy,CN=Password Settings
                              Container,CN=System,DC=galaxy,DC=lan
LockoutDuration             : 00:00:00
LockoutObservationWindow    : 01:00:00
LockoutThreshold            : 3
MaxPasswordAge              : 42.00:00:00
MinPasswordAge              : 1.00:00:00
MinPasswordLength           : 8
Name                        : Test Fine Grained Password Policy
ObjectClass                 : msDS-PasswordSettings
ObjectGUID                  : e345717a-c183-46b2-9396-00e91529f4f2
PasswordHistoryCount        : 24
Precedence                  : 1
ReversibleEncryptionEnabled : False
```


INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Actifs de l'AD et leurs propriétés

- Objets de l'Active Directory
  - **Utilisateurs**
  - Groupes
  - Machines
  - DACL
  - GPO
  - …
- Propriétés
  - Descriptions
  - DistinguishedName
  - …

- Outils : BloodHound, ADRecon, …

Status of User Accounts

Category	Enabled Count	Enabled Percentage	Disabled Count	Disabled Percentage	Total Count	Total Percentage
Must Change Password at Logon	0	0.00%	10	0.83%	10	0.23%
Cannot Change Password	0	0.00%	0	0.00%	0	0.00%
Password Never Expires	29	0.91%	1	0.08%	30	0.68%
Reversible Password Encryption	0	0.00%	0	0.00%	0	0.00%
Smartcard Logon Required	0	0.00%	0	0.00%	0	0.00%
Delegation Permitted	32	1.00%	12	1.00%	44	1.00%
Kerberos DES Only	0	0.00%	0	0.00%	0	0.00%
Kerberos RC4	0	0.00%	0	0.00%	0	0.00%
Does Not Require Pre Auth	1	0.03%	0	0.00%	1	0.02%
Password Age (> 42 days)	1	0.03%	0	0.00%	1	0.02%
Account Locked Out	0	0.00%	0	0.00%	0	0.00%
Never Logged in	21	0.66%	12	1.00%	33	0.75%
Dormant (> 90 days)	0	0.00%	0	0.00%	0	0.00%
Password Not Required	1	0.03%	2	0.17%	3	0.07%
Unconstrained Delegation	0	0.00%	0	0.00%	0	0.00%
SIDHistory	0	0.00%	0	0.00%	0	0.00%

	A	B	C			
1	UserName	Name	Enabled	upID	SID	Description	DistinguishedName
3	Administrator	Administrator	VRAI	513	S-1-5-21-4243601597-32924416	Built-in account for administering the comp	CN=Administrator,CN=Users,DC
4	anakin-skywalker	Anakin-Skywalker	VRAI	513	S-1-5-21-4243601597-32924416	Anakin-Skywalker ?tait un Chevalier Jedi qui	CN=Anakin-Skywalker,OU=Dom
5	bobba-fett	Bobba-Fett	VRAI	513	S-1-5-21-4243601597-32924416	Boba Fett ?tait un clone non alt?r? du chass	CN=Bobba-Fett,OU=Admins,OU
6	C1-10P	C1-10P	VRAI	513	S-1-5-21-4243601597-32924416	C1-10P, plus connu sous le nom de Chopper,	CN=C1-10P,OU=Users,OU=Utili
7	C3-PO	C3-PO	VRAI	513	S-1-5-21-4243601597-32924416	C3-PO est un ? dro?de de protocole ? de la s	CN=C3-PO,OU=Users,OU=Utilis
8	comte-dooku	Comte-Dooku	VRAI	513	S-1-5-21-4243601597-32924416	Le Comte-Dooku ?tait un Jedi corrompu par	CN=Comte-Dooku,OU=Admins,
9	gial-ackbar	Gial-Ackbar	VRAI	513	S-1-5-21-4243601597-32924416	Gial-Ackbar ?tait un v?t?ran Mon Calamari e	CN=Gial-Ackbar,OU=Admins,OU
10	GOUD-4	GOUD-4	VRAI	513	S-1-5-21-4243601597-32924416	Exchange - GOUD-4 ?tait un dro?de travailla	CN=GOUD-4,OU=Admins,OU=U
12	han-solo	Han-Solo	VRAI	513	S-1-5-21-4243601597-32924416	Han-Solo, se faisant appeler Han pendant sa	CN=Han-Solo,OU=Devs,OU=Uti

	A	B	C	D	E	F	
1	Name	Username	Enabled	Service	Host	Password Last Set	Description
2	krbtgt	krbtgt	FAUX	kadmin	changepw	20/12/2022 14:57	Key Distribution Center Service Account
3	R5-D4	r5-d4	VRAI	MSSQLSvc	Gal-Kepler452b.	20/12/2022 15:18	R5-D4 ?tait un dro?de astrom?cano de s?rie R5 fabriqu?
4	R5-D4	r5-d4	VRAI	MSSQLSvc	Gal-Kepler452b.	20/12/2022 15:18	R5-D4 ?tait un dro?de astrom?cano de s?rie R5 fabriqu?
5	R5-D4	r5-d4	VRAI	SQL	run	20/12/2022 15:18	R5-D4 ?tait un dro?de astrom?cano de s?rie R5 fabriqu?

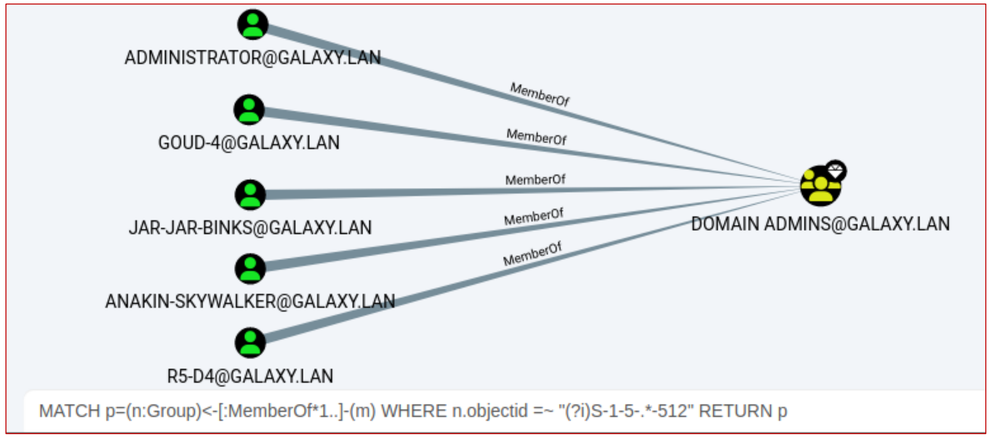
… | Computer Role Stats | Users | Group Members | Groups | User SPNs | OUs | Computers | Computer SPNs | LAPS

INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Actifs de l'AD et leurs propriétés

- Objets de l'Active Directory
  - Utilisateurs
  - **Groupes**
  - Machines
  - DACL
  - GPO
  - …
- Propriétés
  - Descriptions
  - DistinguishedName
  - …



	Name	AdminCount	GroupCategory	GroupScope	ManagedBy	SID
2	Access Control Assistance Operators		Security	DomainLocal		S-1-5-32-579
3	Account Operators	1	Security	DomainLocal		S-1-5-32-548
4	Administrators	1	Security	DomainLocal		S-1-5-32-544
5	Allowed RODC Password Replication Group		Security	DomainLocal		S-1-5-21-424360
6	Backup Operators	1	Security	DomainLocal		S-1-5-32-551
7	Cert Publishers		Security	DomainLocal		S-1-5-21-424360
8	Certificate Service DCOM Access		Security	DomainLocal		S-1-5-32-574

… | Group Members | **Groups** | User SPNs | OUs | Computers | Computer SPNs | LAPS | DNS Zones | DNS Records | …

- Outils : BloodHound, ADRecon, …

INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Actifs de l'AD et leurs propriétés

- Objets de l'Active Directory
  - Utilisateurs
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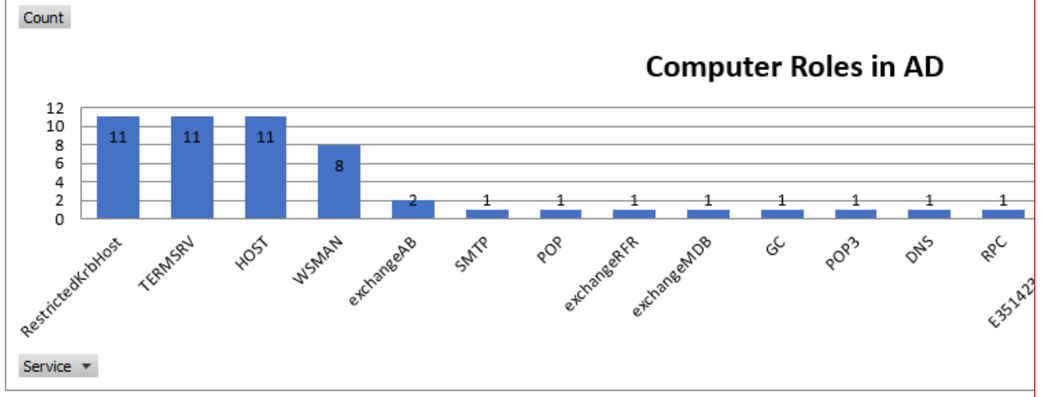
  - …
- Propriétés
  - Descriptions
  - DistinguishedName
  - …

- Outils : BloodHound, ADRecon, …

Computer Role	Count
RestrictedKrbHost	11
TERMSRV	11
HOST	11
WSMAN	8
exchangeAB	2
SMTP	1
POP	1
exchangeRFR	1
exchangeMDB	1
GC	1
POP3	1
DNS	1
RPC	1
E3514235-4B06-11D1-AB04-00C04FC2DCD2	1
SmtpSvc	1
Dfsr-12F9A27C-BF97-4787-9364-D31B6C55EB04	1
ldap	1
IMAP	1
IMAP4	1
Grand Total	**57**



Hostname	Stored	Readable	Password	Expiration
Gal-Korriban.galaxy.lan	FAUX	FAUX		
Gal-Kepler452b.galaxy.lan	VRAI	FAUX		15/12/2023 17:51
Gal-Maridun.galaxy.lan	VRAI	FAUX		15/12/2023 17:20
Gal-Coruscant.galaxy.lan	VRAI	FAUX		15/12/2023 17:53
Gal-Kessel.galaxy.lan	VRAI	FAUX		15/12/2023 17:16
Gal-Kamino.galaxy.lan	FAUX	FAUX		
Gal-Tatooine.galaxy.lan	FAUX	FAUX		
Gal-Naboo.galaxy.lan	FAUX	FAUX		
Gal-Iokath.galaxy.lan	FAUX	FAUX		
Gal-Corellia.galaxy.lan	FAUX	FAUX		
Gal-Mustafar.galaxy.lan	FAUX	FAUX		

… | Users | Group Members | Groups | User SPNs | OUs | Computers | Computer SPNs | LAPS

INTRINSEC

Reconnaissance dans un milieu Active Directory

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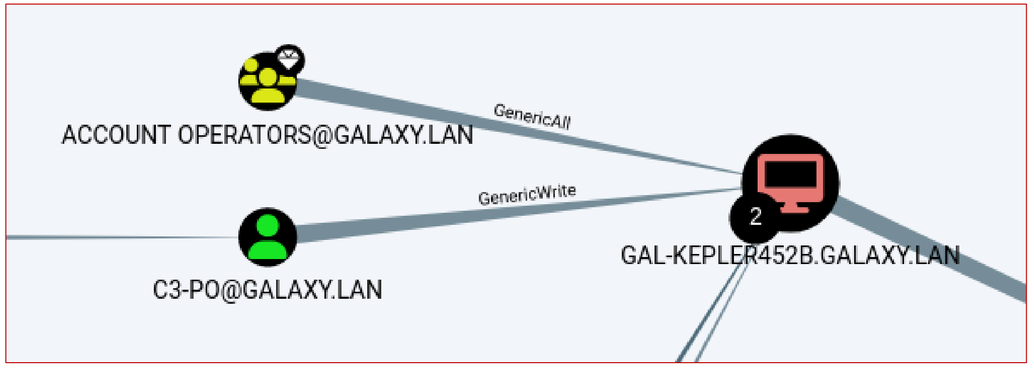
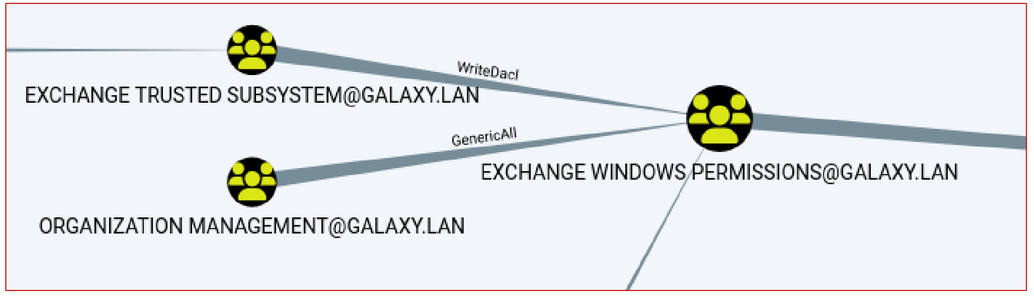
- Propriétés
  - Descriptions
  - DistinguishedName
  - …

- Outils : BloodHound, ADRecon, …

Discretionary Access Control List

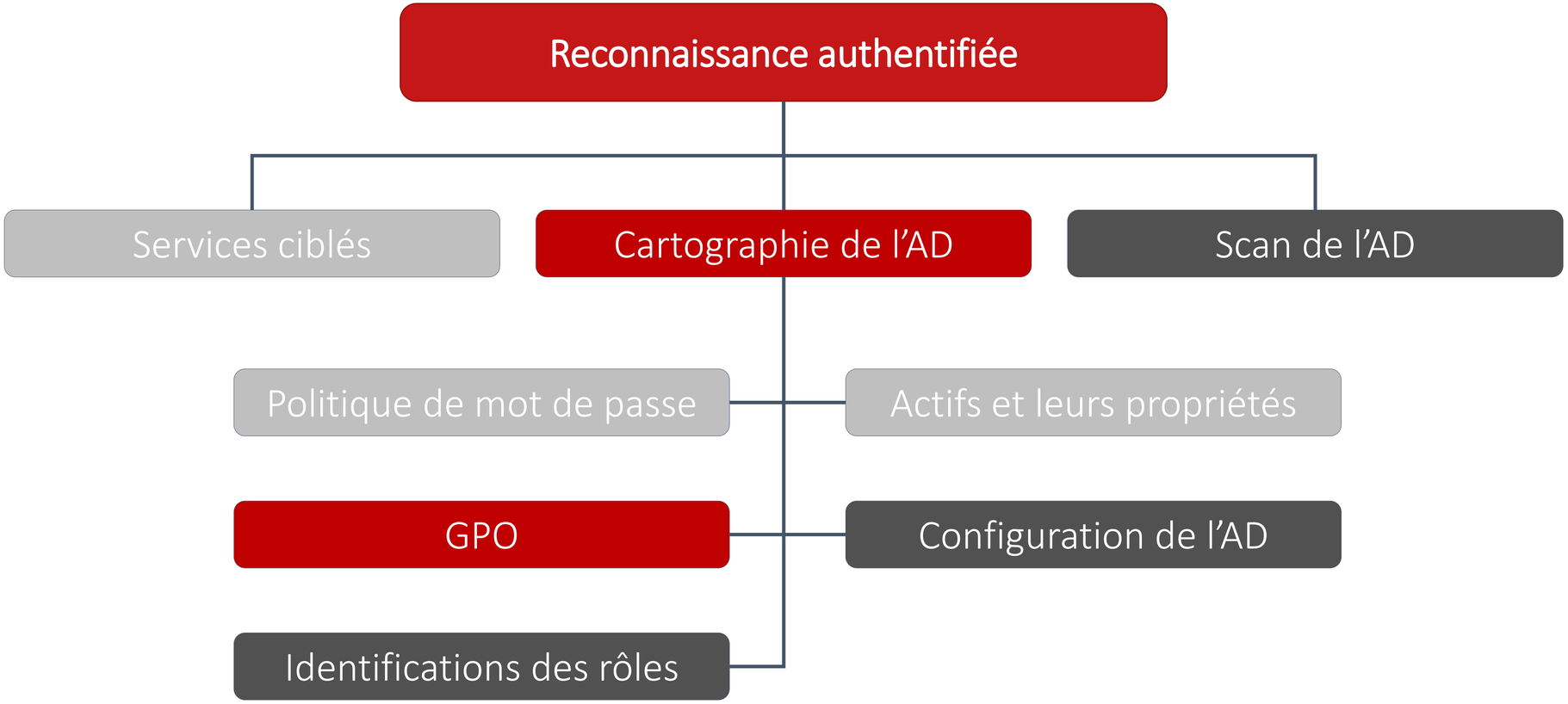




INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée

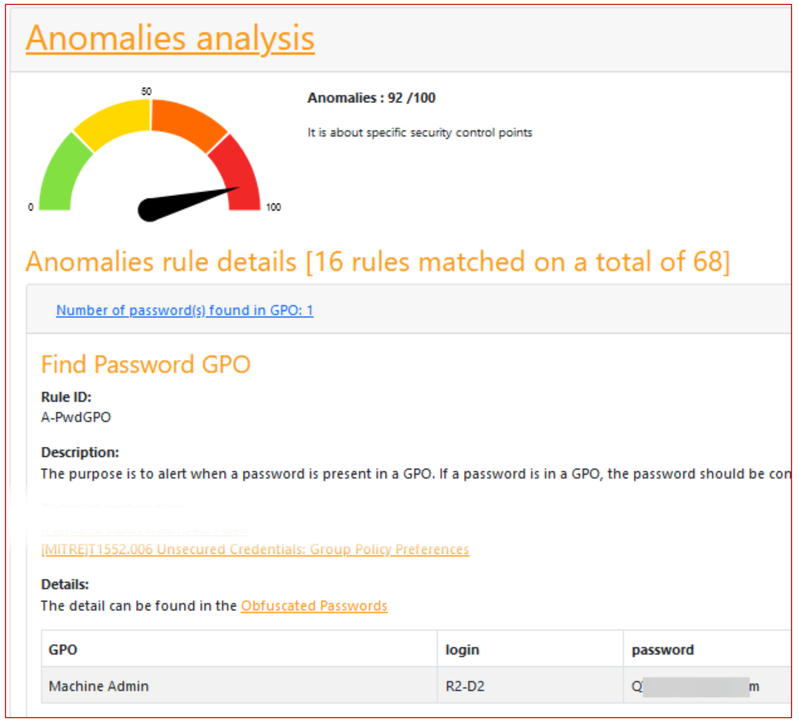


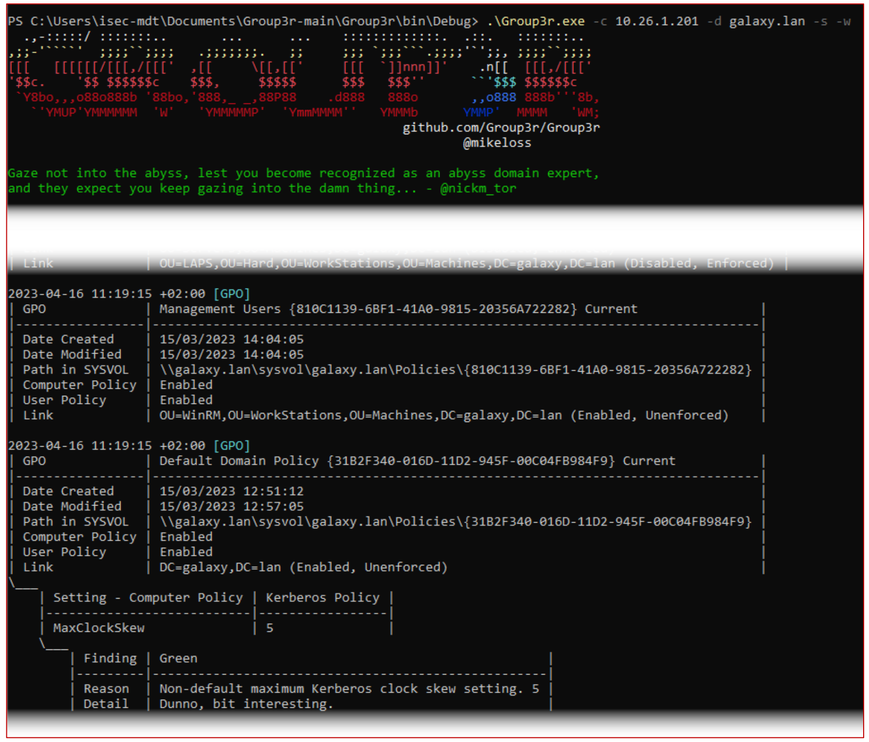
INTRINSEC

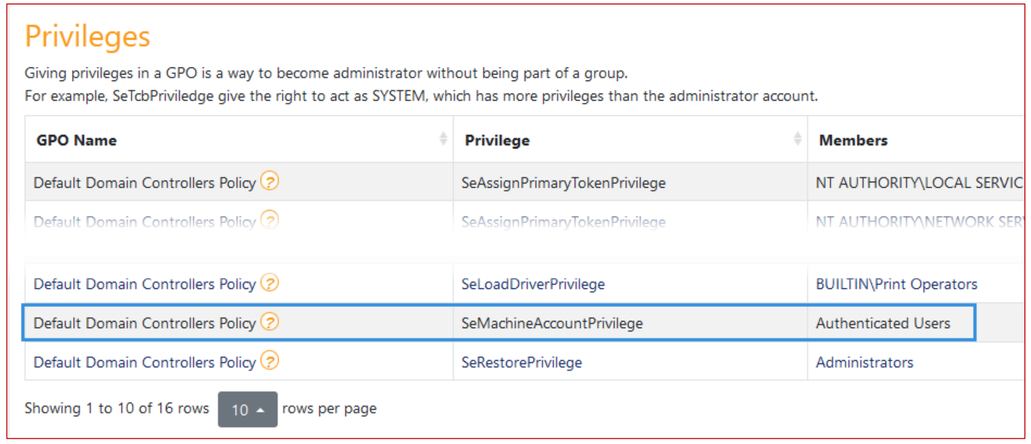
Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – GPO

- Group Policy Object
  - Mots de passe, cpassword
  - Privilèges trop permissifs
  - …
- Outils : Group3r, PingCastle, ADRecon, …

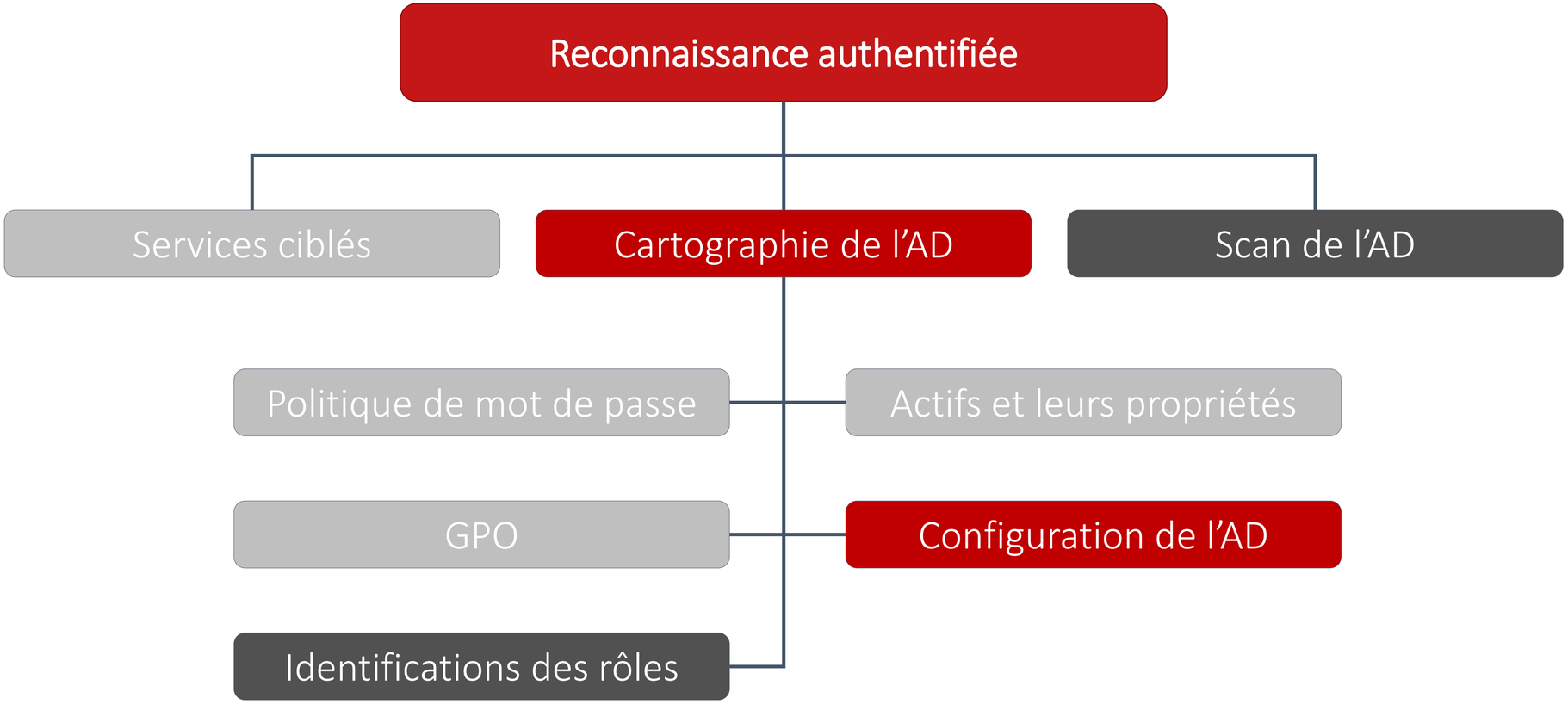






Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Configuration de l'AD

- **Méthodes d'administration**
- Présence d'un AV / EDR
- ADIDNS
- Protocoles
- WSUS
- SCCM
- Nomenclature utilisée
- …

- Outils : BloodHound, PingCastle, ADRecon, krbrelayx, LdapRelayScan, …

Tier 0

Tier 1

Tier 2

```
└─$ crackmapexec smb 10.26.1.212 -u R5-D4 -p '[redacted]' --loggedon-users
SMB         10.26.1.212     445    GAL-KESSEL       [*] Windows 10.0 Build 17763 x64 (name:GAL-KESSEL)
) (SMBv1:False)
SMB         10.26.1.212     445    GAL-KESSEL       [+] galaxy.lan\R5-D4:P@ssw0rd (Pwn3d!)
SMB         10.26.1.212     445    GAL-KESSEL       [+] Enumerated loggedon users
SMB         10.26.1.212     445    GAL-KESSEL       galaxy\r5-d4                    logon_server: GAL
SMB         10.26.1.212     445    GAL-KESSEL       galaxy\r5-d4                    logon_server: GAL
SMB         10.26.1.212     445    GAL-KESSEL       galaxy\GAL-KESSEL$
SMB         10.26.1.212     445    GAL-KESSEL       galaxy\GAL-KESSEL$
SMB         10.26.1.212     445    GAL-KESSEL       galaxy\GAL-KESSEL$
```


INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Configuration de l'AD

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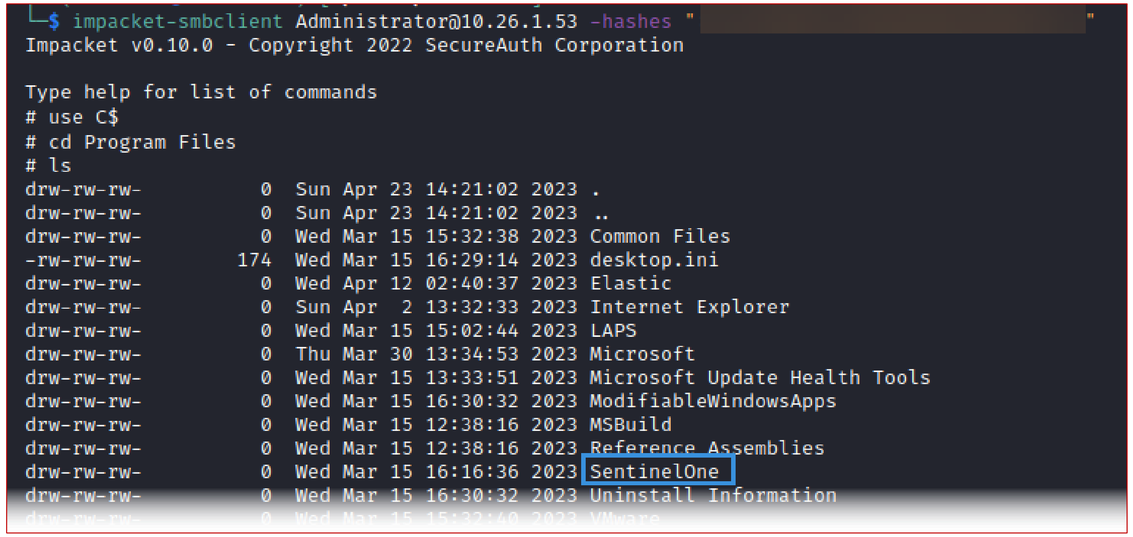

- Outils : BloodHound, PingCastle, ADRecon, krbrelayx, LdapRelayScan, …

INTRINSEC

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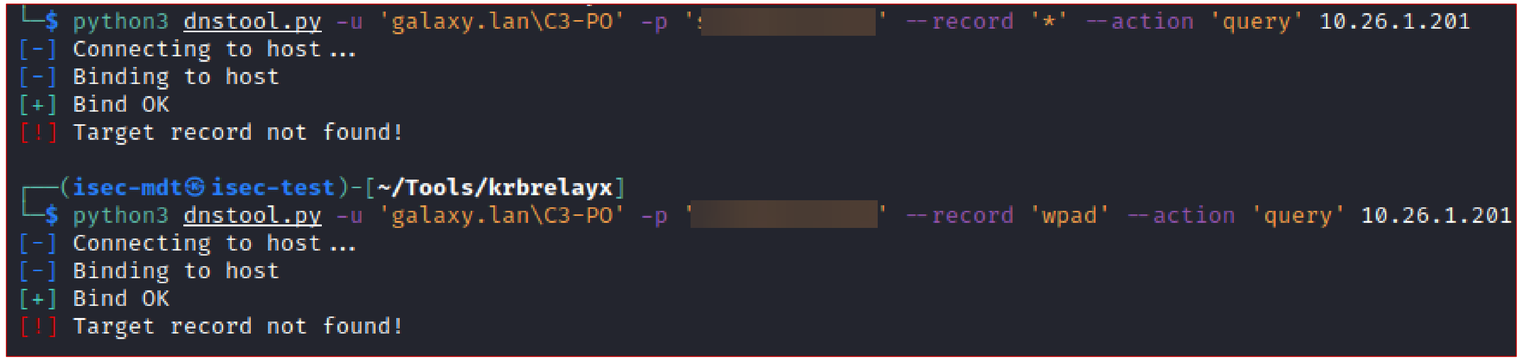

- Outils : BloodHound, PingCastle, ADRecon, krbrelayx, LdapRelayScan, …

INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Configuration de l'AD

- Méthodes d'administration
- Présence d'un AV / EDR
- ADIDNS
- **Protocoles**
- WSUS
- SCCM
- Nomenclature utilisée
- …

```
└─$ python3 LdapRelayScan.py -method BOTH -u C3-PO -p '[redacted]' -dc-ip 10.26.1.201

~Domain Controllers identified~
   Gal-Korriban.galaxy.lan

~Checking DCs for LDAP NTLM relay protections~
   Gal-Korriban.galaxy.lan
      [+] (LDAP)  SERVER SIGNING REQUIREMENTS NOT ENFORCED!
```

- Outils : BloodHound, PingCastle, ADRecon, krbrelayx, LdapRelayScan, …

INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Configuration de l'AD

- Méthodes d'administration
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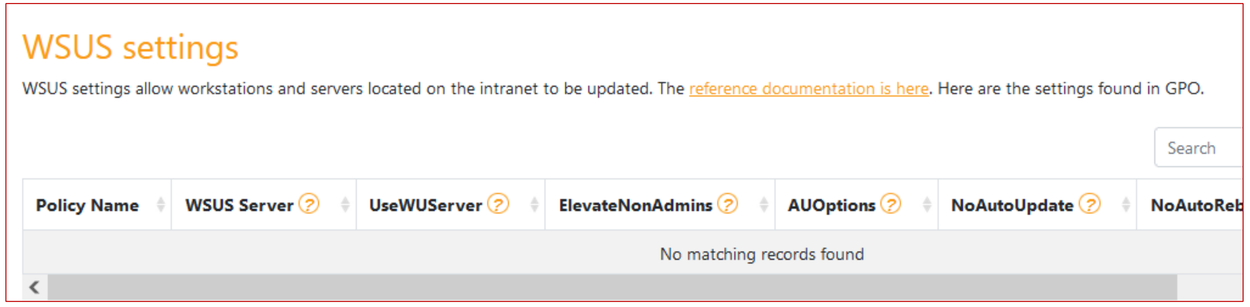
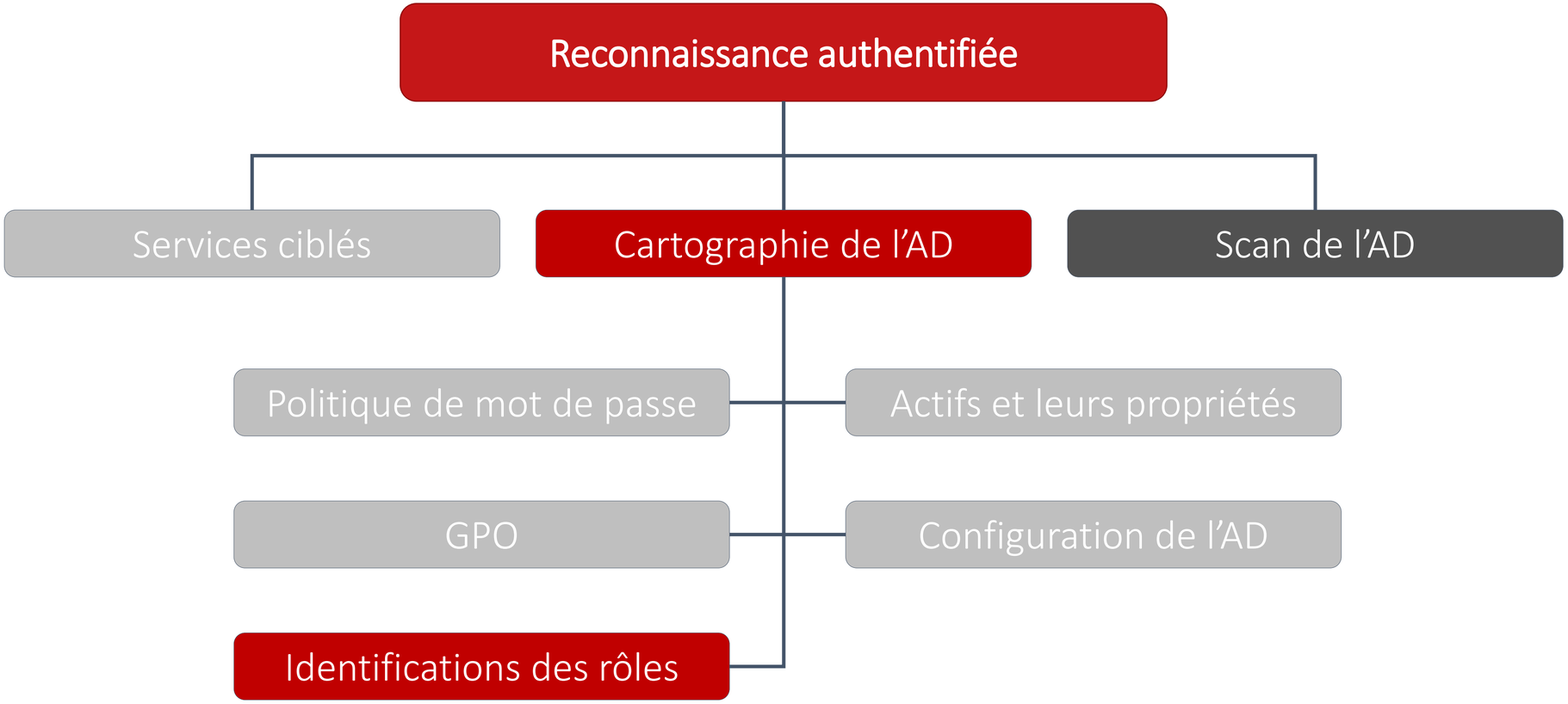


- Outils : BloodHound, PingCastle, ADRecon, krbrelayx, LdapRelayScan, …

INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée



INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Identifications des rôles

- ADCS
- ...
- Outils : Certify, Certipy, BloodHound, ADRecon, ...

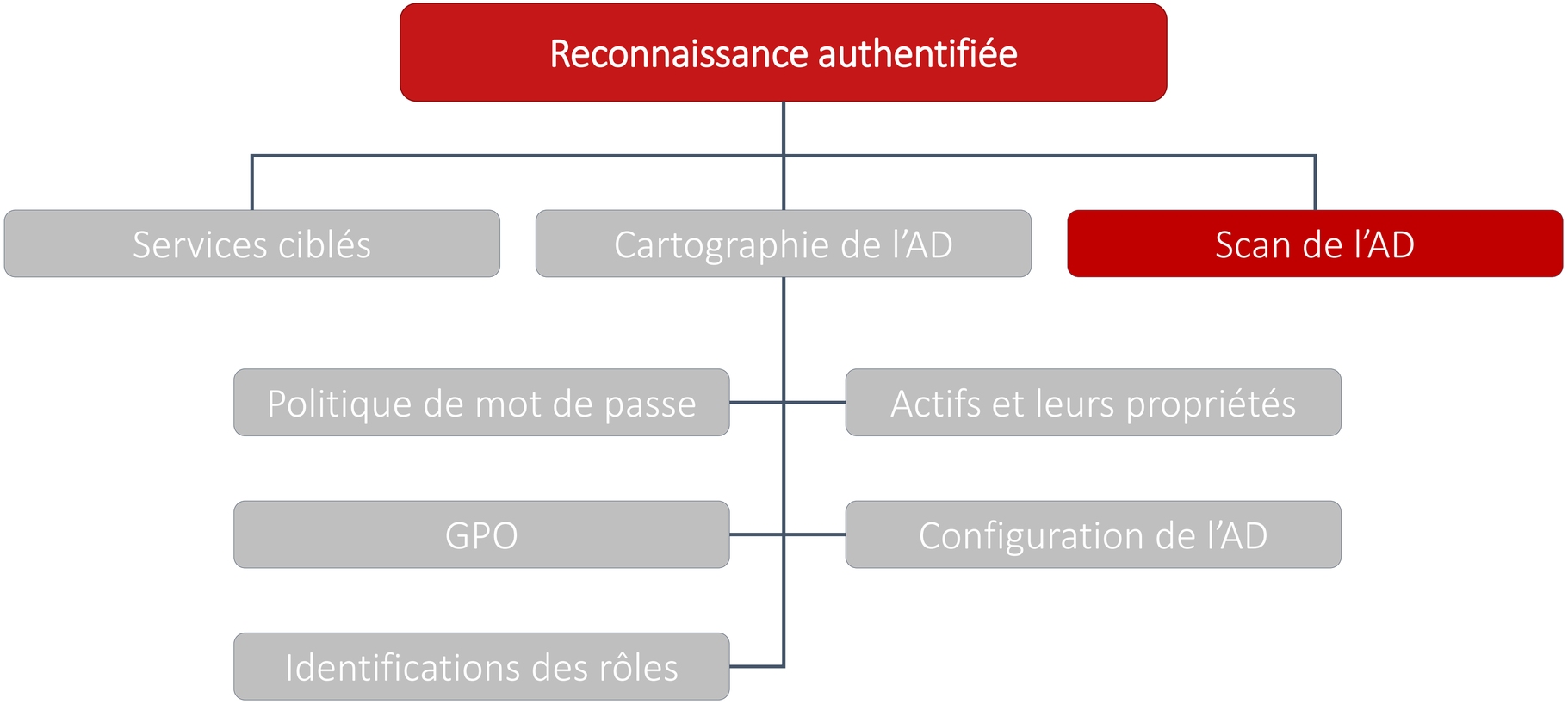
```
PS C:\Users\isec-mdt\Documents> .\Certify.exe find /domain:galaxy.lan /vulnerable

  _____          _   _  __
 / ____|        | | (_)/ _|
| |     ___ _ __| |_ _| |_ _   _
| |    / _ \ '__| __| |  _| | | |
| |___|  __/ |  | |_| | | | |_| |
 \_____\___|_|   \__|_|_|  \__, |
                            __/ |
                           |___./
  v1.1.0

[*] Action: Find certificate templates
[*] Using the search base 'CN=Configuration,DC=galaxy,DC=lan'

[*] Listing info about the Enterprise CA 'galaxy-GAL-KEPLER452B-CA'

    Enterprise CA Name            : galaxy-GAL-KEPLER452B-CA
    DNS Hostname                  : Gal-Kepler452b.galaxy.lan
    FullName                      : Gal-Kepler452b.galaxy.lan\galaxy-GAL-KEPLER452B-CA
    Flags                         : SUPPORTS_NT_AUTHENTICATION, CA_SERVERTYPE_ADVANCED

      Allow  ManageCA, ManageCertificates              <UNKNOWN>                    S-1-5-21-981138465-619241
    Enrollment Agent Restrictions : None

[!] Vulnerable Certificates Templates :

    CA Name                               : Gal-Kepler452b.galaxy.lan\galaxy-GAL-KEPLER452B-CA
    Template Name                         : StormTrooperEnrollement
    Schema Version                        : 2
    Validity Period                       : 1 year
    Renewal Period                        : 6 weeks
    msPKI-Certificate-Name-Flag           : ENROLLEE_SUPPLIES_SUBJECT
    mspki-enrollment-flag                 : INCLUDE_SYMMETRIC_ALGORITHMS, PUBLISH_TO_DS
    Authorized Signatures Required        : 0
    pkiextendedkeyusage                   : Authentification du client, Messagerie électronique sécurisée, Systè
    mspki-certificate-application-policy  : Authentification du client, Messagerie électronique sécurisée, Systè
    Permissions
      Enrollment Permissions
        Enrollment Rights           : AUTORITE NT\Utilisateurs authentifiésS-1-5-11
      Object Control Permissions
        Owner                       : <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-512
        WriteOwner Principals       : <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-512
                                      <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-519
        WriteDacl Principals        : <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-512
                                      <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-519
        WriteProperty Principals    : <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-512
                                      <UNKNOWN>                    S-1-5-21-981138465-619241437-4107189995-519
```

```
└─$ certipy find -u C3-PO@galaxy.lan -p 'sTARWARS!@#$5' -dc-ip 10.26.1.201 -stdout -vulnerable
Certipy v4.3.0 - by Oliver Lyak (ly4k)

[*] Finding certificate templates
[*] Found 34 certificate templates
[*] Finding certificate authorities
[*] Found 1 certificate authority
[*] Found 12 enabled certificate templates
[*] Trying to get CA configuration for 'galaxy-GAL-KEPLER452B-CA' via CSRA
[!] Got error while trying to get CA configuration for 'galaxy-GAL-KEPLER452B-CA' via CSRA: CASessionError: code: 0x8
0070005 - E_ACCESSDENIED - General access denied error.
[*] Trying to get CA configuration for 'galaxy-GAL-KEPLER452B-CA' via RRP
[!] Failed to connect to remote registry. Service should be starting now. Trying again...
[*] Got CA configuration for 'galaxy-GAL-KEPLER452B-CA'
[*] Enumeration output:
Certificate Authorities
  0
    CA Name                             : galaxy-GAL-KEPLER452B-CA
    DNS Name                            : Gal-Kepler452b.galaxy.lan
    Certificate Subject                 : CN=galaxy-GAL-KEPLER452B-CA, DC=galaxy, DC=lan
    Certificate Serial Number           : 741F24E1D0059B944B95AA970812616E
    Certificate Validity Start          : 2023-03-15 15:02:56+00:00
    Certificate Validity End            : 2028-03-15 15:12:56+00:00

                                          GALAXY.LAN\Domain Admins
                                          GALAXY.LAN\Enterprise Admins
        Enroll                          : GALAXY.LAN\Authenticated Users
    [!] Vulnerabilities
      ESC8                              : Web Enrollment is enabled and Request Disposition is set to Issue
Certificate Templates
  0
    Template Name                       : StormTrooperEnrollement
    Display Name                        : StormTrooper Enrollement
    Certificate Authorities             : galaxy-GAL-KEPLER452B-CA
    Enabled                             : True
    Client Authentication               : True
    Enrollment Agent                    : False
    Any Purpose                         : False
    Enrollee Supplies Subject           : True
    Certificate Name Flag               : EnrolleeSuppliesSubject
    Enrollment Flag                     : PublishToDs
                                          IncludeSymmetricAlgorithms
    Private Key Flag                    : ExportableKey
    Extended Key Usage                  : Encrypting File System
                                          Secure Email
                                          Client Authentication
    Requires Manager Approval           : False
    Requires Key Archival               : False
    Authorized Signatures Required      : 0
    Validity Period                     : 1 year
    Renewal Period                      : 6 weeks
    Minimum RSA Key Length              : 2048
    Permissions
      Enrollment Permissions
        Enrollment Rights               : GALAXY.LAN\Authenticated Users
      Object Control Permissions
        Owner                           : GALAXY.LAN\Domain Admins
        Write Owner Principals          : GALAXY.LAN\Domain Admins
                                          GALAXY.LAN\Enterprise Admins
        Write Dacl Principals           : GALAXY.LAN\Domain Admins
                                          GALAXY.LAN\Enterprise Admins
        Write Property Principals       : GALAXY.LAN\Domain Admins
                                          GALAXY.LAN\Enterprise Admins
    [!] Vulnerabilities
      ESC1                              : 'GALAXY.LAN\\Authenticated Users' can enroll, enrollee supplies subject and
 template allows client authentication
```


INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée

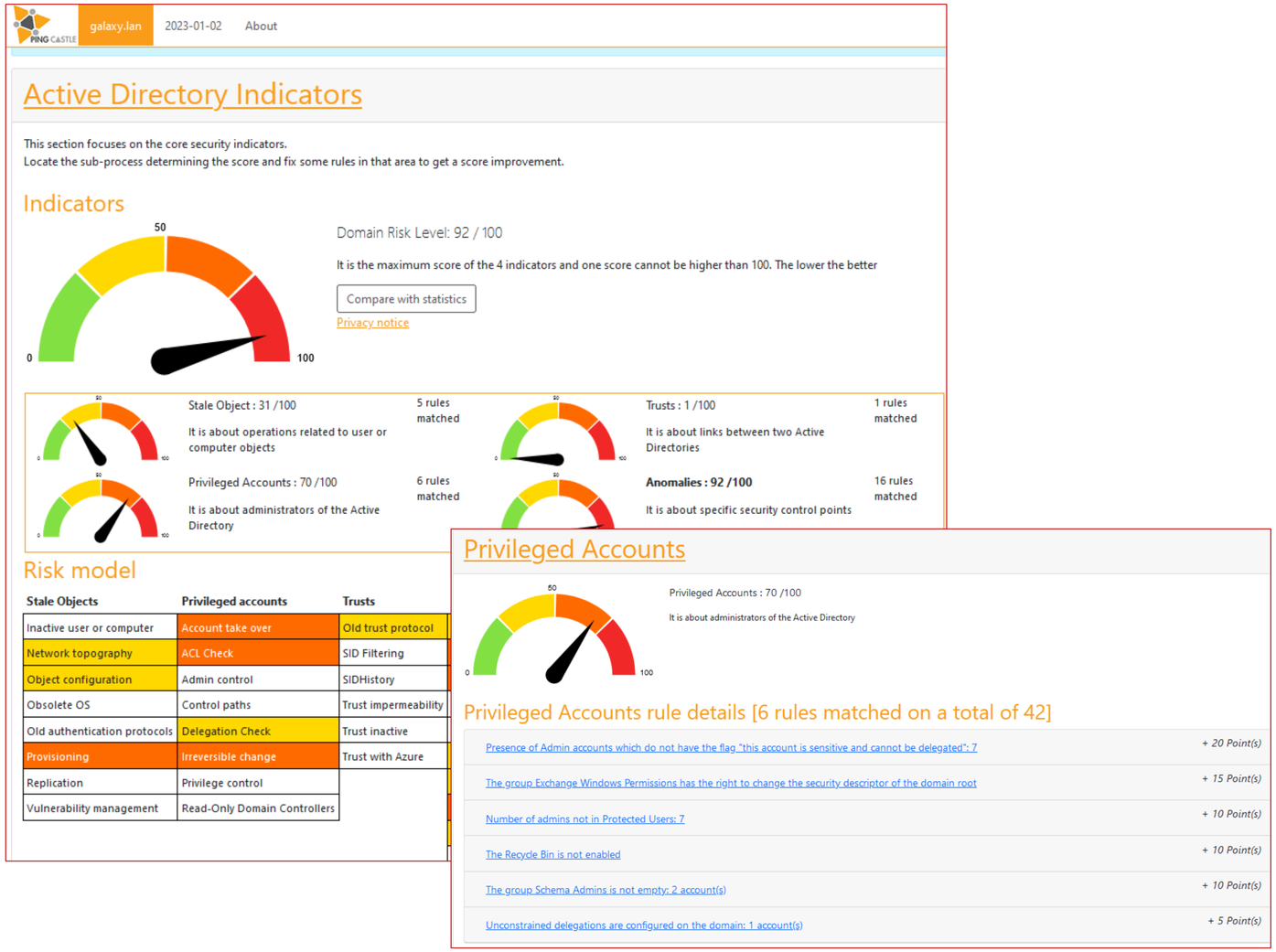


INTRINSEC

Reconnaissance dans un milieu Active Directory

Reconnaissance authentifiée – Scan de l'AD

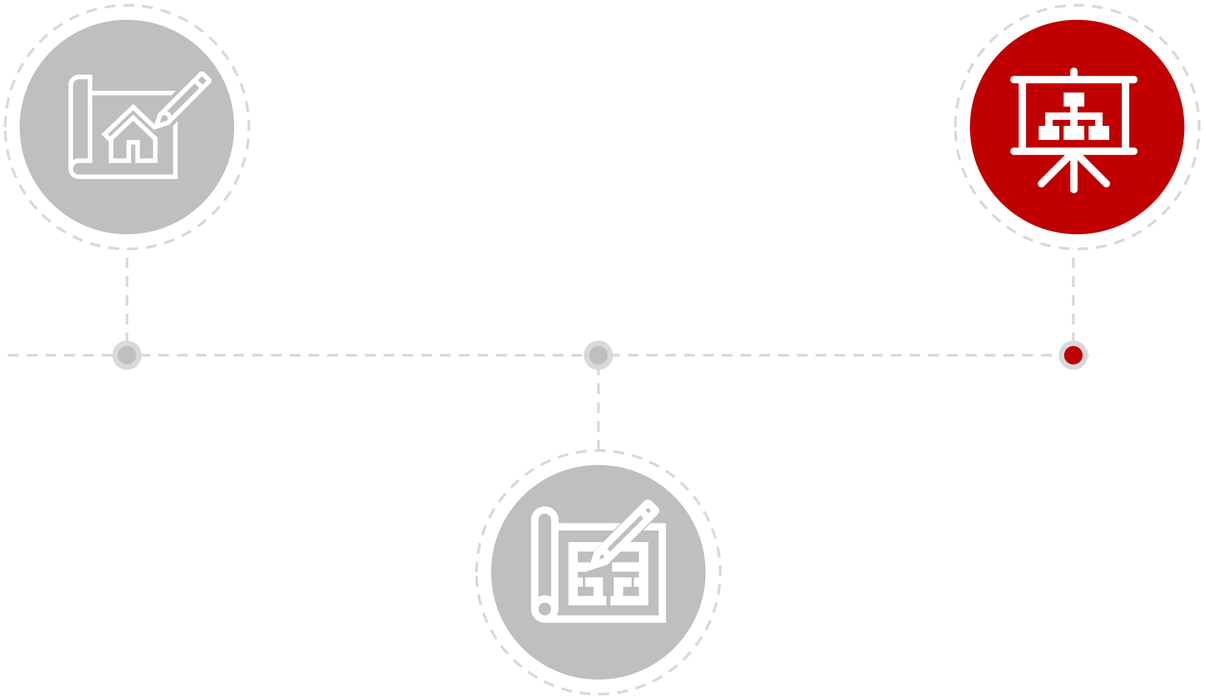
- Relever les différents défauts
  - Privilèges permissifs
  - Configuration
  - …
- Outils : PingCastle, …



Plan

Reconnaissance Anonyme

Conclusion



Introduction

Reconnaissance Authentifiée

INTRINSEC

Reconnaissance dans un milieu Active Directory

- *In the end, it matters …*