

## CIA Triad

*The CIA triad is the foundation for cybersecurity and each component uses some form of authentication or authorization to keep data safe.*

### **Confidentiality**

Confidentiality focuses on who is allowed to see the data, which can relate to privacy (Hashemi-Pour, 2023). This requires the use of authentication methods, like passwords, multi-factor authentication (MFA), biometrics, and more. By providing proof, a user can log in and see the restricted data. In addition, authorization is used to check whether or not you should have access to a file, like an admin versus a regular employee. Lock screens on laptops and phones are simple passwords or number combinations, while banks have extra steps like MFA via code in an email to log in. Confidentiality can be threatened by complex attacks like hijacking and man-in-the-middle attacks, where hackers monitor WiFi connections, or through simple methods like shoulder surfing.

### **Integrity**

Integrity focuses on the modification of data and ensuring unauthorized edits don't happen. Even if data is only seen by those who are allowed to see it, you have to ensure it hasn't been mistakenly or purposely edited, which can lead to errors or worse. Integrity requires accounting, which means keeping track of who did what, where, and at what time they did the action. This uses both authentication and authorization to ensure that only certain users are allowed to edit files and that the user is who they say they are. Systems use checksums and digital signatures to ensure data hasn't been changed, a crucial safeguard for bank transfers, file sharing, and more (Hashemi-Pour, 2023).

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## **Availability**

Availability ensures that data is accessible whenever it is needed. Servers have to be running almost all the time, which means maintenance has to be efficient and unintrusive to daily operations. This also requires companies to consider data recovery plans in the case of a breach or crisis that has caused data loss. This means having data backups, scheduled maintenance times, and plans on how to get back online quickly to continue operations. Threats can range from human-made DDoS attacks, hardware failures, and the environment itself (Hashemi-Pour, 2023).

## **Authentication vs. Authorization**

Authentication is verifying you are who you say you are by providing proof of some knowledge that only the user is supposed to know, have, or be (Kizza, 2024). Passwords are something you know, tokens and physical keys are something you have, and biometrics are something you are. On the other hand, authorization checks what you're allowed to do (GeeksforGeeks). This is vital to the concept of least privilege, in which employees are given access to the bare minimum amount of tools necessary for their role. A front desk employee shouldn't have the same access as an accounting employee. If businesses don't establish who is allowed to do what, then you can have insider threats, whether accidental or intentional. For example, Google allows you to specify who a file can be modified by, whether it should be only the creator, specific individuals, an entire organization, or anyone who finds the document.

## **Conclusion**

Each pillar of the CIA triad is necessary to protect the data of individuals and companies. Confidentiality is needed for privacy and keeping information secret, integrity allows us to trust the data we use, and availability gives us the 24/7 convenience and efficiency that we've grown used to

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today. Two concepts often found in the pillars are authentication and authorization—they're necessary for ensuring only approved, privileged users can view and interact with data.

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## References

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