Lesson 1.

Introduction to Information Security

Outline

1. What is Information Security?
2. Why is it important?
3. What can we do?
4. Security concepts
5. Summary

What is Information Security?

Def 1:

Information security, often referred to as **InfoSec**, refers to the **processes** and **tools** designed and deployed to **protect sensitive business information** from **modification**, **disruption**, **destruction**, and **inspection**. (Ref: Cisco.com)

Def 2:

Information security is the practice of preventing unauthorized access, use, disclosure, disruption, modification, inspection, recording or destruction of information.

(Ref: wikipedia)

What is Information Security?

- The U.S. Government's National Information Assurance Glossary defines **INFOSEC** as:

"Protection of information systems against unauthorized access to or modification of information, whether in storage, processing or transit, and against the denial of service to authorized users or the provision of service to unauthorized users, including those measures necessary to detect, document, and counter such threats."

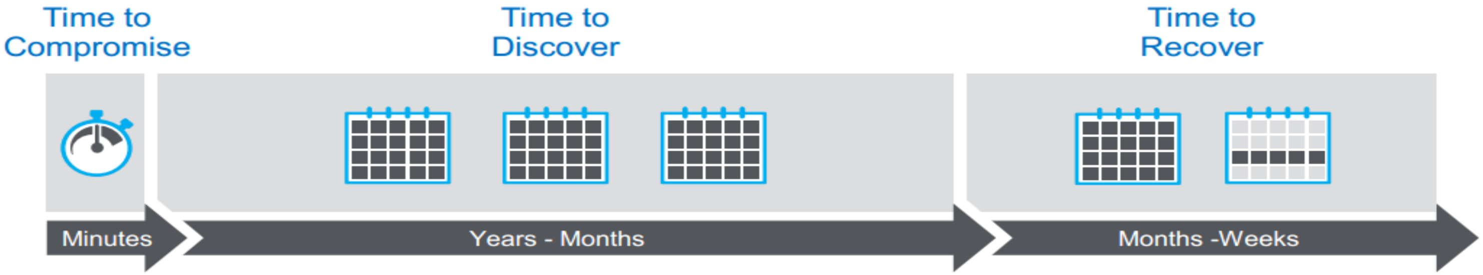
What is Information Security?

- Three widely accepted elements or areas of focus (referred to as the "**CIA Triad**"):
  - Confidentiality
  - Integrity
  - Availability (Recoverability)
- Includes Physical Security as well as Electronic

Why is InfoSec Important?

- Information security is not an 'IT problem', it is a business issue.

Current ThreatScape Realities



Time to Compromise

Time to Discover

Time to Recover

Minutes

Years - Months

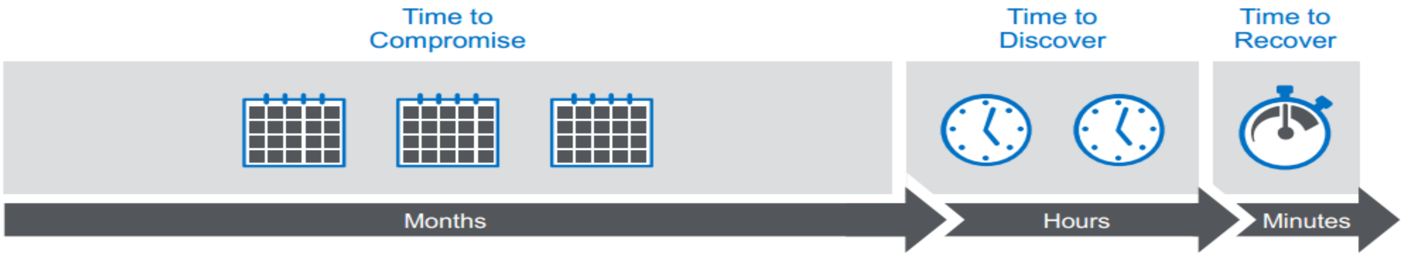
Months -Weeks

Minimal Adversarial Effort

Overwhelmed Security Teams

$$$ Catastrophic Impact $$$

Business and Security Outcomes



Time to Compromise

Time to Discover

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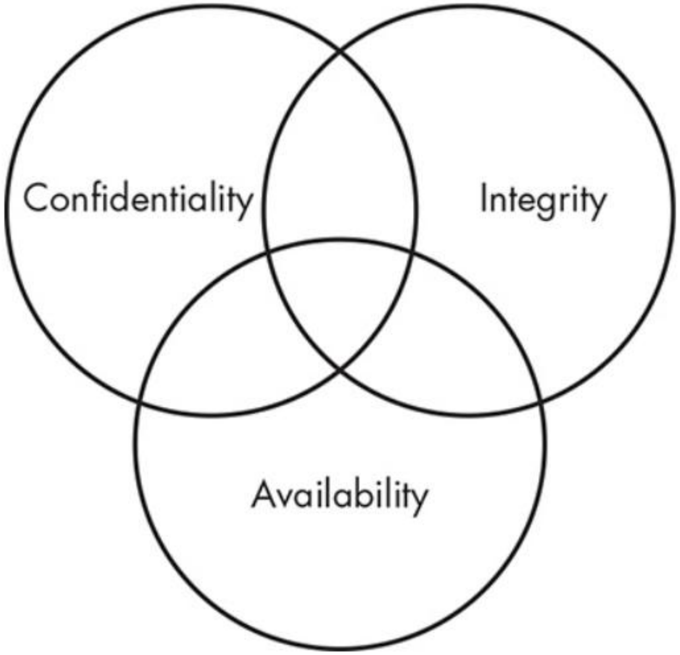
Significant Adversarial Effort

Optimized Security Teams

$ Minimized Impact $

Main goals of Information Security



Main goals of Information Security

- **Confidentiality**:only authorized entities have access to the data

- **Integrity:** there are no unauthorized modifications of the data

- **Availability:** authorized entities can access the data when and how they are permitted to do so

Data
Confidentiality
Integrity
Availability

(C-I-A Triad)

Asset, Threats, Vulnerabilities, and Risk

- Asset – People, property, and information. People may include employees and customers along with other invited persons such as contractors or guests. Property assets consist of both tangible and intangible items that can be assigned a value. Intangible assets include reputation and proprietary information. Information may include databases, software code, critical company records, and many other intangible items.
  - *An asset is what we're trying to protect.*
- Threat – Anything that can exploit a vulnerability, intentionally or accidentally, and obtain, damage, or destroy an asset.
  - *A threat is what we're trying to protect against.*
- Vulnerability – Weaknesses or gaps in a security program that can be exploited by threats to gain unauthorized access to an asset.
  - *A vulnerability is a weakness or gap in our protection efforts.*
- Risk – The potential for loss, damage or destruction of an asset as a result of a threat exploiting a vulnerability.
  - *Risk is the intersection of assets, threats, and vulnerabilities.*
- **A + T + V = R**

Asset, Threats, Vulnerabilities, and Risk

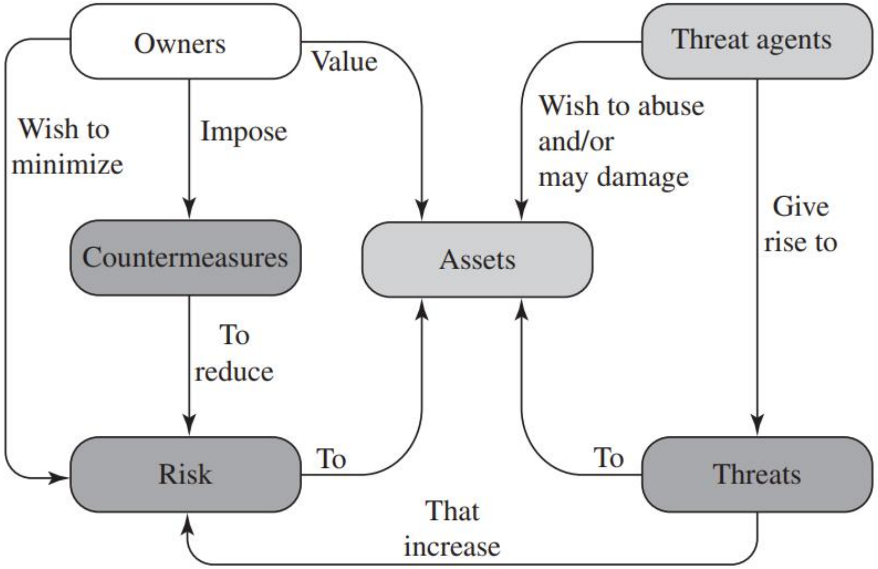


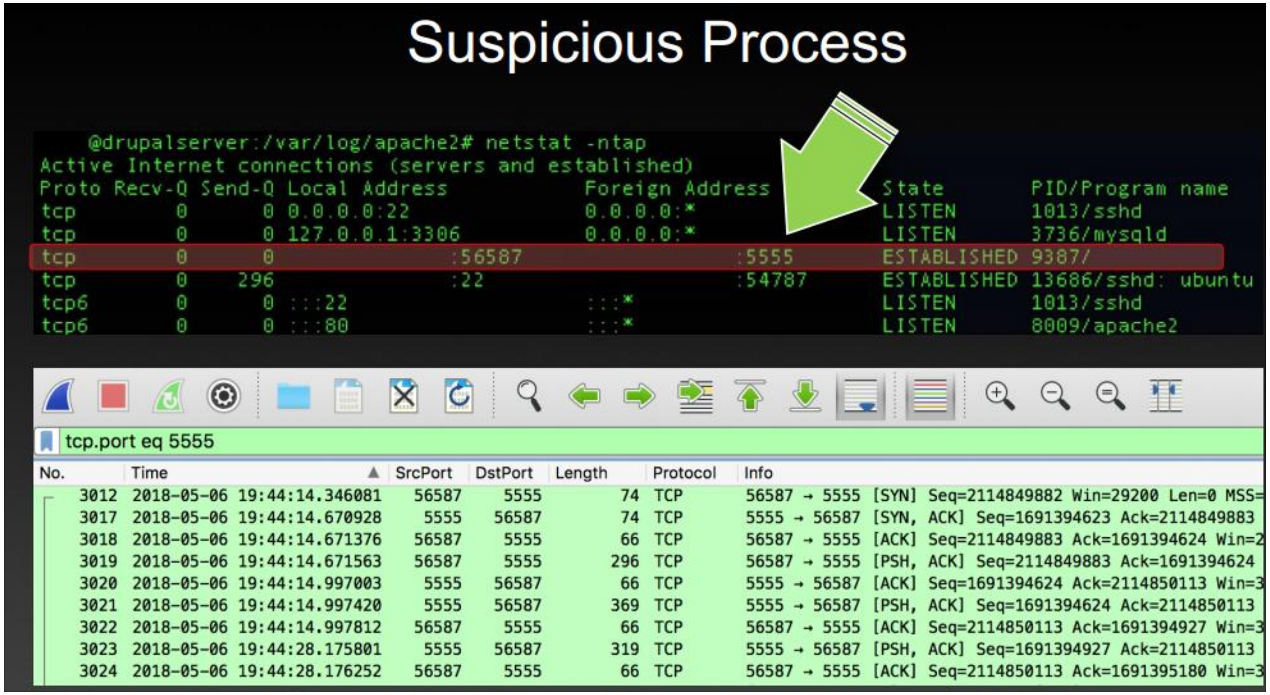
Figure 1.1 Security Concepts and Relationships

What can we do?

- **Security Assessment**
  - Identify areas of risk
  - Identify potential for security breaches, collapses
  - Identify steps to mitigate
- **Security Application**
  - Expert knowledge (train, hire, other)
  - Multi-layered Approach (there is no single solution)
  - Policies and Procedures

What can we do?

- **Security Awareness**
  - Not just for the geeks!
  - Security Training at all levels (external and/or internal)
  - Continuing education and awareness – not a one-time shot!
  - Make it part of the culture



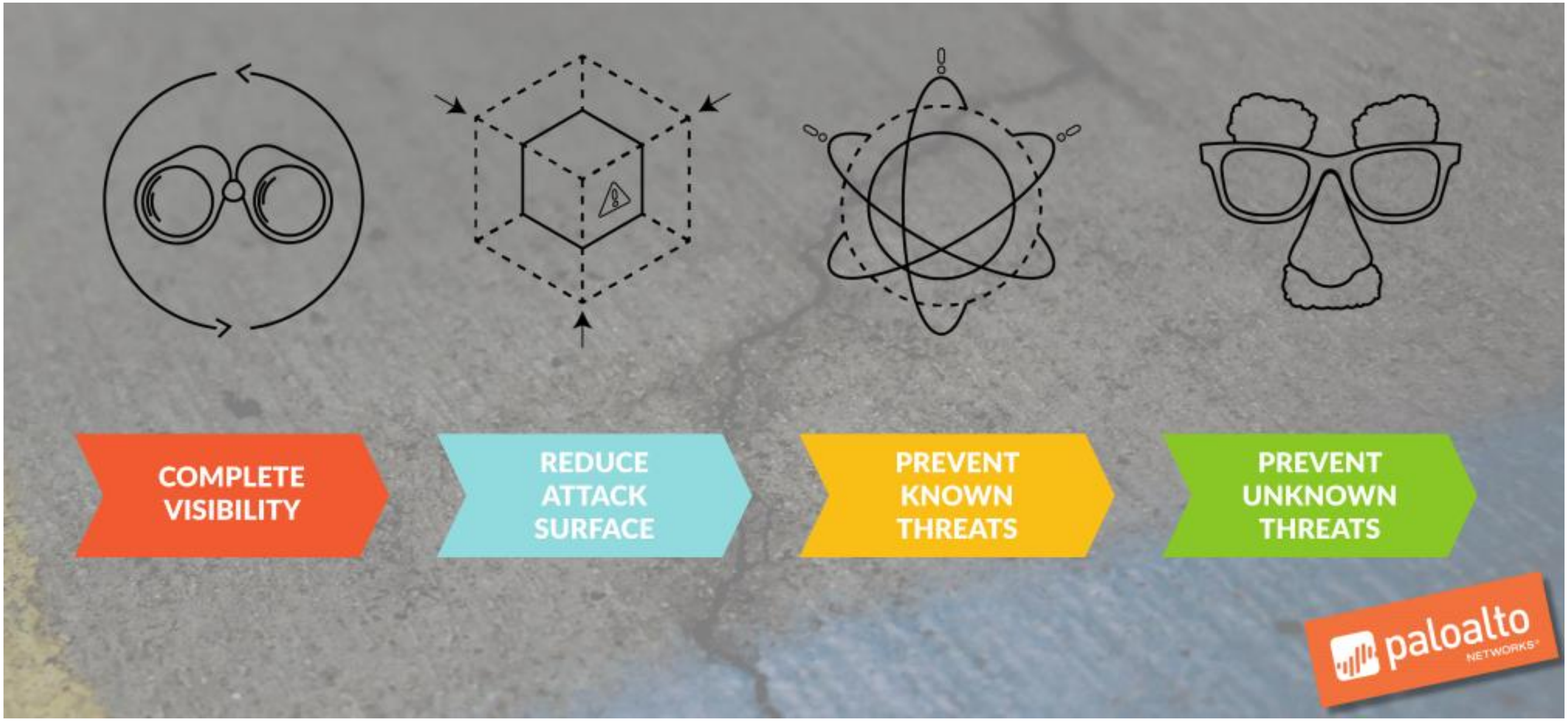
Suspicious Process

```
    @drupalserver:/var/log/apache2# netstat -ntap
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      1013/sshd
tcp        0      0 127.0.0.1:3306          0.0.0.0:*               LISTEN      3736/mysqld
tcp        0      0               :56587                   :5555    ESTABLISHED 9387/
tcp        0    296               :22                      :54787   ESTABLISHED 13686/sshd: ubuntu
tcp6       0      0 :::22                   :::*                    LISTEN      1013/sshd
tcp6       0      0 :::80                   :::*                    LISTEN      8009/apache2
```

tcp.port eq 5555

```
No.     Time                        SrcPort  DstPort  Length  Protocol  Info
   3012 2018-05-06 19:44:14.346081   56587     5555      74   TCP       56587 → 5555 [SYN] Seq=2114849882 Win=29200 Len=0 MSS=
   3017 2018-05-06 19:44:14.670928    5555    56587      74   TCP       5555 → 56587 [SYN, ACK] Seq=1691394623 Ack=2114849883
   3018 2018-05-06 19:44:14.671376   56587     5555      66   TCP       56587 → 5555 [ACK] Seq=2114849883 Ack=1691394624 Win=2
   3019 2018-05-06 19:44:14.671563   56587     5555     296   TCP       56587 → 5555 [PSH, ACK] Seq=2114849883 Ack=1691394624
   3020 2018-05-06 19:44:14.997003    5555    56587      66   TCP       5555 → 56587 [ACK] Seq=1691394624 Ack=2114850113 Win=3
   3021 2018-05-06 19:44:14.997420    5555    56587     369   TCP       5555 → 56587 [PSH, ACK] Seq=1691394624 Ack=2114850113
   3022 2018-05-06 19:44:14.997812   56587     5555      66   TCP       56587 → 5555 [ACK] Seq=2114850113 Ack=1691394927 Win=3
   3023 2018-05-06 19:44:28.175801    5555    56587     319   TCP       5555 → 56587 [PSH, ACK] Seq=1691394927 Ack=2114850113
   3024 2018-05-06 19:44:28.176252   56587     5555      66   TCP       56587 → 5555 [ACK] Seq=2114850113 Ack=1691395180 Win=3
```

What can we do?

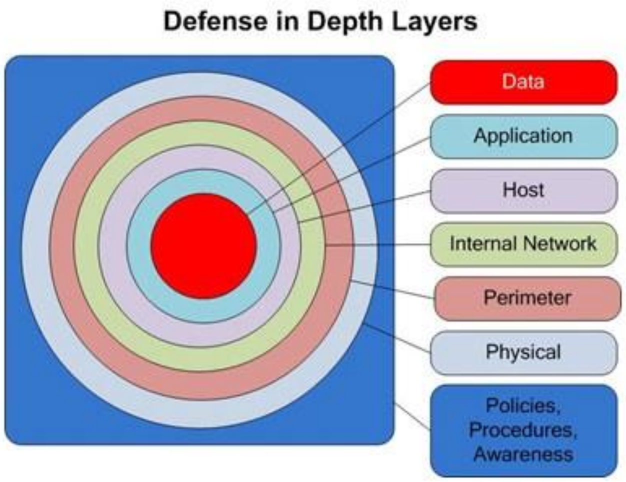


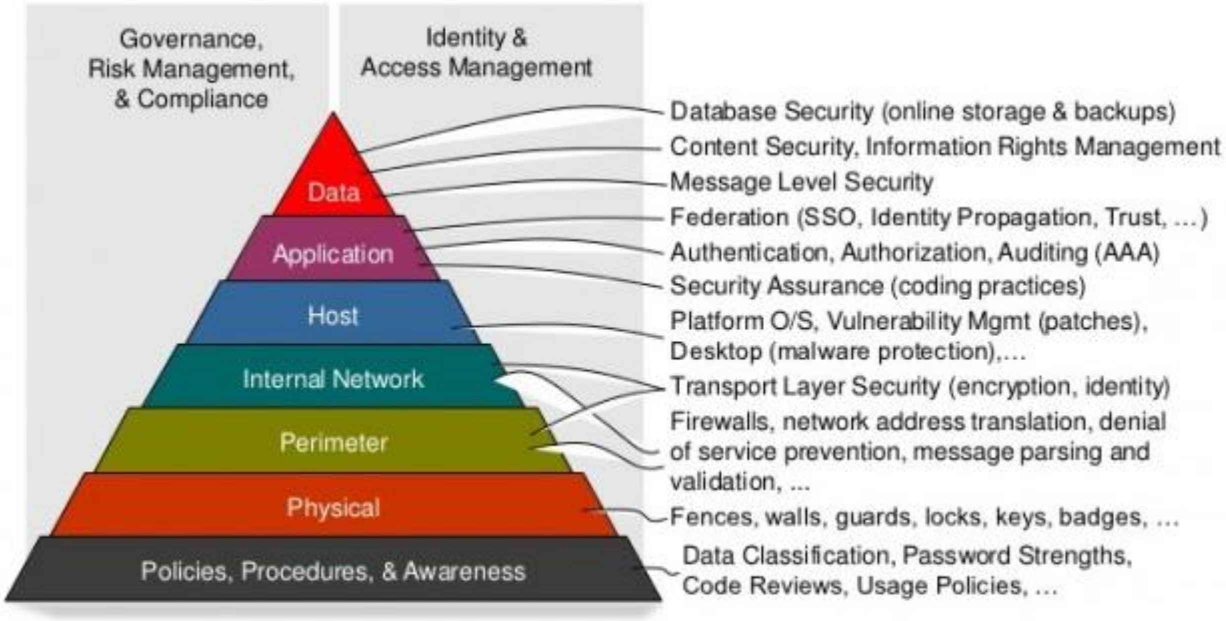
Principle of Least Privilege

- Every program and every privileged user of the system should operate using the least amount of privileges necessary to complete the job

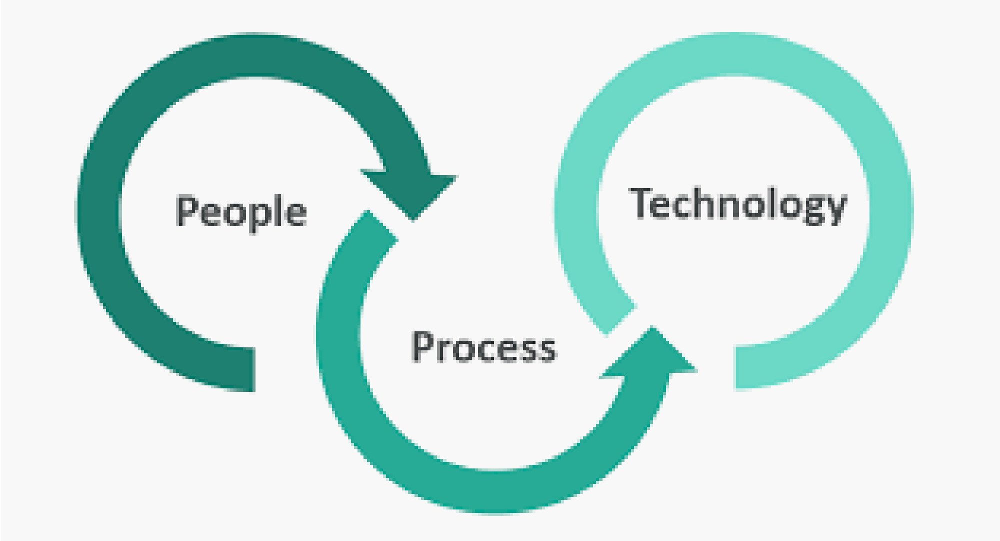
What can we do?

- Defense in depth




Governance, Risk Management, & Compliance
Identity & Access Management
Data
Application
Host
Internal Network
Perimeter
Physical
Policies, Procedures, & Awareness
Database Security (online storage & backups)
Content Security, Information Rights Management
Message Level Security
Federation (SSO, Identity Propagation, Trust, …)
Authentication, Authorization, Auditing (AAA)
Security Assurance (coding practices)
Platform O/S, Vulnerability Mgmt (patches), Desktop (malware protection),…
Transport Layer Security (encryption, identity)
Firewalls, network address translation, denial of service prevention, message parsing and validation, …
Fences, walls, guards, locks, keys, badges, …
Data Classification, Password Strengths, Code Reviews, Usage Policies, …

What can we do?



Cyber-security is not just about technology, IT or engineers.

C-I-A

- **Confidentiality**
- **Integrity**
- **Availability**

P-P-T

- **People**
- **Process**
- **Technology**

Governance

- **Policy**
- **Audit**
- **Awareness**

Security Concepts

- Authentication
- Authorization
- Accounting
- Access control
- Nonrepudiation
  - The ability to ensure that someone cannot deny his/her actions

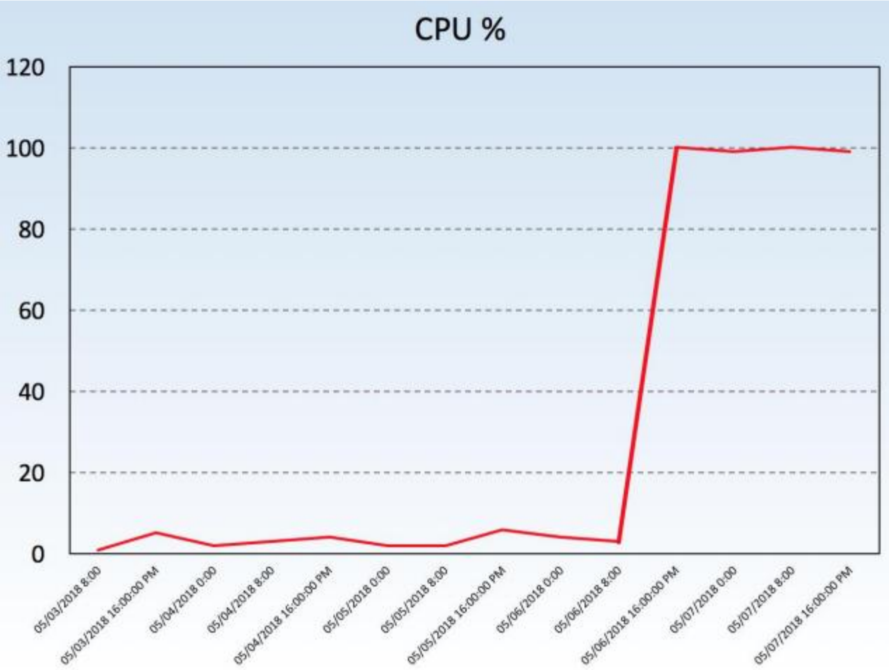
Security Control Frameworks

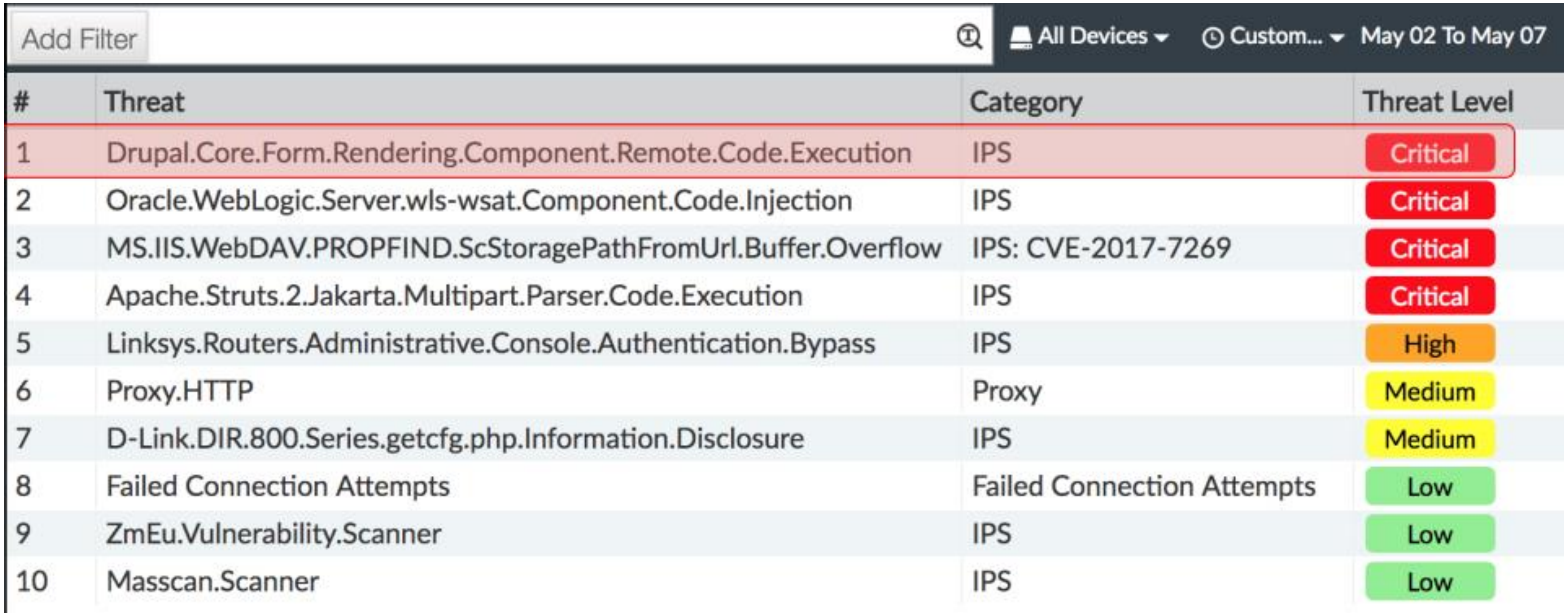
- This is a notional construct outlining the organization’s approach to security, including a list of specific security processes, procedures, and solutions used by the organization. Some frameworks:
  - ISO 27001/27002
  - COBIT
  - ITIL
  - RMF
  - CSA STAR

Summary

- Objective of InfoSec is ***Confidentiality, Integrity and Availability***…protect your systems and your data
- Threats are numerous, evolving, and their impact is costly
- Security should be applied in layers (“road blocks”)
- Security Awareness at all levels must be maintained
- Practices: Ubuntu (cd, ls, mkdir, chmod, chown,…)

Q&A





#	Threat	Category	Threat Level
1	Drupal.Core.Form.Rendering.Component.Remote.Code.Execution	IPS	Critical
2	Oracle.WebLogic.Server.wls-wsat.Component.Code.Injection	IPS	Critical
3	MS.IIS.WebDAV.PROPFIND.ScStoragePathFromUrl.Buffer.Overflow	IPS: CVE-2017-7269	Critical
4	Apache.Struts.2.Jakarta.Multipart.Parser.Code.Execution	IPS	Critical
5	Linksys.Routers.Administrative.Console.Authentication.Bypass	IPS	High
6	Proxy.HTTP	Proxy	Medium
7	D-Link.DIR.800.Series.getcfg.php.Information.Disclosure	IPS	Medium
8	Failed Connection Attempts	Failed Connection Attempts	Low
9	ZmEu.Vulnerability.Scanner	IPS	Low
10	Masscan.Scanner	IPS	Low

Questions (MQCs)

Q1. Message ……….means that the data must arrive at the receiver exactly as sent

A. Confidentiality
B. Integrity
C. Authentication
D. None of the above

Answer: B

Q2. Cryptography does not concern itself with:

A. Availability

B. Authenticity

C. Integrity

D. Confidentiality

Answer: A

Q3. An access control system that grants users only those rights necessary for them to perform their work is operating on **which security principle**?

A. Discretionary Access

B. Least Privilege

C. Mandatory Access

D. Separation of Duties

Answer: B

Q4. Which of the following is the verification of a person’s identity?

A. Authorization

B. Accoutability

C. Authentication

D. Password

Answer: C

Q5. John is concerned about social engineering. He is particularly concerned that this technique could be used by an attacker to obtain information about the network, including possibly even passwords. What countermeasure would be most effective in combating social engineering?

A. SPI firewall

B. An IPS

C. User training

D. Strong policies

Answer: C

Q6. The application of which of the following standards would BEST reduce the potential for data breaches?

A. ISO 9000
B. ISO 20121
C. ISO 26000
D. ISO 27001

Answer: D

Q7. The first phase of hacking an IT system is compromise of which foundation of security?

A. Availability
B. Confidentiality
C. Integrity
D. Authentication

Answer: B

Q8. The PRIMARY purpose of a security awareness program is to?

A. Ensure that everyone understands the organization's policies and procedures.

B. Communicate that access to information will be granted on a need-to-know basis.

C. Warn all users that access to all systems will be monitored on a daily basis.

D. Comply with regulations related to data and information protection.

Answer: A

Q9. Which type of cyber attack is commonly performed through emails?

A. Trojans
B. Phishing
C. Worms
D. Ransomware

Answer: B

Q10. The use of strong authentication, the encryption of Personally Identifiable Information (PII) on database servers, application security reviews, and the encryption of data transmitted across networks provide

A. Data integrity.

B. Defense in depth.

C. Data availability.

D. Non-repudiation.

Answer: B