NotPetya: A Cyberweapon in the Russia–Ukraine Conflict

Research

- Conducted and Compiled by

Anas Malik

Student at FAST Lahore

Abstract

- NotPetya appeared in June 2017 as ransomware but was a destructive wiper.
- Primarily targeted Ukraine but spread globally via software supply chain.
- Caused over $10 billion in damages; attributed to Russian GRU’s Sandworm group.

Background

Organizational Map of Russian APT Groups

- A visual showing Russian APT groups like Sandworm, Fancy Bear, APT28, with lines connecting them to the GRU or FSB.

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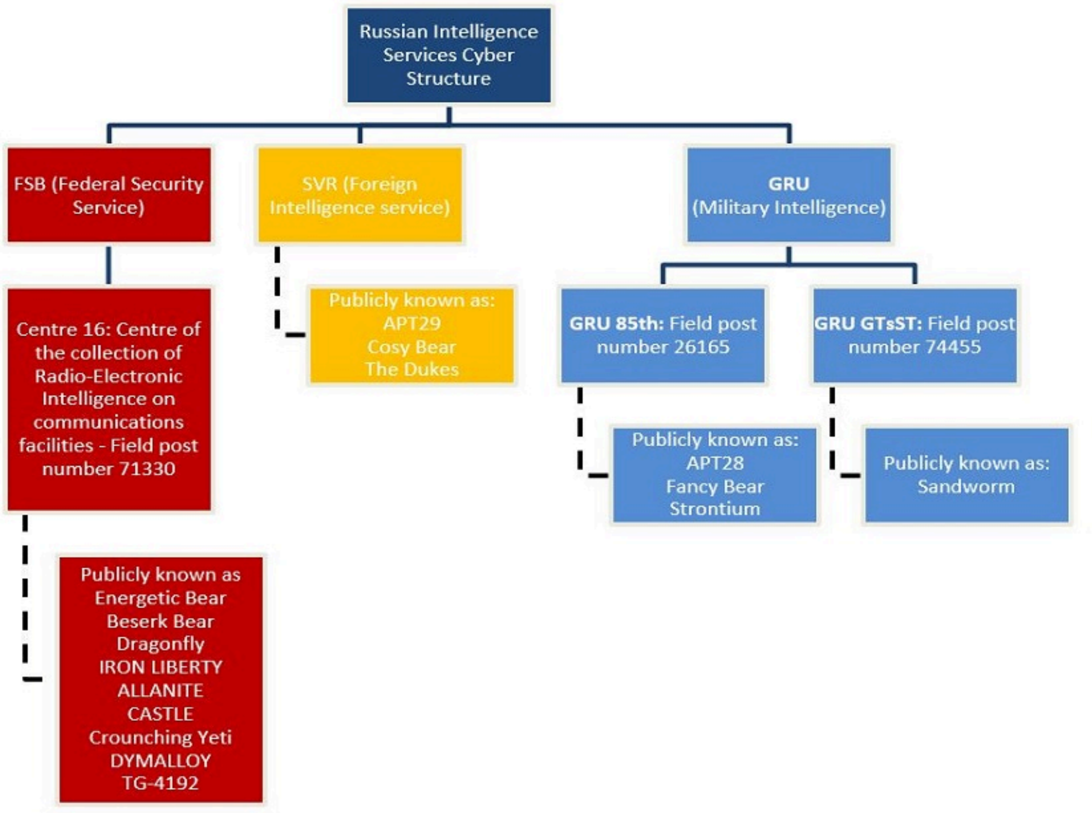
> 
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> Russian Intelligence Services Cyber Structure
>
> FSB (Federal Security Service)
>
> Centre 16: Centre of the collection of Radio-Electronic Intelligence on communications facilities - Field post number 71330
>
> Publicly known as
Energetic Bear
Beserk Bear
Dragonfly
IRON LIBERTY
ALLANITE
CASTLE
Crounching Yeti
DYMALLOY
TG-4192
>
> SVR (Foreign Intelligence service)
>
> Publicly known as:
APT29
Cosy Bear
The Dukes
>
> GRU (Military Intelligence)
>
> **GRU 85th:** Field post number 26165
>
> Publicly known as:
APT28
Fancy Bear
Strontium
>
> **GRU GTsST:** Field post number 74455
>
> Publicly known as: Sandworm

Timeline of Russian Cyber Attacks on Ukraine

- A horizontal timeline showing major cyber incidents e.g.
- 2014 Crimea annexation, 2015/2016 power grid attacks, 2017 NotPetya, 2022 invasion-related attacks.

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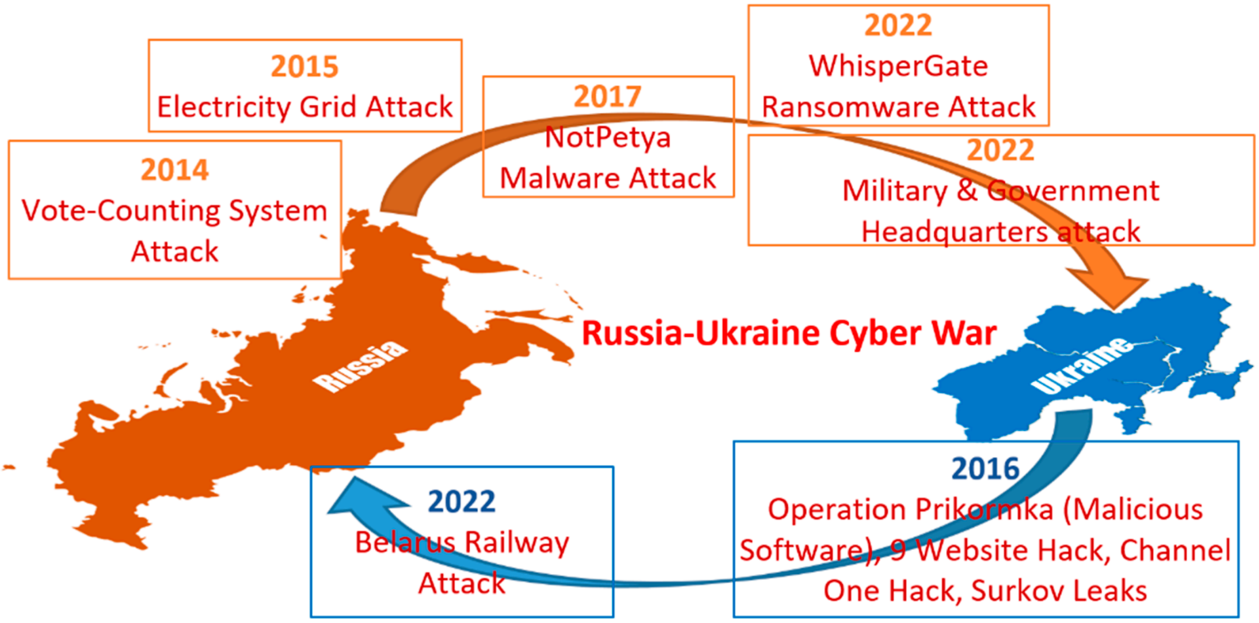
> 
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Cyber Attack Lifecycle

- This lifecycle which must be studied was used in each of cyber attacks and programs conducted by GRU units incuding SandWorm

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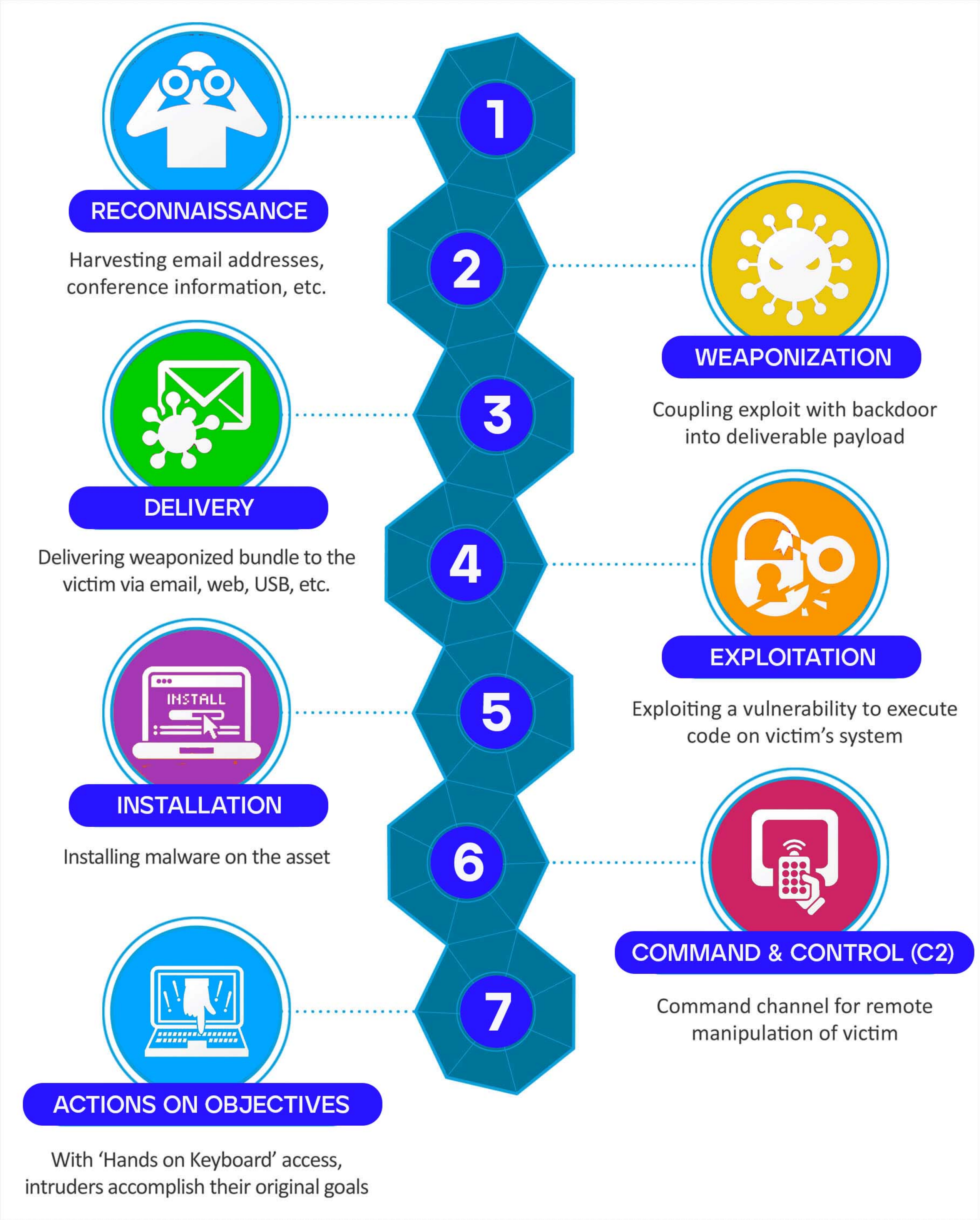
> 
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> 1
> RECONNAISSANCE
> Harvesting email addresses, conference information, etc.
> 2
> WEAPONIZATION
> Coupling exploit with backdoor into deliverable payload
> 3
> DELIVERY
> Delivering weaponized bundle to the victim via email, web, USB, etc.
> 4
> EXPLOITATION
> Exploiting a vulnerability to execute code on victim's system
> 5
> INSTALLATION
> Installing malware on the asset
> INSTALL
> 6
> COMMAND & CONTROL (C2)
> Command channel for remote manipulation of victim
> 7
> ACTIONS ON OBJECTIVES
> With 'Hands on Keyboard' access, intruders accomplish their original goals
>

Introduction

- Occurred during Russia–Ukraine tensions (eve of Ukraine's Constitution Day).

- Delivered via compromised Ukrainian tax software “M.E.Doc.”
- Named Sandworm due to Dune references in code.

Attack Overview

- **Initial vector:** Backdoor in M.E.Doc from earlier phishing & human error.
- **Tools used:**
  - Mimikatz for credential harvesting.
  - EternalBlue & EternalRomance (NSA exploits) for lateral movement.
- **Payload:** Encrypts Master Boot Record (MBR); shows fake ransom note.
- **Kill-switch:** Checks for file `perfc.dat` to avoid re-infection.

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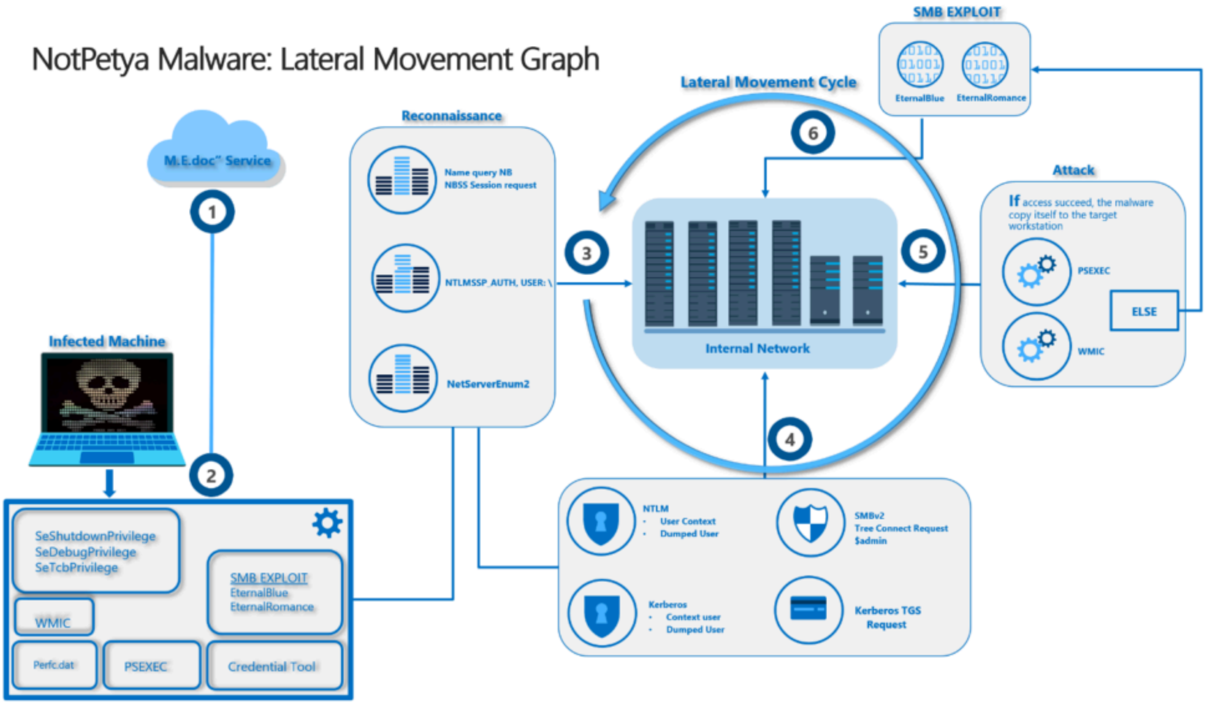
> 
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> *Diagram showing attack flow and process chain from M.E.Doc → LAN via exploits.*

Global Impact

- Hit major companies: Maersk, Merck, FedEx, etc.
- Maersk: 76 ports impacted; estimated $300M loss.
- Estimated global losses exceeded $10B.
- No real decryption mechanism = destruction, not ransom.

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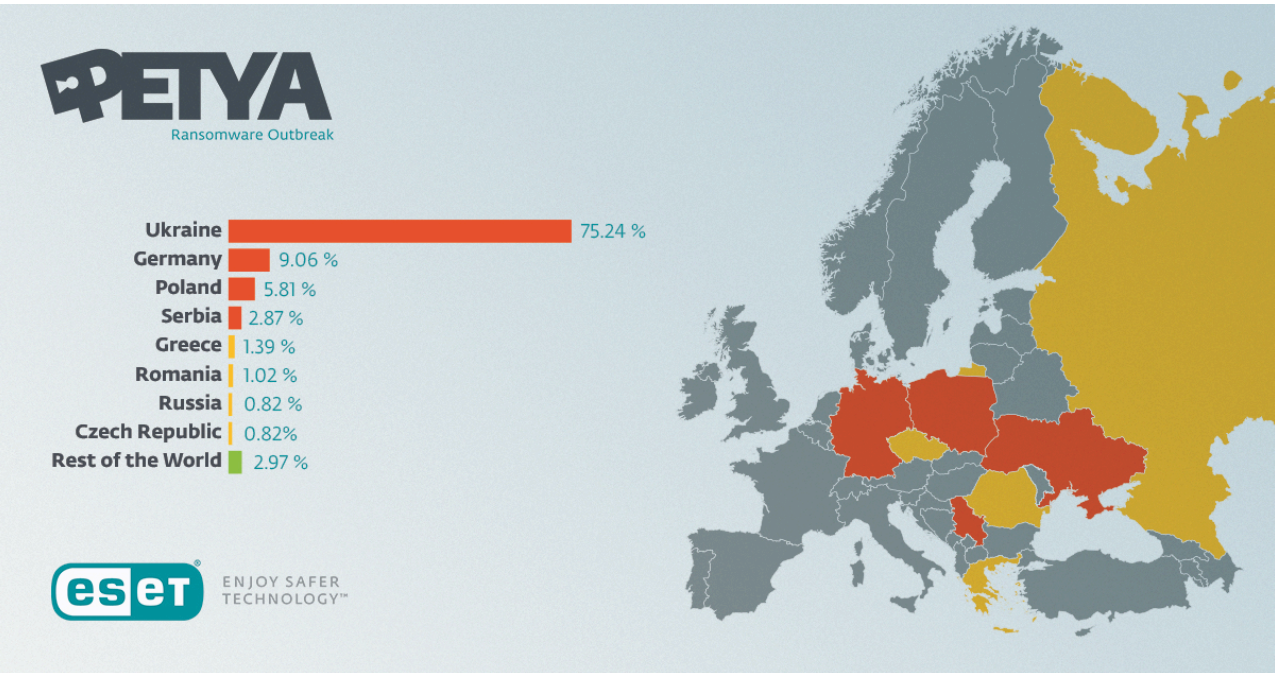
> 
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> *Statistics showing global NotPetya spread.*

CIA Triad Impact

- **Confidentiality:** Largely unaffected (no data theft publically found but who knows what they got).
- **Integrity:** Destroyed via disk encryption and system damage.
- **Availability:**
  - Paralyzed systems and operations globally.
  - Including internation companies and vendor issues

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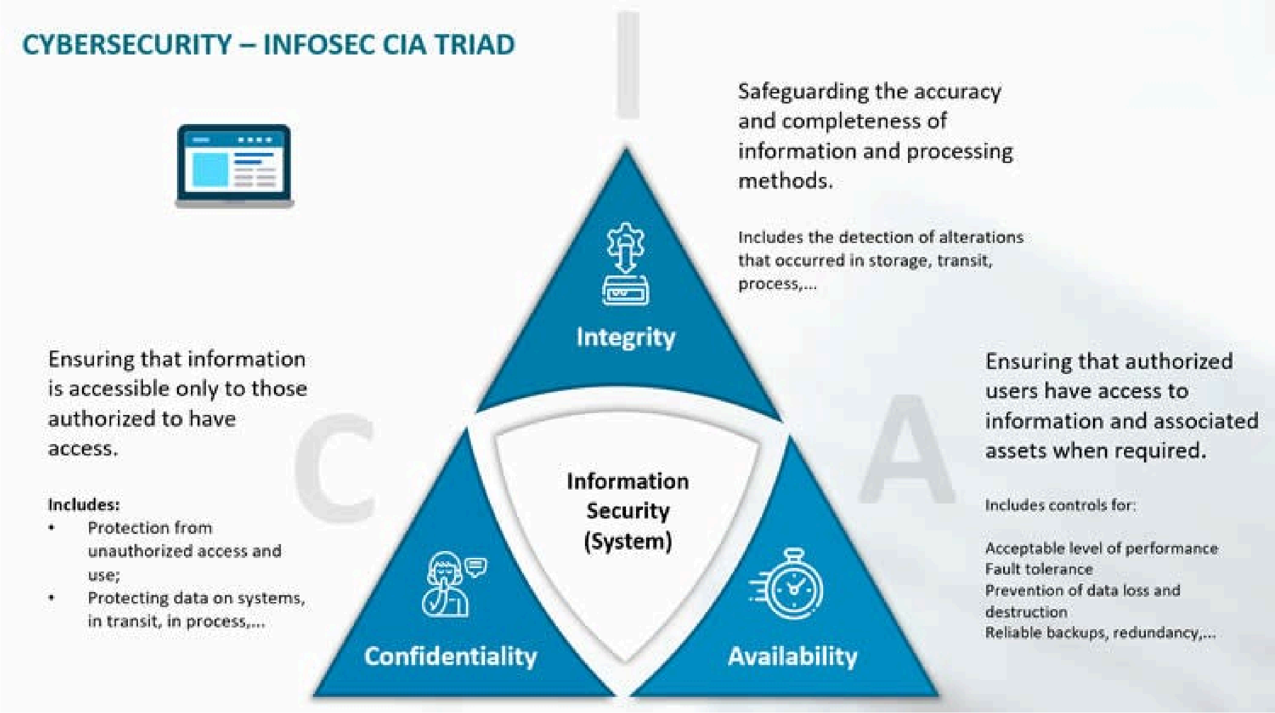
> 
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CYBERSECURITY – INFOSEC CIA TRIAD
> I
> C
> A
> Integrity
> Confidentiality
> Availability
> Information Security (System)
>
> Safeguarding the accuracy and completeness of information and processing methods.
>
> Includes the detection of alterations that occurred in storage, transit, process,...
>
> Ensuring that information is accessible only to those authorized to have access.
>
> Includes:
> - Protection from unauthorized access and use;
> - Protecting data on systems, in transit, in process,...
>
> Ensuring that authorized users have access to information and associated assets when required.
>
> Includes controls for:
>
> Acceptable level of performance
> Fault tolerance
> Prevention of data loss and destruction
> Reliable backups, redundancy,...
>
> CIA Triad diagram with "Integrity" and "Availability" highlighted.*

Security Failures

- **Human error:** No training on determining phishing emails led to initial compromise.
- **Patch management:** Many systems unpatched despite known exploits.
- **Network segmentation:** Absent or weak, enabling rapid spread.
- **Backup & IR plans:** Inadequate for rapid, destructive malware.
- **Compliance gaps:** Lack of adherence to ISO/NIST controls.

Lessons Learned

- Always vet & secure supply-chain software.
- Patch critical systems regularly (especially legacy).
- Enforce MFA and remove shared admin credentials.
- Use strong segmentation to contain malware spread.
- Maintain and test offline backups.

References

1. A. Greenberg, “The Untold Story of NotPetya,” *WIRED*, 2018.
2. Lloyd’s Futureset, “Illuminating Cyber Risk,” 2018.
3. Portnox Blog, “A Closer Look at NotPetya,” 2023.
4. D. Bisson, “NotPetya Timeline,” *Tripwire*, 2017.
5. Columbia SIPA Case Study, “NotPetya,” 2022.