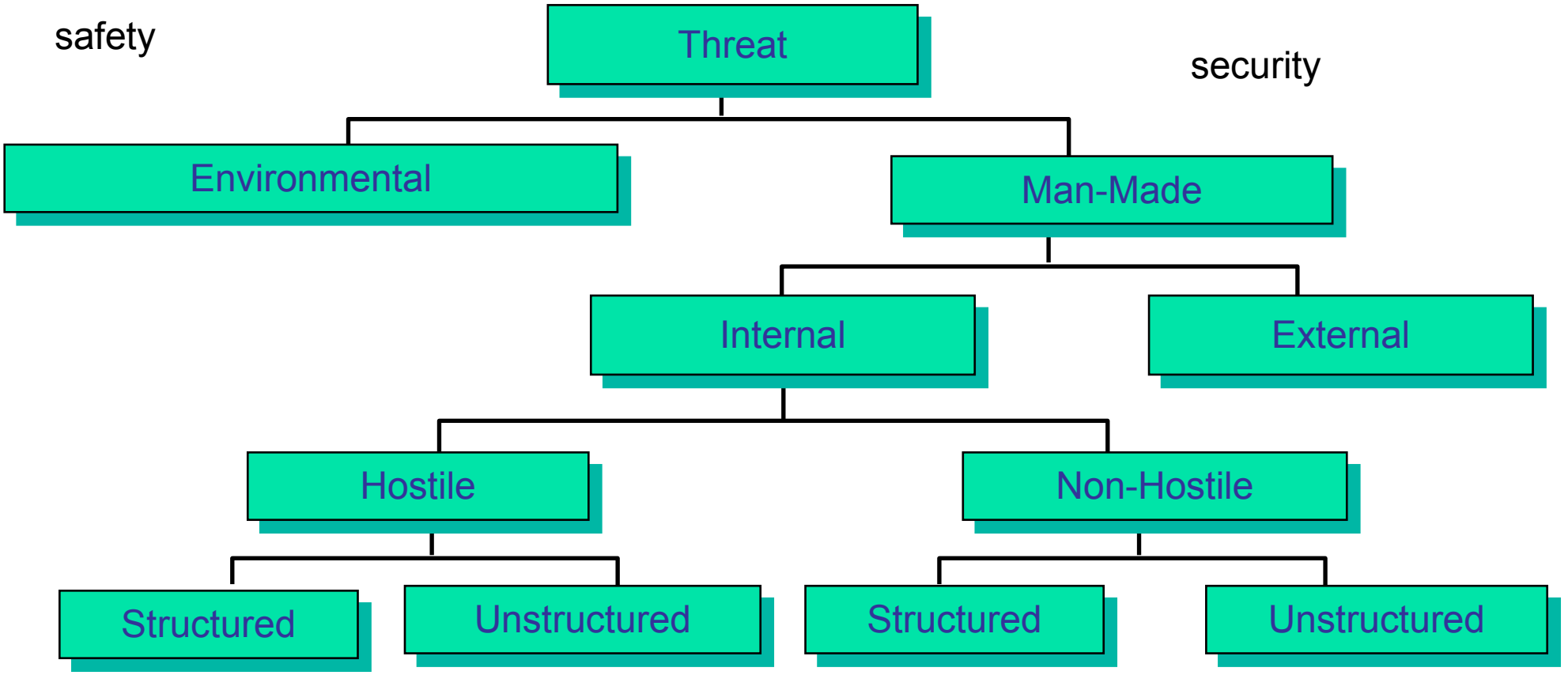
Threat Analysis

Threat analysis

- It has to determines the enemies of a system
  - Who is interested in attacking the system
  - Who can access the resources to attack a system
  - What are the events that may involve the system
- It determines the threats (classes) and the agents in each class
- If there is not a threat that can exploit a given vulnerability, then the assessment may neglect such a vulnerability
- It is strongly related (it may be interleaved with) the attack analysis (is there anyone that can implement this attack?)

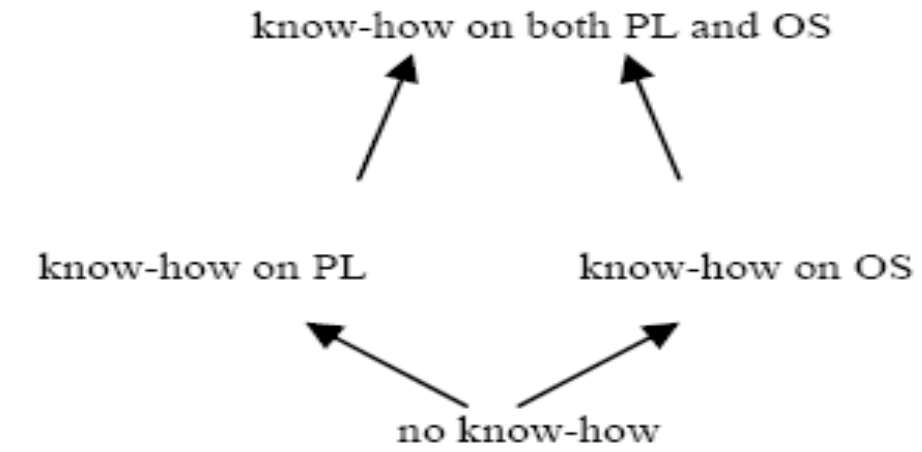
A threat taxonomy



Threat analysis

- For each agent, the analysis determines
  - The agent goals= rights on components
  - The resources the agent can access
    - Tecnological
    - Information (security through obscurity)
    - Know how and abilities
  - The risk attitude of the agent
- Agents can be partially ordered according to
  - the resources they can access
  - the risk they are willing to take
- The higher the position, the larger the danger
- Attacks can be ordered in the same way

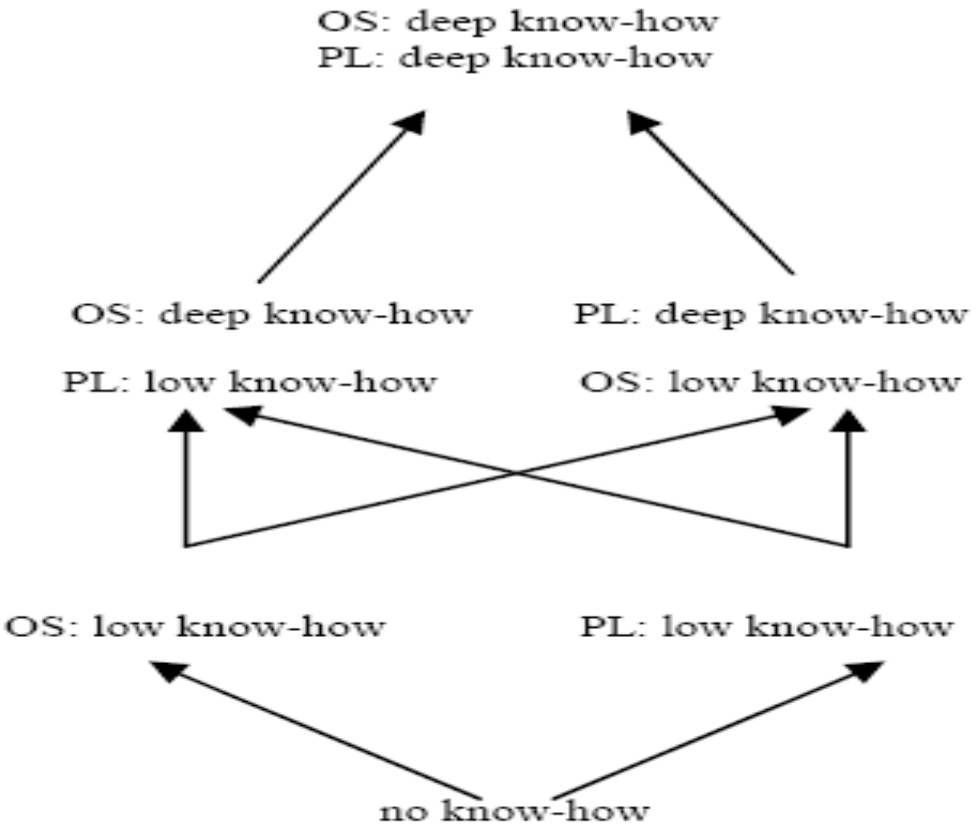
A lattice based description of agents



a) A poset modelling the know-how of a threat

A finite model to describe threat agents

A lattice based description of agents



A more refined model to describe threat agents

Describing an agent

- Each attack is described by a tuple of attributes and a noise
- Each agent is described by a tuple of attributes (same for attack) and an accepted noise
- We have one distinct partial order for each attribute
- This define a partial order for both agents and attacks

Feasible attacks

- Given
  - a tuple T_A that describes the attack A and where each tuple element evaluates an attribute of A
  - a tuple T_M that describes a threat agent M and where each element evaluates the resources that M can access
- M can execute A provided
  - Each element of tuple T_M is larger than or equal to the corresponding elemen of T_A
  - The noise paired with A is smaller than or equal to the one that is accepted by M

Threat model

- Anytime a security problem is analysed there is the problem of formally determining the actions that any threat agent
  - can execute
  - cannot execute
  - is not willing to execute

  should be considered
- It this problem is not solved, the analysis is not complete
- Not important when national security is involved

Threat model and partial orders

- The partial orders among threats and attacks do not support the discovery of threat or of attacks
- They are an important way of guaranteeing the coherence of the analysis because they enable us to guarantee that a more powerful threat actually can implement a larger set of attacks (even if sometimes it may be not interested in implementing them)