Securing Spaces

AP Cybersecurity ▪ Unit 2

AP Cybersecurity

What we will cover

1. The CIA triad
2. Adversaries & attack phases
3. Risk & how to manage it
4. Classifying controls
5. Physical attacks
6. Protecting & detecting

1 Foundations

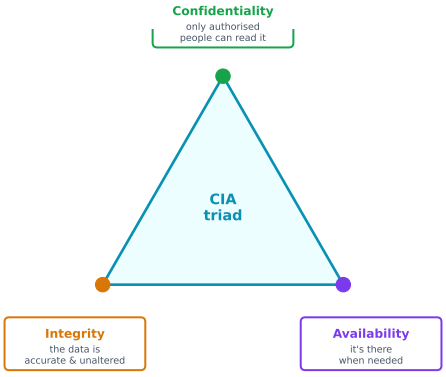
The CIA triad – the three goals of security

Every control protects at least one part of the **CIA triad** 信息安全三要素:

- **Confidentiality** 保密性 – only authorised people can read it
- **Integrity** 完整性 – it is accurate and unaltered
- **Availability** 可用性 – it is there when needed

> Be ready to say which goal a control serves: encryption → confidentiality; a hash → integrity; a backup → availability.

The CIA triad – the three goals of security, in detail



CIA triad: Confidentiality · Integrity · Availability (core security goals)

> The CIA triad: the three goals every security control supports

Who attacks, and why

Script kiddie 脚本小子
reuses others' tools –
greed or recognition

Hacktivist 黑客活动分子
a political, social
or personal cause

Insider 内部人员
already has legitimate access

Cyberterrorist 网络恐怖分子
disrupts critical infrastructure

Transnational criminal organisations 跨国犯罪组织 chase money – ransomware and stolen data.

Attacks unfold in phases

reconnaissance 侦察 – often **OSINT** 公开来源情报

initial access, then persistence

lateral movement 横向移动

act on the goal, evade detection

Padlock physical

The phases of an attack

reconnaissance 侦察	gathering information, often from public **OSINT** 公开来源情报 sources – and **dumpster diving** 翻垃圾搜集情报, searching the target's trash
initial access	getting a first foothold – a phished credential, an unpatched service
escalation	raising privileges from that foothold toward administrator
lateral movement	spreading from the first host to others on the network
action on objective	the point of the whole exercise: exfiltrate, encrypt, or destroy

> Defences are cheapest at the early phases. An attacker stopped at reconnaissance costs nothing; one stopped at exfiltration has already been inside for weeks.

Risk – and the four ways to manage it

A **risk** 风险 appears when a **threat** 威胁 can exploit a **vulnerability** 漏洞 to compromise an **asset** 资产.

> Assess it by weighing **likelihood** 可能性 against **severity** 严重性.

Avoid 规避
stop the activity

Transfer 转移
e.g. an insurer

Mitigate 缓解
add controls

Accept 接受
live with it

> You accept the leftover **residual risk** 剩余风险 because perfect security is impossible.

Classifying a control – two ways, always

By type

physical 物理 – locks, fences, guards
technical 技术 – firewalls, encryption
managerial 管理 – policies and procedures

By function

preventative 预防性 – stop it (a lock)
detective 检测性 – spot it (a camera)
corrective 纠正性 – fix it (patching)

> Exam answers name both: a door lock is physical by type and preventative by function.

Worked example – rate the risk, classify the fix

A hospital stores patient records on an unencrypted server in an unlocked room

The asset is highly sensitive (patient data, protected by law) and the vulnerability is easy to exploit (no encryption, no access control).

$$\Rightarrow \text{ HIGH risk}$$

The fix – a door lock – is physical by type and preventative by function.

> High risk needs BOTH high value and easy exploitation. A "foothold to other systems" is the classic moderate risk.

Writing the risk assessment down

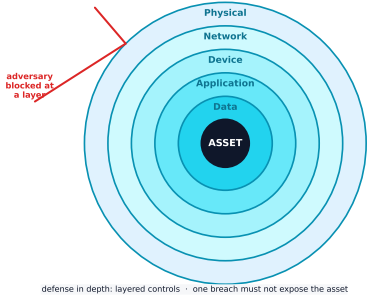
what drives likelihood	the value of the target, the skill the exploit needs, and how exposed the vulnerability is
the two ratings	qualitative (low/medium/high – fast, comparable, imprecise) and quantitative (a currency figure – precise, and only as good as its inputs)
a risk assessment 风险评估 records	the vulnerable asset and its value; the likely threats; how the specific vulnerability could be exploited; the likelihood and impact; and the chosen response
the four responses	accept, avoid, transfer (insure or outsource), mitigate (add a control)

> The exam wants the two rating styles told apart. Qualitative ranks risks against each other; quantitative says what a control is *worth*.

Defence in depth

The best strategy layers many controls – **defence in depth** 纵深防御. If an adversary bypasses one layer, another still stands. Layers: human, physical, network, device, application, data.

Defence in depth, in detail



one breach does not expose the asset

> The best strategy layers many controls – **defence in depth** 纵深防御. If an adversary gets past one layer, another still stands.

2 Physical attacks

Physical attacks – walking straight in

Digital security means nothing if an adversary can simply walk in. Most **physical attacks** 物理攻击 begin with social engineering:

Piggybacking 尾随（获许可）
the authorised person holds the door – tricked

Tailgating 尾随（未察觉）
slipping through unnoticed

Shoulder surfing 肩窥
watching you type

Dumpster diving 翻垃圾搜集情报 ▪ **card cloning** 门禁卡复制

> Piggybacking has consent (you were tricked); tailgating does not (you never knew). The exam tests this exact pair.

Protecting physical spaces

Managerial first: security-awareness training (do not badge strangers in) and a workstation policy – locking devices, a **clean desk policy** 清桌政策, privacy screens.

> With physical access an adversary can cut power, copy data, or plug in a **key-logger** 键盘记录器.

fences, gates, **bollards** 防撞柱 – deter

card readers 读卡器 – log and restrict

access control vestibule 门禁前室 – stops piggybacking

disabled USB ports; a **UPS** 不间断电源

Detecting physical attacks – placement matters

Some controls detect rather than prevent: cameras record, guards respond, **motion sensors** 运动传感器 alert – and employees often notice an intruder first.

> Cameras belong at **points of ingress and egress** 出入口.

> Motion sensors work in low-traffic areas like server rooms. Put one in a busy hallway and the constant false alarms make everyone ignore them.

A stationary guard protects a fixed high-value point; a patrolling guard is harder to plan around. Reviewing door-open times can reveal piggybacking – a door held open too long is suspicious.

Protecting Physical Spaces, continued

A dome security camera: physical controls and monitoring protect spaces as well as networks

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A monitor wall: network monitoring and logging help detect intrusions

Social engineering: the seven tactics

Most attacks begin not with code but with **social engineering** 社会工程学 - psychological tricks that manipulate a person into doing what the adversary wants.

- **quantitative** 定量 - a number: a score on a scale (e.g. 1-10), or a money value (e.g. "a $10,000 annual risk").
- **qualitative** 定性 - a label: *low* / *medium* / *high* / *severe*, or a grid such as *likely-high-impact* vs *unlikely-low-impact*.
- **Avoid** 规避 - stop the risky activity (only possible if it isn't essential).
- **Transfer** 转移 - shift the burden to someone else, such as an insurer.

The seven social-engineering tactics

pretexting 借口	inventing a believable reason to make contact – “I’m from IT”
authority 权威	posing as someone powerful, or relaying “the boss’s” instructions
intimidation 恐吓	threatening consequences if a demand is not met
consensus 从众	“everyone in your team has already done this”
scarcity 稀缺	a limited supply, so hesitating means losing out
urgency 紧迫感	a tight deadline, so the target acts before thinking
familiarity 熟悉	pretending to be, or to know, someone close to the target

All seven bypass judgement by triggering an automatic emotional response – fear, trust, haste, or the wish to fit in. Naming which one an example uses is the exam task.

Exam tips

- Memorise the **CIA triad** and be ready to say *which* goal a control protects - encryption serves **confidentiality**, a hash checks **integrity**, a backup restores **availability**.
- Know the **four risk responses** (avoid, transfer, mitigate, accept) and the two ways to **classify controls** (by type: physical/technical/managerial; by function: preventative/detective/corrective).
- Distinguish **piggybacking** (with consent, tricked) from **tailgating** (without the person's knowledge) - exam questions test this exact pair.
- For risk-rating questions, **high risk needs both high value AND easy exploitation**; a "foothold to other systems" is the classic **moderate** risk.
- **Defense in depth** is the model answer whenever a question asks why one control is not enough.

3 Recap

Unit 2 – key takeaways

1 CIA

say WHICH goal a control serves – C, I or A

2 Risk

threat × vulnerability on an asset; avoid, transfer, mitigate, accept

3 Classify twice

by type (physical/technical/managerial) AND function

4 Depth

layers – the answer to “why is one control not enough?”

Check yourself

1. Which CIA goal does a hash protect?
2. Piggybacking or tailgating: the victim knows they let you in?
3. Classify a security camera by type and by function.
4. Name the four ways to manage a risk.

Answers **1.** integrity **2.** piggybacking **3.** physical; detective **4.** avoid, transfer, mitigate, accept