Intro Lecture!

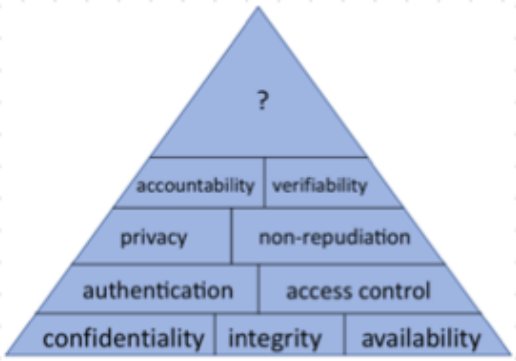
- In Security **Assumptions will be broken!!!**

Security Goals

- **Confidentiality** → Eavesdropping, man-in-the-middle.
- **Integrity** → masquerading, message tampering, replaying.
- **Availability** → Denial of Service.

So... **what does it mean that a system is secure?!?**

- we can **take a look** at the following:



- The pyramid shows what is needed to for a system to be secure
- many other aspects can apply!

We can say that **"Security is impossibly hard"**!

- you must **defend** against **all** possible attacks
- adversary needs to **find just one** attack that works
- ~~∃~~ no perfect security
- Security is measured in the resources required of the adversary!

Security Principles

- **Economy of Mechanism:**
  - **Keep it simple!**
  - Complex design yields **complex failure analysis!**
- **Open Design:**
  - Security of the system should **not depend on secrecy** of its protection mechanisms.
  - The **adversary knows the system!**
- **Minimum Exposure:**
  - **Minimise the attack surface** a system presents
  - **Reduce external interfaces**
  - **Limit info & window of opportunity!**

- **Least Privilege:**
  - Any component should use the least set of privileges.
  - Restrict email access, Powerpoint doesn't run as root.
- **Fail Safe Defaults:**
  - Start & end in a secure state
  - If failure, no-one has access!
- **Complete Mediation:**
  - Access to anything must be controlled!
  - OS access to file sys, circumvented if access to physical disk is possible!
- **No single point of failure**
  - Build redundant security!
  - Separation of duty is key!
- **Psychological Acceptability:**
  - Design usable things!!!
  - Help user to make the right choice!