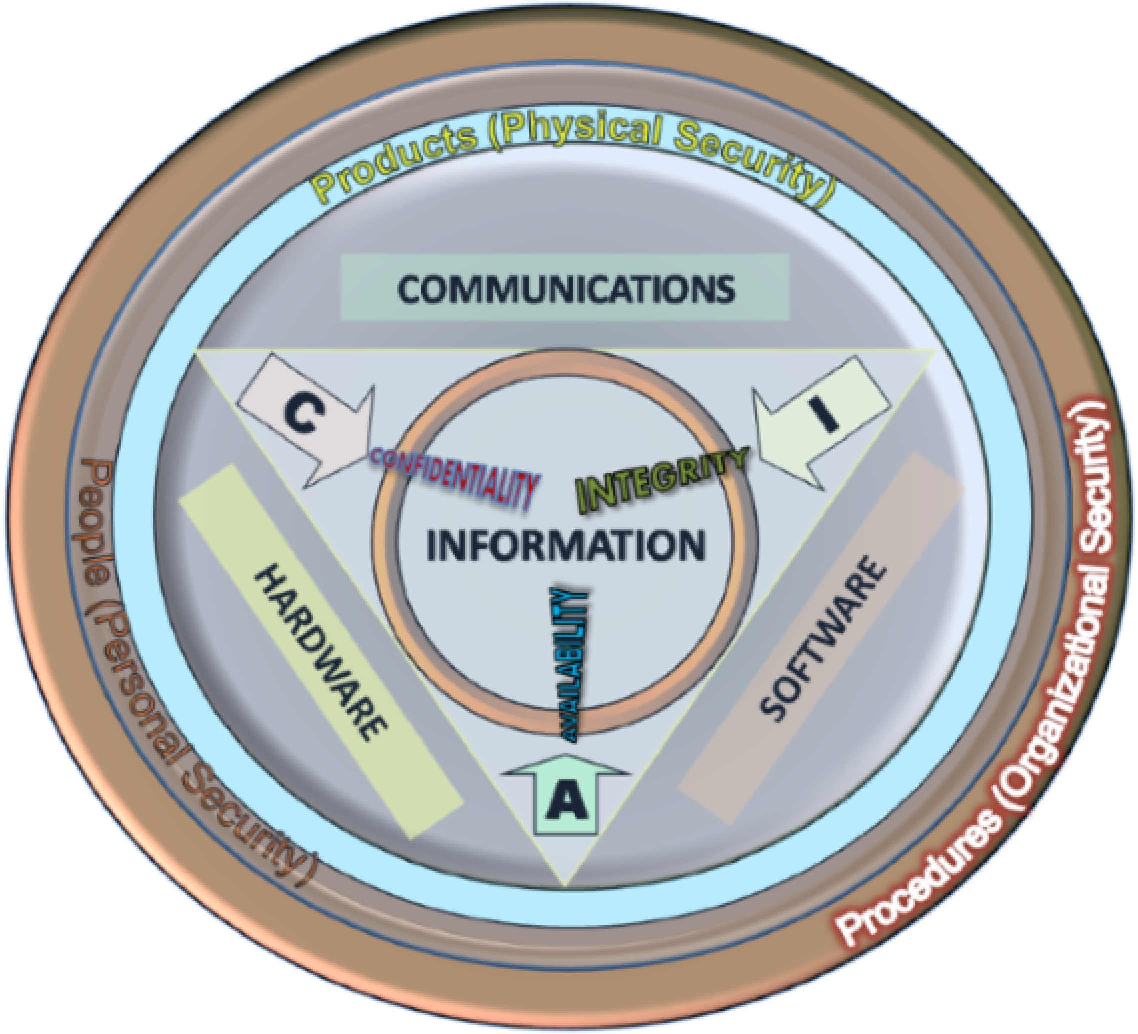
Security Goals

Information Security (44 U.S. Code § 3552)

> (1) The term “information security” means protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide—
>
> (A) integrity, which means guarding against improper information modification or destruction, and includes ensuring information nonrepudiation and authenticity;
>
> (B) confidentiality, which means preserving authorized restrictions on access and disclosure, including means for protecting personal privacy and proprietary information; and
>
> (C) availability, which means ensuring timely and reliable access to and use of information.

Information Security Triad: CIA


Products (Physical Security)
COMMUNICATIONS
C
I
CONFIDENTIALITY
INTEGRITY
INFORMATION
HARDWARE
AVAILABILITY
SOFTWARE
A
People (Personal Security)
Procedures (Organizational Security)

The Information Security triad: CIA. Second version, 2009 John M. Kennedy T., used under CC-BY-SA 3.0

🎯 Confidentiality

- **Protecting information from disclosure** to unauthorized parties
- Access to information should be granted only on a **need-to-know basis**
- **Data categorization** according to the amount and type of possible damage should it fall into wrong hands

Supporting Principles (🔐)

- Authentication, Authorization, Encryption, Anonymity, Secrecy

🎯 Integrity

- **Protecting information from being modified** by unauthorized parties
- Being correct or **consistent with the intended state** of information
- Ensuring that the **information is not tampered** whenever it travels from source to destination or even stored at rest

Supporting Principles (🔏)

- Hashing, Digital Signatures, Non-repudiation, Tamper-evident packaging

🎯 Availability

- Ensuring that authorized parties are **able to access information** when needed
- Ensuring that the services of an organization are available

Supporting Principles (🏧)

- Accessibility, Fault Tolerance, Redundancy, Backup, Testing

Exercise 2.1 (📌)

1. Which security goals are at risk by the following threats?

Threat	C	I	A
Network Sniffing			
DDoS Attack			
Rogue WiFi Access Point			
Electromagnetic Pulse (EMP)			
Whistleblower			
Social Engineering			

Attacker Behavior vs. Security Goals

	Active	Passive	Threatened Security Goals
Observing	(✓)	✓	Confidentiality
Altering	✓	✗	Confidentiality, Integrity, Availability

Extended CIA Models

Parkerian Hexad (1998)

- Confidentiality
- Possession / Control (🆕)
- Integrity
- Authenticity (🆕)
- Availability
- Utility (🆕)

🎯 Possession / Control

- Protecting against the idea that **confidential data can be possessed/controlled by an unauthorized individual or party**
- Loss of control or possession of information should not automatically lead to the breach of confidentiality

Supporting Principles (🛅)

- Encryption, Authentication

🎯 Authenticity

- Assurance that **a message or transaction is from the source it claims to be from**

Supporting Principles (📝)

- Identification, Digital Certificates

ℹ️ *Despite its close relation to Integrity you can find Authenticity also used as part of an extended CIAA quartet occasionally.*

🎯 Utility

- **Usefulness** of data or information

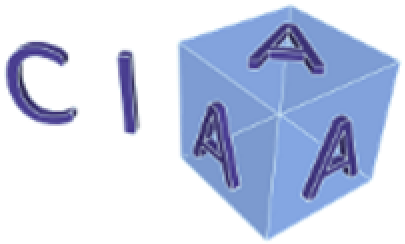
Supporting Principles (💾📟)

- Compatibility, Accessibility

> Information may be available and therefore usable but it doesn't necessarily have to be in a useful form to be defined as available. [^1]

CIA^3 (2016)

- Confidentiality
- Integrity
- Availability
- Accountability (🆕)
- Assurance (🆕)



🎯 Accountability

- Allowing to answer questions like "*Who did it?*" or "*Who is accountable?*"
- Considering **legal consequences** and contractual obligations
- Encompassing **segregation of duties** and awareness training

Supporting Principles (🙈🙉🙊)

- **Integrity**, Non-repudiation, Authenticity, Design, Governance, Policy

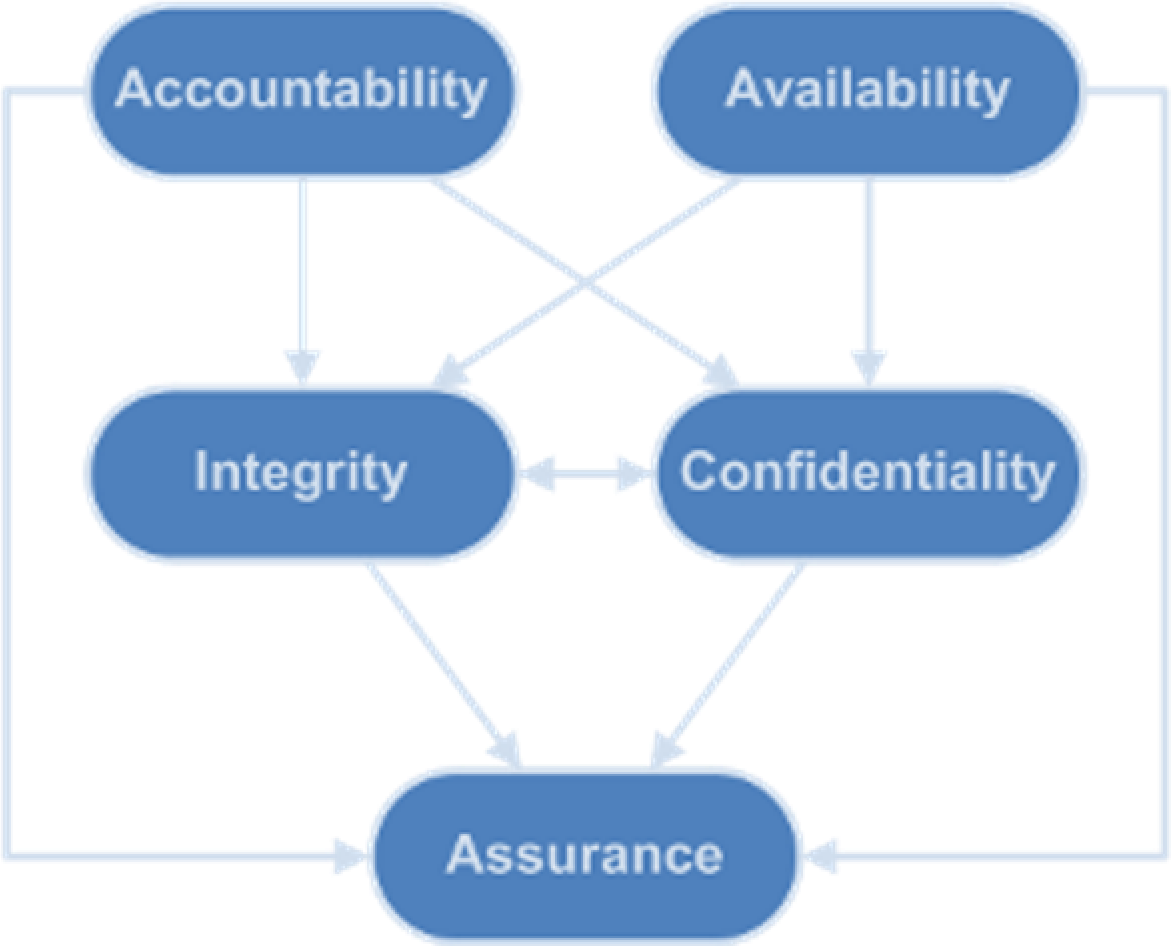
🎯 Assurance

- Introduces **control activities** for the aforementioned security goals
- Periodic controls **assuring that all security measures** (both technical and operational) **work as intended**

Supporting Principles (📊 📈)

- Auditing, Measuring, Monitoring, Continuous Improvement

Dependency Model of CIA^3



CIA3 model (anno 2016), http://www.cia-cubed.org, used under CC-BY-SA 4.0

Exercise 2.2 (🤝)

1. Which of the extended CIAA security goals could have been compromised in each of the Motivation: Case Studies?
2. In your work group, research the assigned case and ✓ all compromised goals
3. Reason or prove each ✓ briefly during the presentation to the plenum

Case Study	Confidentiality	Integrity	Availability	Authenticity
Peloton				
Marriot				
Equifax				
CloudPets				

Exercise 2.3 (📝 🏠)

1. Define at least three supporting measures for each CIA^3 security goal, distinguishing between technical and organizational measures

Security Goal	Technical Measures	Organizational Measures
Confidentiality		
Integrity		
Availability		
Accountability		
Assurance		