Information Security

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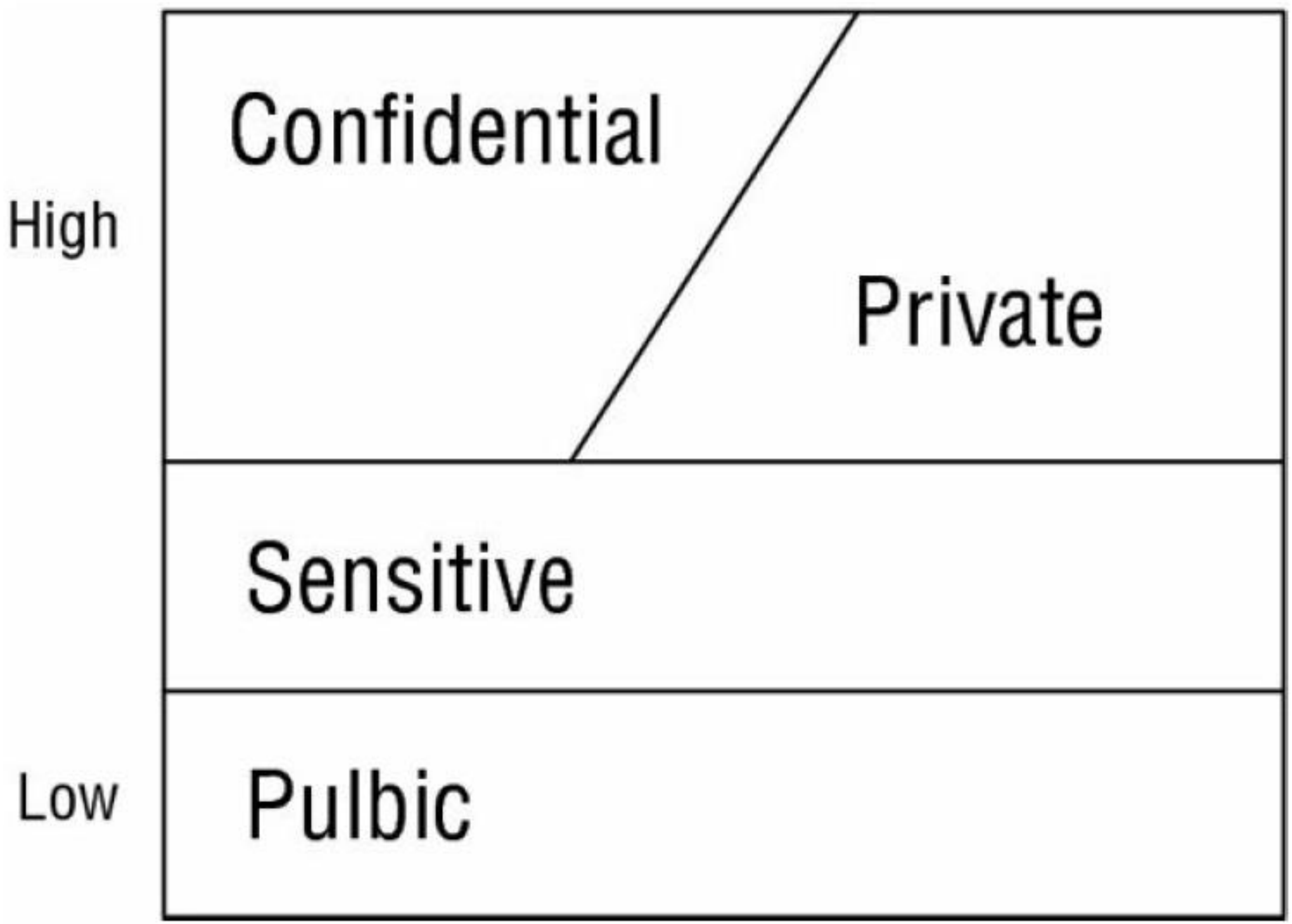
Chapter 1

Introduction to Information Security

Data Classification

Commercial business/private sector classification systems can vary widely because they typically do not have to adhere to a standard or regulation.

<u>Confidential</u> The highest level of classification. This is used for data that is extremely sensitive and for internal use only. A significant negative impact could occur for a company if confidential data is disclosed. Sometimes the label proprietary is substituted for confidential.



High

Low

Confidential

Private

Sensitive

Pulbic

Commercial business/private sector classification levels

Sometimes proprietary data is considered a specific form of confidential information. If proprietary data is disclosed, it can have drastic effects on the competitive edge of an organization.

Private Used for data that is of a private or personal nature and intended for internal use only. A significant negative impact could occur for the company or individuals if private data is disclosed.

Confidential and private data in a commercial business/private sector classification scheme both require roughly the same level of security protection. The real difference between the two labels is that confidential data is company data whereas private data is data related to individuals, such as medical data.

Sensitive Used for data that is more classified than public data. A negative impact could occur for the company if sensitive data is disclosed.

Public The lowest level of classification. This is used for all data that does not fit in one of the higher classifications. Its disclosure does not have a serious negative impact on the organization.

Another consideration related to data classification or categorization is ownership. Ownership is the formal assignment of responsibility to an individual or group. Ownership can be made clear and distinct within an operating system where files or other types of objects can be assigned an owner. Often, an owner has full capabilities and privileges over the object they own.

The ability to take ownership is often granted to the most powerful accounts in an operating system, such as the administrator in Windows or root in Unix or Linux. In most cases, the subject that creates a new object is by default the owner of that object. In some environments, the security policy mandates that when new objects are created, a formal change of ownership from end users to an administrator or management user is necessary. In this situation, the admin account can simply take ownership of the new objects.

Ownership of objects outside of formal IT structures is often not as obvious. A company document can define owners for the facility, business tasks, processes, assets, and so on. However, such documentation does not always “enforce” this ownership in the real world. The ownership of a file object is enforced by the operating system and file system, whereas ownership of a physical object, intangible asset, or organizational concept (such as the research department or a development project) is defined only on paper and can be more easily undermined. Additional security governance must be implemented to provide enforcement of ownership in the physical world.

Security Concepts

Access: A subject or object’s ability to use, manipulate, modify, or affect another subject or object. Authorized users have legal access to a system, whereas hackers must gain illegal access to a system. Access controls regulate this ability.

Asset: The organizational resource that is being protected. An asset can be logical, such as a Web site, software information, or data; or an asset can be physical, such as a person, computer system, hardware, or other tangible object. Assets, particularly information assets, are the focus of what security efforts are attempting to protect.

Attack: An intentional or unintentional act that can damage or otherwise compromise information and the systems that support it. Attacks can be active or passive, intentional or unintentional, and direct or indirect.

Control, safeguard, or countermeasure: Security mechanisms, policies, or procedures that can successfully counter attacks, reduce risk, resolve vulnerabilities, and otherwise improve security within an organization.

Risk: The probability of an unwanted occurrence, such as an adverse event or loss. Organizations must minimize risk to match their risk appetite—the quantity and nature of risk they are willing to accept.

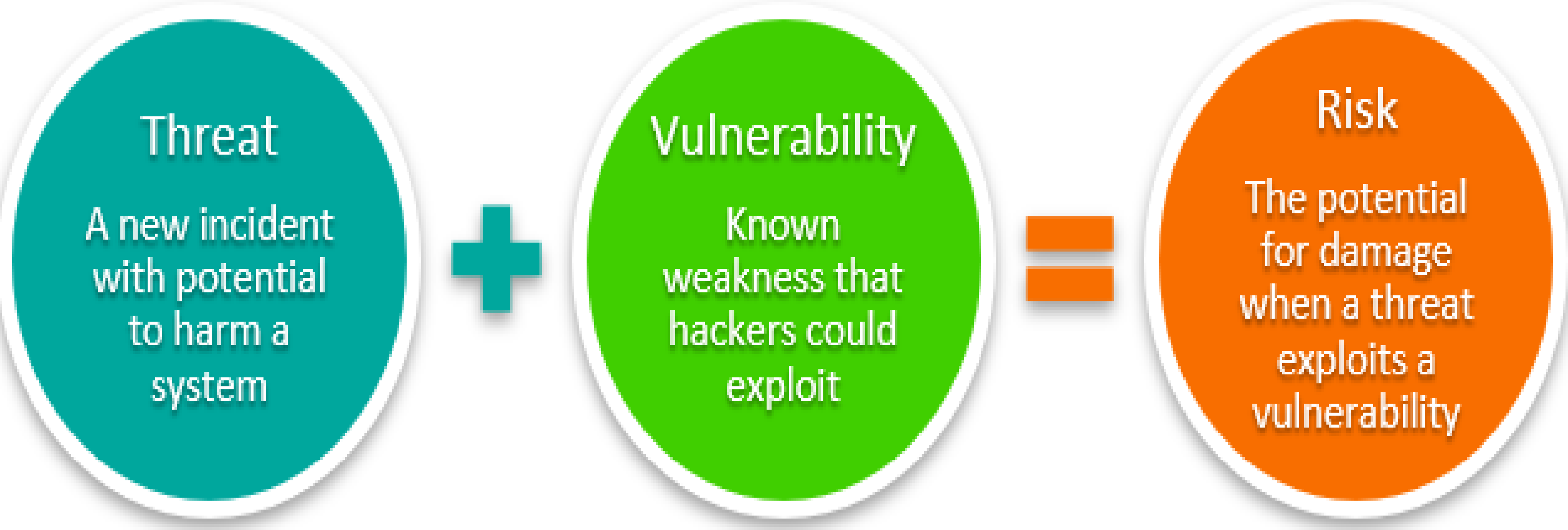
Threat: Any event or circumstance that has the potential to adversely affect operations and assets. The term threat source is commonly used interchangeably with the more generic term threat.

Threat agent: The specific instance or a component of a threat. For example, the threat source of “trespass or espionage” is a category of potential danger to information assets, while “external professional hacker”.

Threat event: An occurrence of an event caused by a threat agent. An example of a threat event might be damage caused by a storm. This term is commonly used interchangeably with the term attack

Threat source: A category of objects, people, or other entities that represents the origin of danger to an asset in other words, a category of threat agents. Threat sources are always present and can be purposeful or undirected.

Vulnerability: A potential weakness in an asset or its defensive control system(s). Some examples of vulnerabilities are a flaw in a software package, an unprotected system port, and an unlocked door. Some well-known vulnerabilities have been examined, documented, and published; others remain latent (or undiscovered).



Threat

A new incident with potential to harm a system

+

Vulnerability

Known weakness that hackers could exploit

=

Risk

The potential for damage when a threat exploits a vulnerability

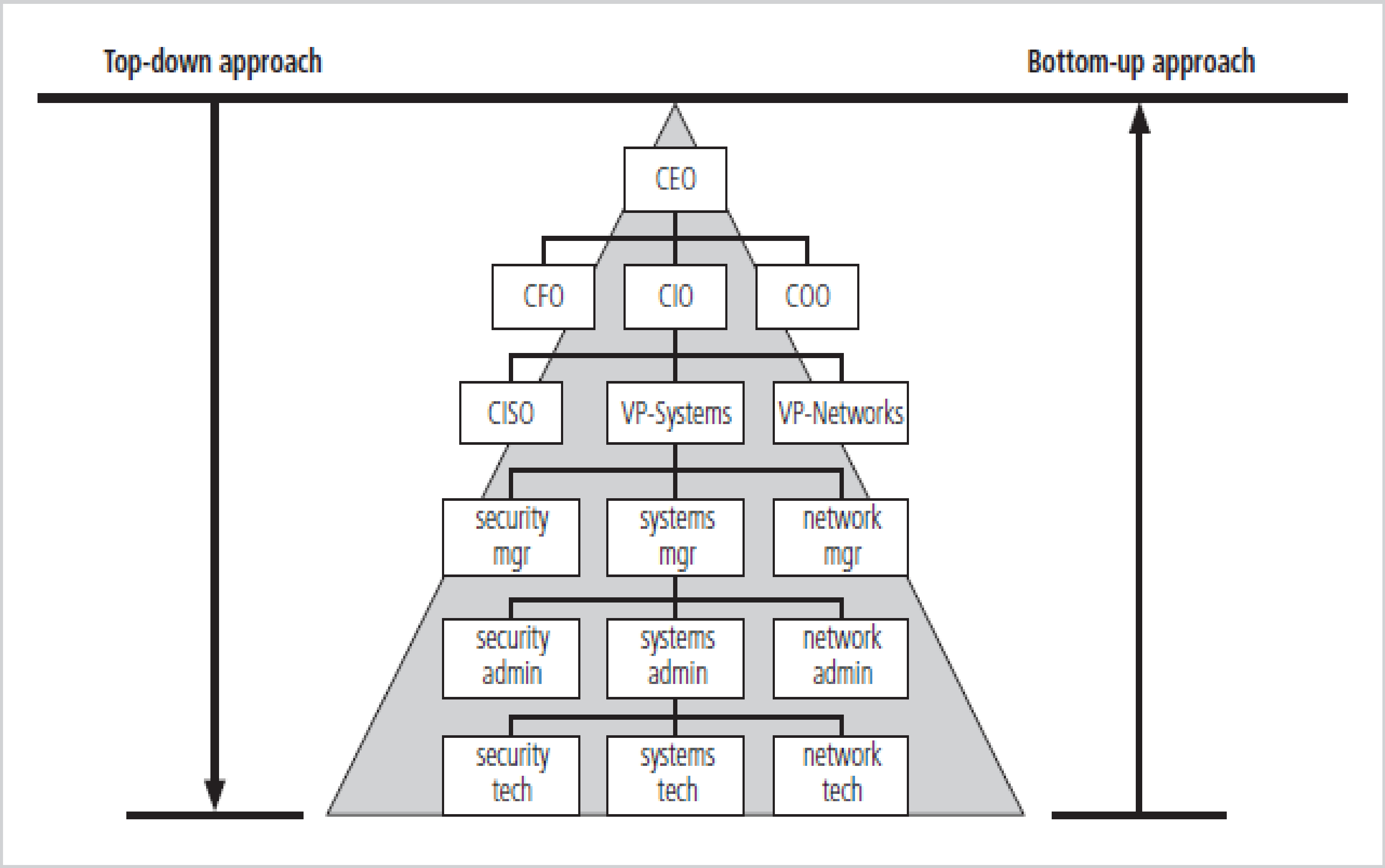
Exploit: A technique used to compromise a system. This term can be a verb or a noun. Threat agents may attempt to exploit a system or other information asset by using it illegally for their personal gain. Or, an exploit can be a documented process to take advantage of a vulnerability or exposure, usually in software, that is either inherent in the software or created by the attacker. Exploits make use of existing software tools or custom-made software components.

Exposure: A condition or state of being exposed; in information security, exposure exists when a vulnerability is known to an attacker.

Loss: A single instance of an information asset suffering damage or destruction, unintended or unauthorized modification or disclosure, or denial of use. When an organization's information is stolen, it has suffered a loss.

The implementation of information security in an organization must begin somewhere, and cannot happen overnight. Securing information assets is an incremental process that requires coordination, time, and patience. Information security can begin as a grassroots effort in which systems administrators attempt to improve the security of their systems. This is often referred to as a bottom-up approach.

The key advantage of the bottom-up approach is the technical expertise of individual administrators. By working with information systems on a day-to-day basis, these administrators possess in-depth knowledge that can greatly enhance the development of an information security system. They know and understand the threats to their systems and the mechanisms needed to protect them successfully.


Top-down approach
Bottom-up approach
CEO
CFO
CIO
COO
CISO
VP-Systems
VP-Networks
security mgr
systems mgr
network mgr
security admin
systems admin
network admin
security tech
systems tech
network tech

The **top-down approach** has a higher probability of success. With this approach, the project is initiated by upper-level managers who issue policies, procedures, and processes; dictate the goals and expected outcomes; and determine accountability for each required action. This approach has strong upper-management support, a dedicated champion, usually dedicated funding, a clear planning and implementation process, and the means of influencing organizational culture. The most successful kind of top-down approach also involves a formal development strategy known as a systems development life cycle.

Security Roles and Responsibilities

A security role is the part an individual plays in the overall scheme of security implementation and administration within an organization. Security roles are not necessarily prescribed in job descriptions because they are not always distinct or static. Familiarity with security roles will help in establishing a communications and support structure within an organization. This structure will enable the deployment and enforcement of the security policy.

The following six roles are presented in the logical order in which they appear in a secured environment:

1- Senior Manager The organizational owner (senior manager) role is assigned to the person who is ultimately responsible for the security maintained by an organization and who should be most concerned about the protection of its assets. The senior manager must sign off on all policy issues.

In fact, all activities must be approved by and signed off on by the senior manager before they can be carried out. There is no effective security policy if the senior manager does not authorize and support it. The senior manager’s endorsement of the security policy indicates the accepted ownership of the implemented security within the organization.

The senior manager is the person who will be held liable for the overall success or failure of a security solution and is responsible for exercising due care and due diligence in establishing security for an organization. Even though senior managers are ultimately responsible for security, they rarely implement security solutions. In most cases, that responsibility is delegated to security professionals within the organization.

2- Security Professional The security professional, information security (InfoSec) officer, or computer incident response team (CIRT) role is assigned to a trained and experienced network, systems, and security engineer who is responsible for following the directives mandated by senior management. The security professional has the functional responsibility for security, including writing the security policy and implementing it.

The role of security professional can be labeled as an IS/IT function role. The security professional role is often filled by a team that is responsible for designing and implementing security solutions based on the approved security policy. Security professionals are not decision makers; they are implementers. All decisions must be left to the senior manager.

3- Data Owner The data owner role is assigned to the person who is responsible for classifying information for placement and protection within the security solution. The data owner is typically a high-level manager who is ultimately responsible for data protection. However, the data owner usually delegates the responsibility of the actual data management tasks to a data custodian.

4-Data Custodian The data custodian role is assigned to the user who is responsible for the tasks of implementing the prescribed protection defined by the security policy and senior management. The data custodian performs all activities necessary to provide adequate protection for the CIA Triad (confidentiality, integrity, and availability) of data and to fulfill the requirements and responsibilities delegated from upper management.

5- User The user (end user or operator) role is assigned to any person who has access to the secured system. A user’s access is tied to their work tasks and is limited so they have only enough access to perform the tasks necessary for their job position (the principle of least privilege). Users are responsible for understanding and upholding the security policy of an organization by following prescribed operational procedures and operating within defined security parameters.

6- Auditor An auditor is responsible for reviewing and verifying that the security policy is properly implemented and the derived security solutions are adequate. The auditor role may be assigned to a security professional or a trained user. The auditor produces compliance and effectiveness reports that are reviewed by the senior manager.

Issues discovered through these reports are transformed into new directives assigned by the senior manager to security professionals or data custodians. However, the auditor is listed as the last or final role because the auditor needs a source of activity (that is, users or operators working in an environment) to audit or monitor. All of these roles serve an important function within a secured environment. They are useful for identifying liability and responsibility as well as for identifying the hierarchical management and delegation scheme.