Dynamic System Modeling for Threat Analysis

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Threat-Driven Cyber Security

Define the **scope** of the analysis. Exhibit the system, **attack surface** and critical resources.

Gather **information** relevant for the defined scope.

Correlate the gathered pieces of information to **identify** the **threats**, **vulnerabilities** and potential **attacks**.

Make **intelligence - driven decisions** and take **action** against threats.

Dynamic Attack-Defense Model

How to model and build a **dynamic simulation** of a **running system** in a **cyber security** context *i.e.* in an environment where **threat actors** evolve ?

Attack Surface Reification

Concepts identification and description. Relevant **structures** and **abstractions** choices.

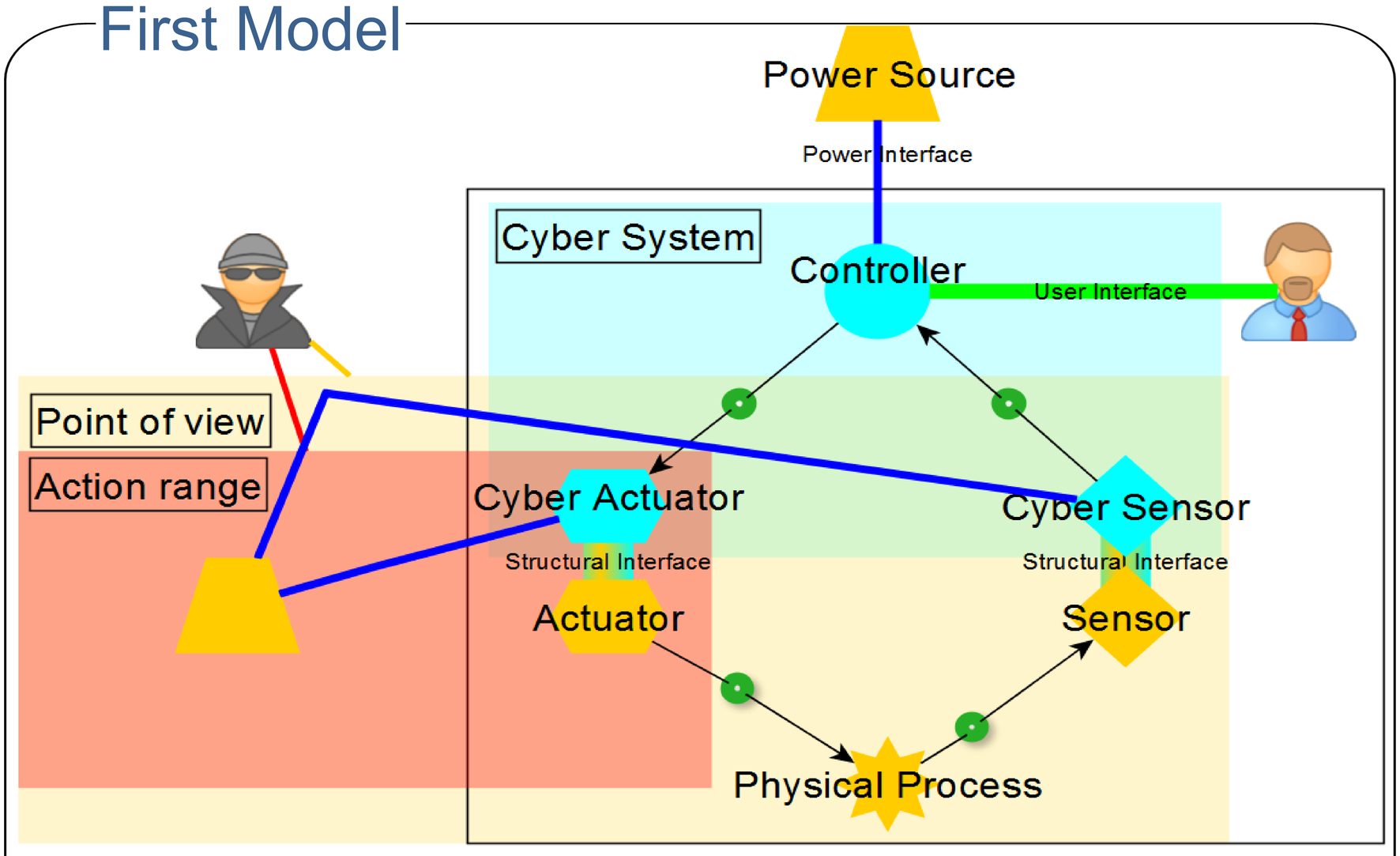
Dynamic Model

Lifecycle of the system. **Temporal** dimension, **interactive** system and evolving **attackers** and **defenders**.

Implementation & Simulation

Runnable and non-cyber-agent-**user-friendly** simulation. **Compatibility** with other security **tools**.

First Model



Cyber Physical System: Group of **interacting entities**. **Target** of the attackers. Definition in an **environment**.

Actor: **Attacker** or **defender** of the system. Interactions with the system through an evolving **point of view** and **action range**.

Actions: Available **evolution** attempts of an actor's interactions with the system. (modification, insertion, deletion)

Research Directions

Cyber Threat Intelligence
Cyber-related vocabulary

Operational Design
Military operation planning

Embedded Systems
Cyber physical system modeling

Attack Trees
Step-by-step attack modeling

Model-Checking
Formal verification method

Game Theory
Multiplayer scenarii modeling

Temporal Graphs
Evolving data structure

Automata
Conditional state-machines

Composite Structure
Both textual and graphical

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