Network Incident Severity Assessment

Automatic Defense Mechanisms

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Outline

- Introduction and motivation
- POSITIF
- Assessment Model
- Outlook & Future Work

Introduction

- Information Security

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    - Intrusion Detection (IDS, IPS, Honeypots, Log analysis)

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    - Intrusion Prevention → reactive
    - Intrusion Detection → reactive

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    - Alert Correlation reduces information amount → doesn´t provide knowledge!

Motivation

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  - Incident's effect on "health" of
    - Affected system(s)
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  - Manual Method
    - Time between alert and reaction
    - Evaluate impact on network $\Longrightarrow$ Topological knowledge helps, but challenging for big networks

Problem Statement

- Extract knowledge from information in alerts

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- React to detected anomalies

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  - Goal
  - Workflow
  - Structure
  - Proactive Security Monitor
- Assessment Model
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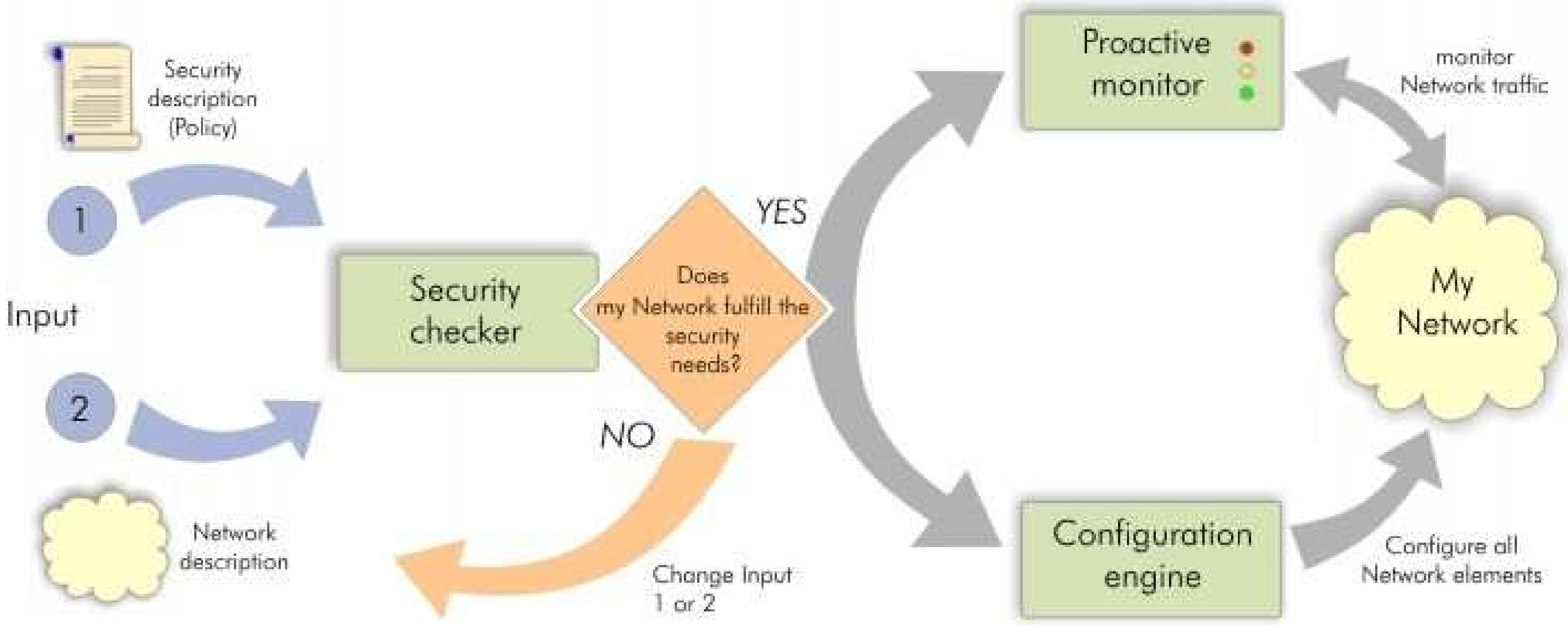
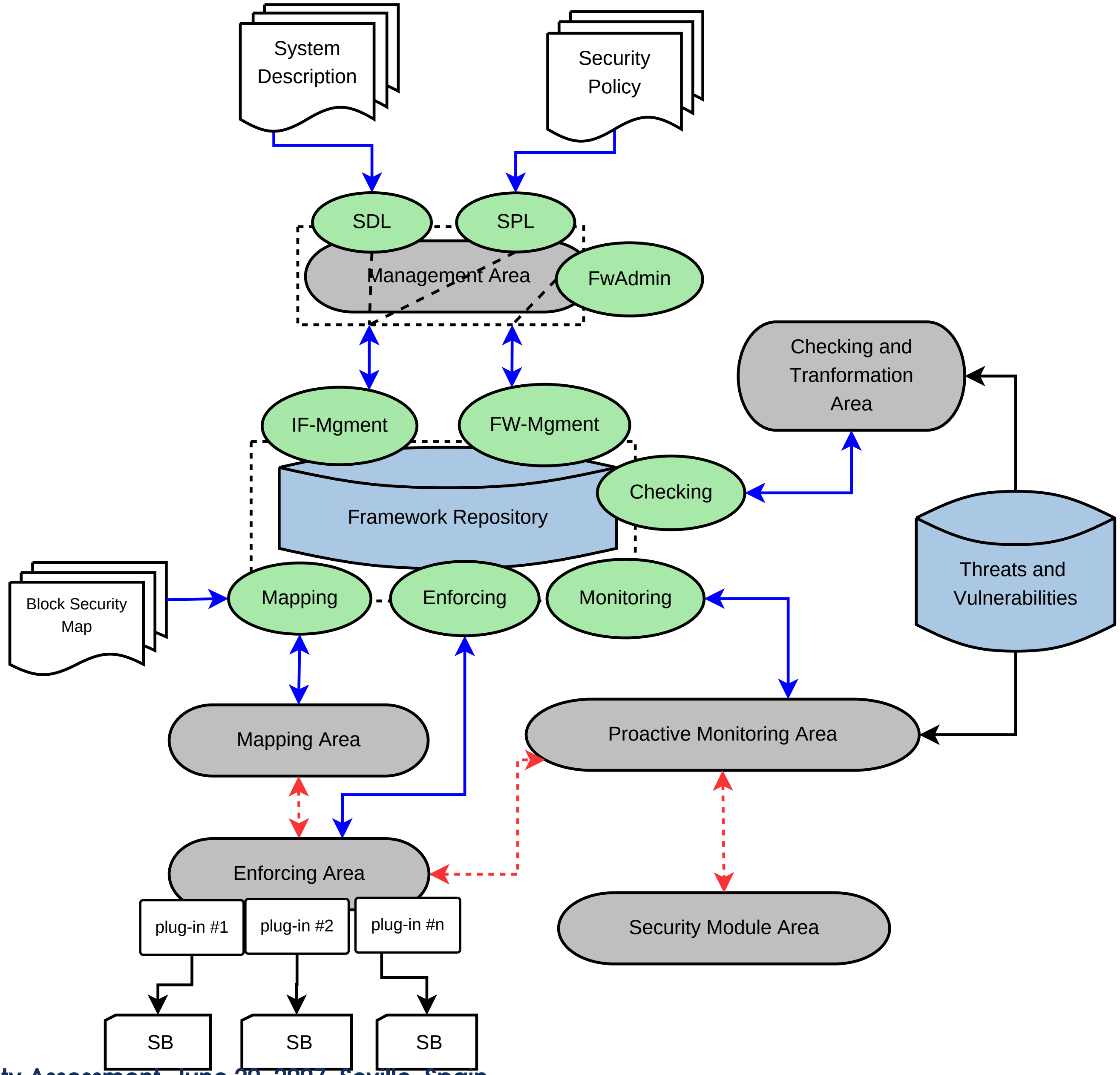
POSITIF Workflow



POSITIF Structure



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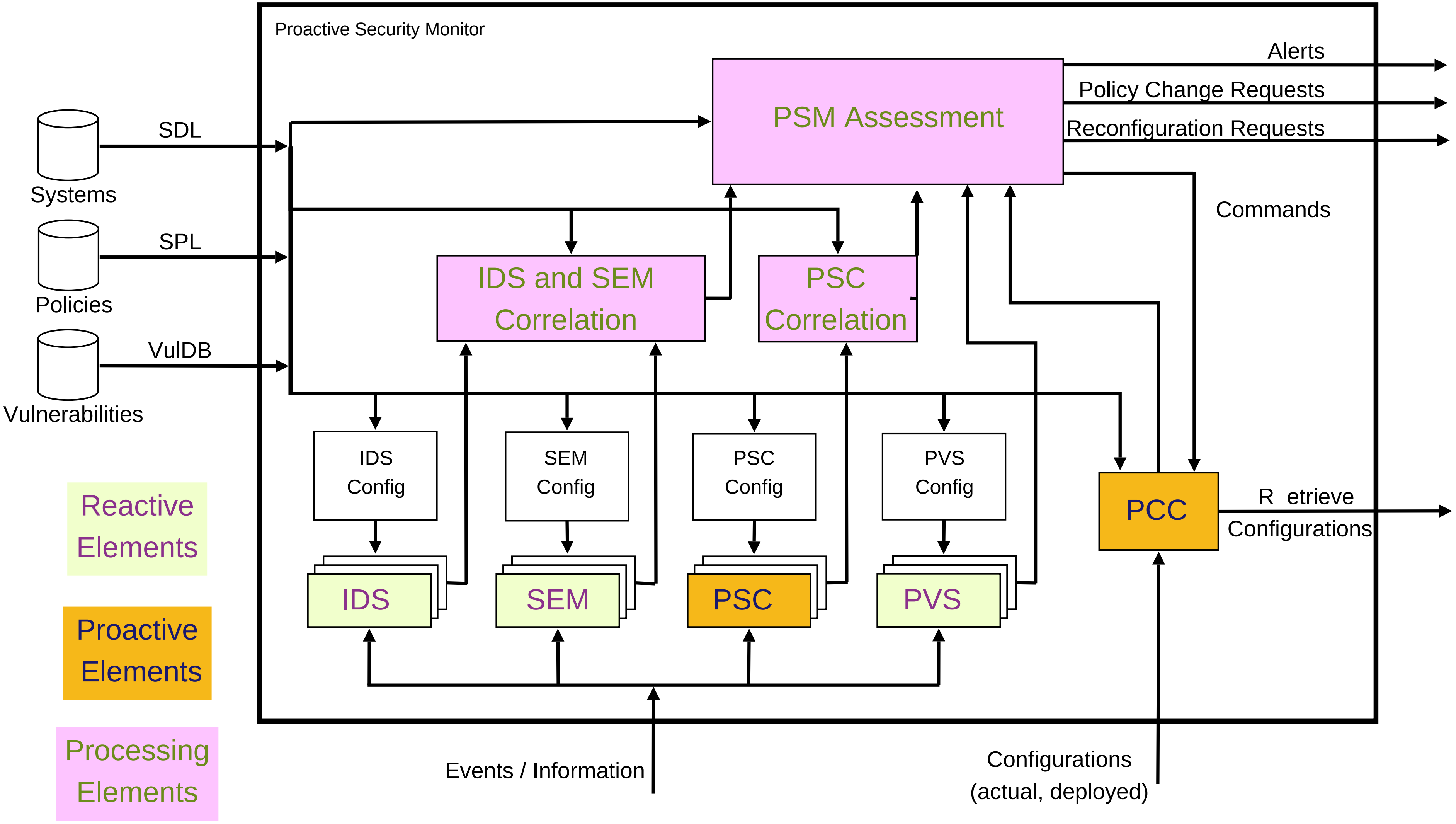
  - Protocol: BEEP (Blocks Extensible Exchange P.)

PSM Structure



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  - Preparation
  - Model
  - Reaction State Machine
  - Process
- Outlook & Future Work

Assessment - Preparation

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  - Self-stabilization

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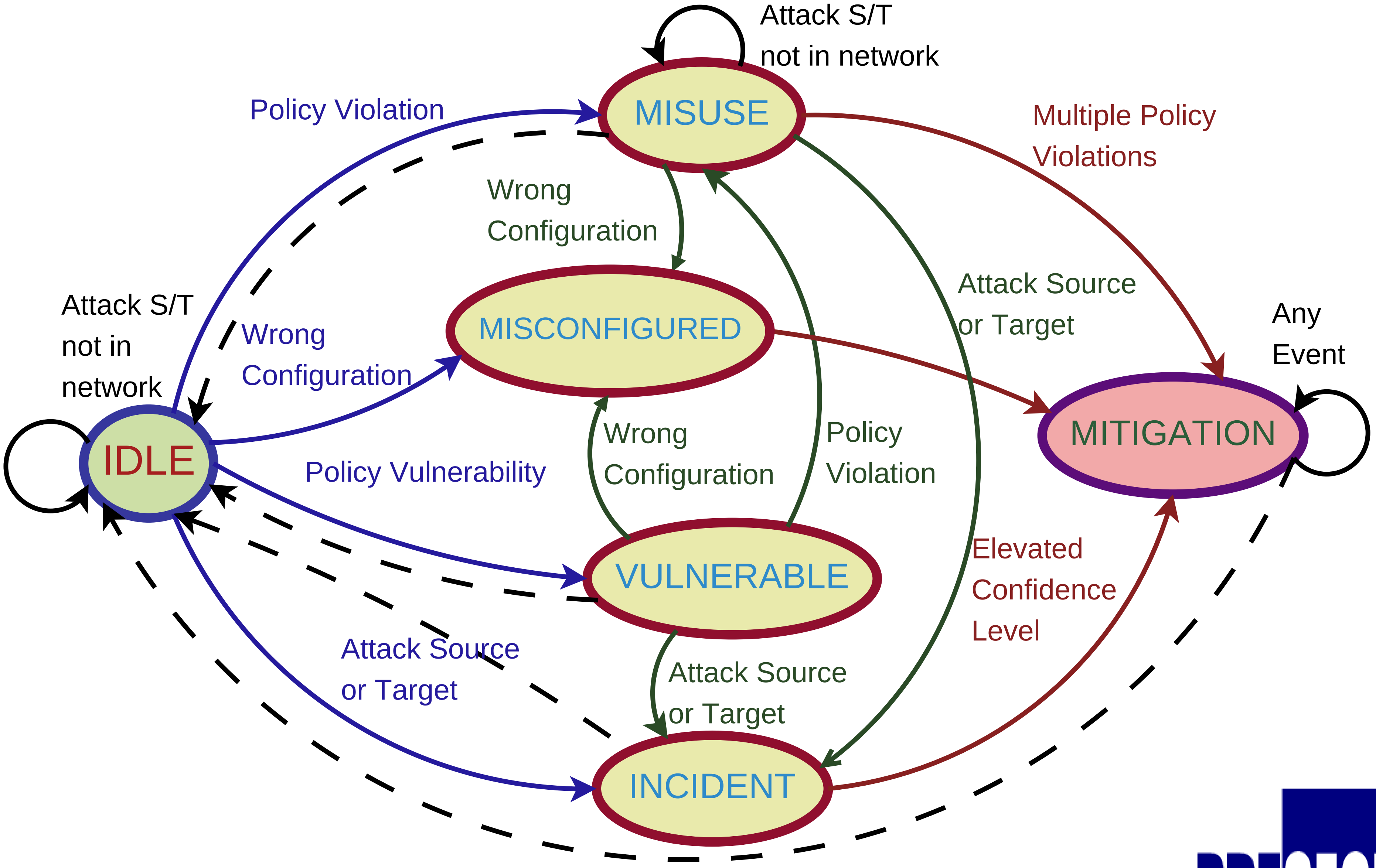
  - Self-stabilization
  - Extension to overall network health measure

PSM - State Machine



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  - Correlates IDS Correlation with other sensor inputs

Alert Clustering

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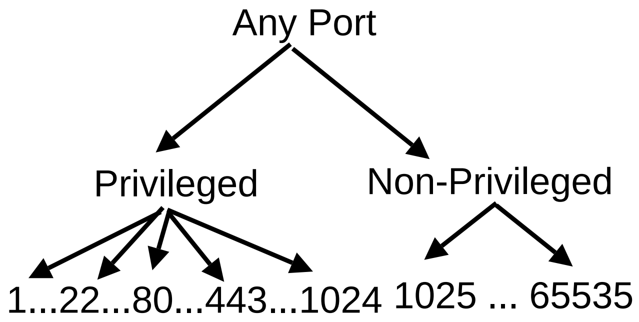
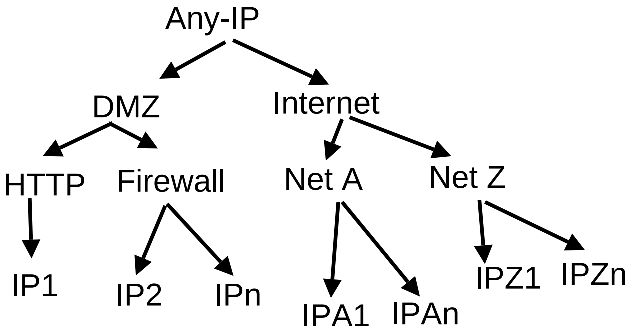
  - Calculate effect of all clusters (Cluster Association Strength)

Alert Clustering Hierarchies





Levels of Generalization		IP Address	IP Port	Time
General	1	Any-IP		Within-Day
	2	Network	Any-Port	Within-Hours
	3	Subnet	(Non-)Privileged	Within-Minutes
Specific	4	Host	Actual port	Within-Seconds

Alert Correlation

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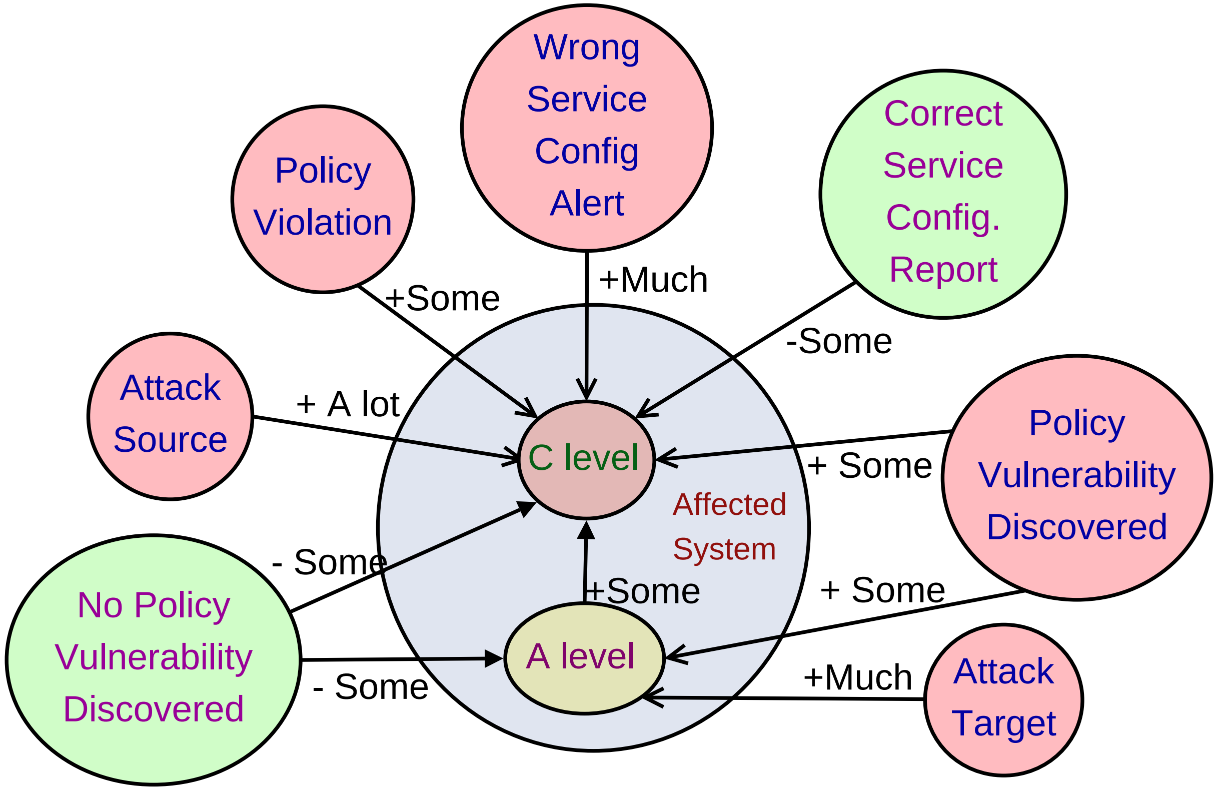

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  - Centroid Defuzzification → Overall Degree Concern (System)

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- Information clutter reduced to single value: low, caution, elevated, high, severe
- Level changes can trigger (de-)increase in Network Security Level

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  - Deteriorating / improving conditions are reflected by changes in the overall Policy Security Level

Future Work

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Questions?