

レジリエンスの指標：Performance MetricとCompetency Metric

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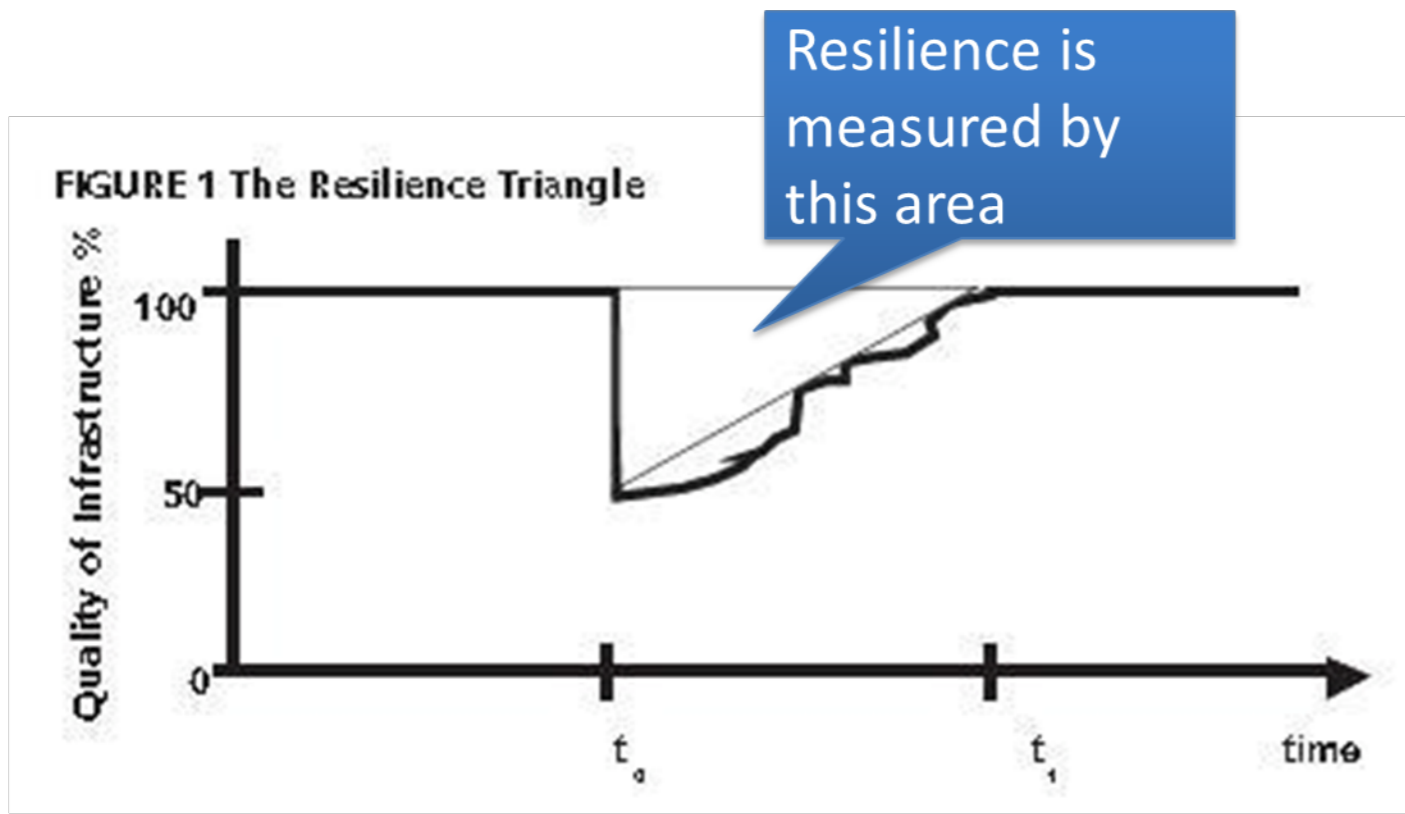


情報・システム研究機構 新領域融合センタープロジェクト「システムズ・レジリエンス」

問題意識：レジリエンスをどのように評価するか？

I. Typical Resilience Metric

Bruneau's "Resilience Triangle"



Michel Bruneau, et al., 2003

II. Performance Metric vs Competency Metric

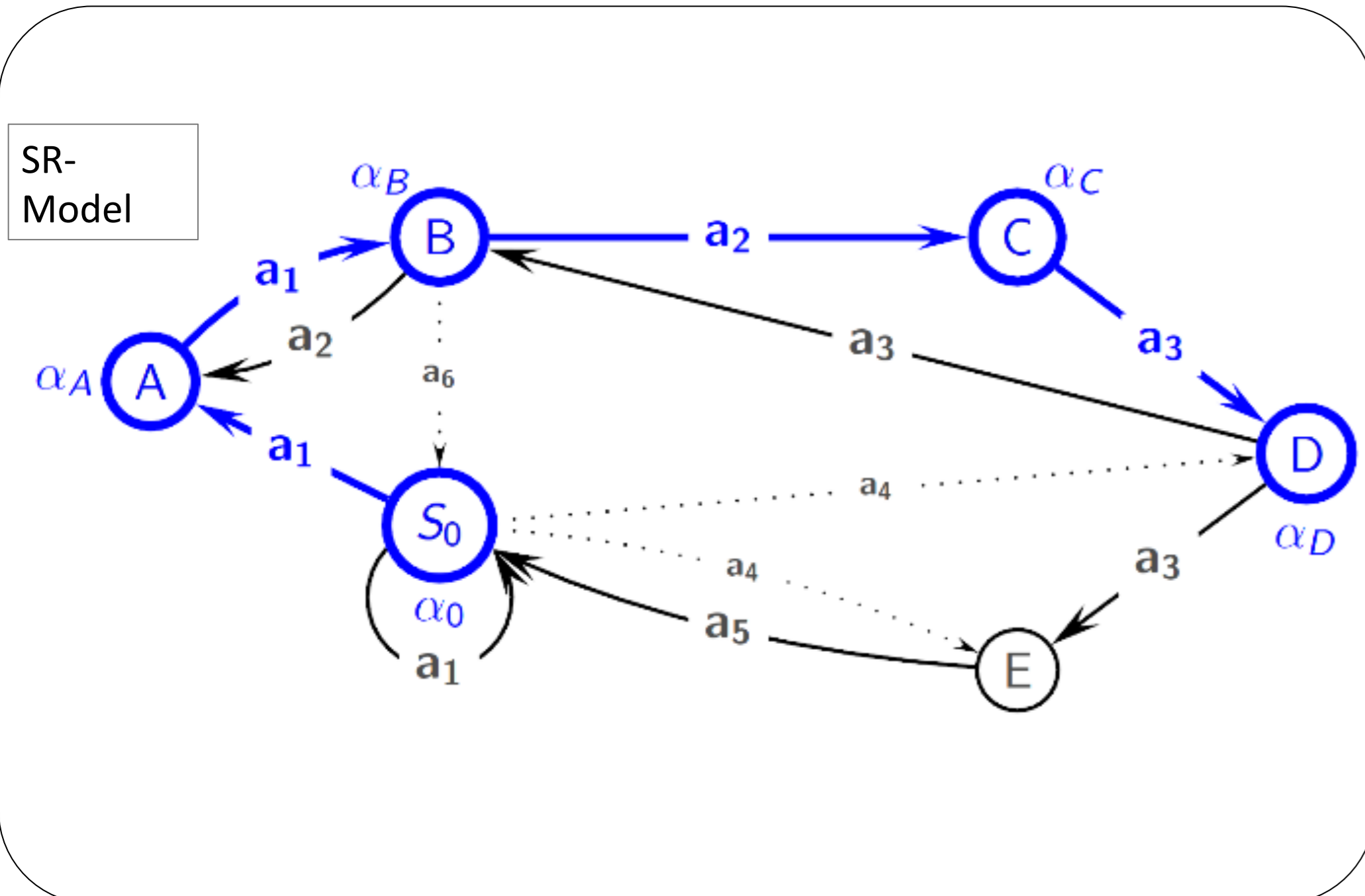
Performance Metric

- Against past events
- Demonstrated
- Objective
- Absolute (e.g., Bruneau's triangle)
- Consider single timeline

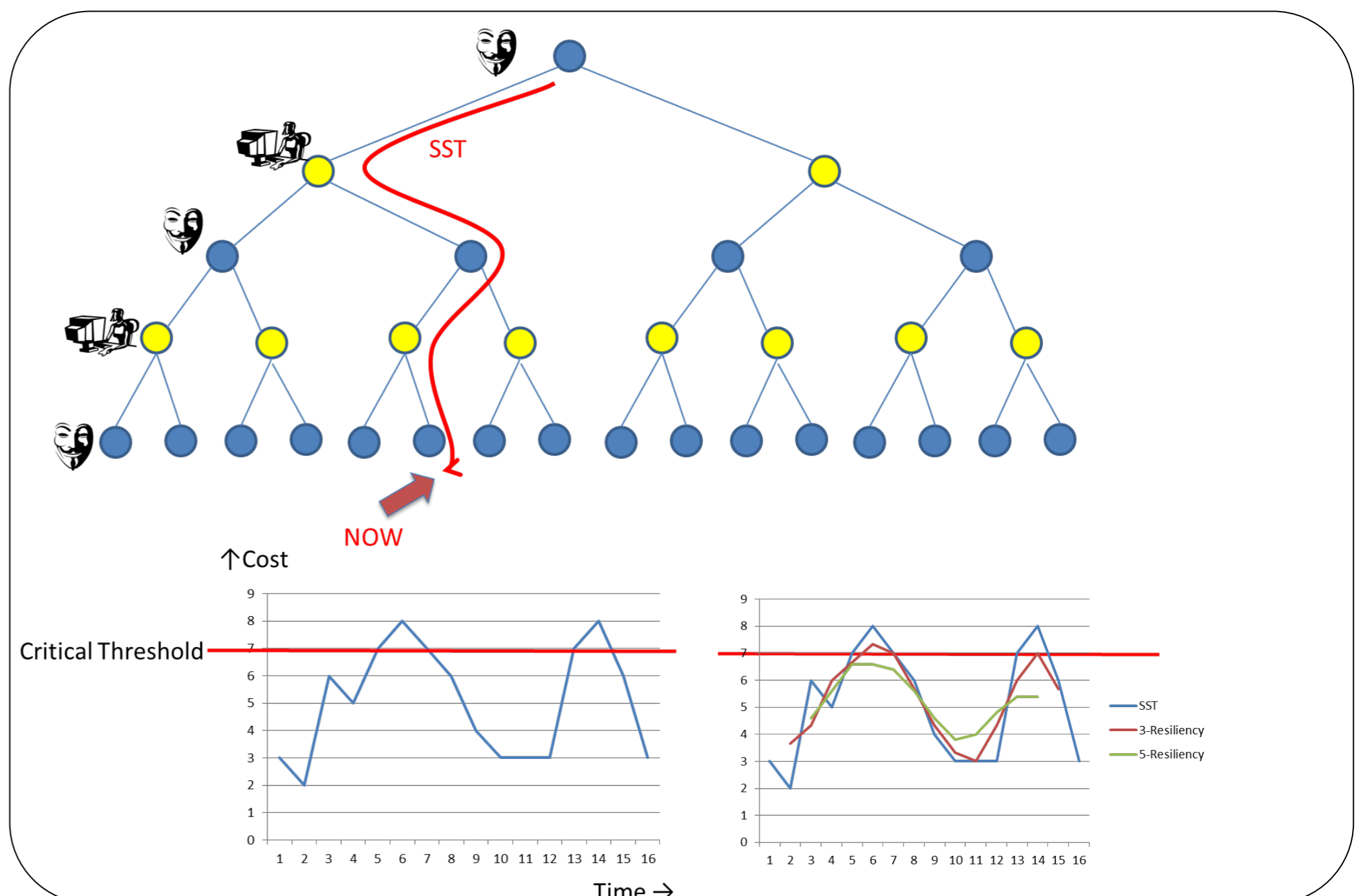
Competency Metric

- Against future events
- In theory
- Subjective
- Relative (system A is more resilient than system B)
- Consider multiple scenarios

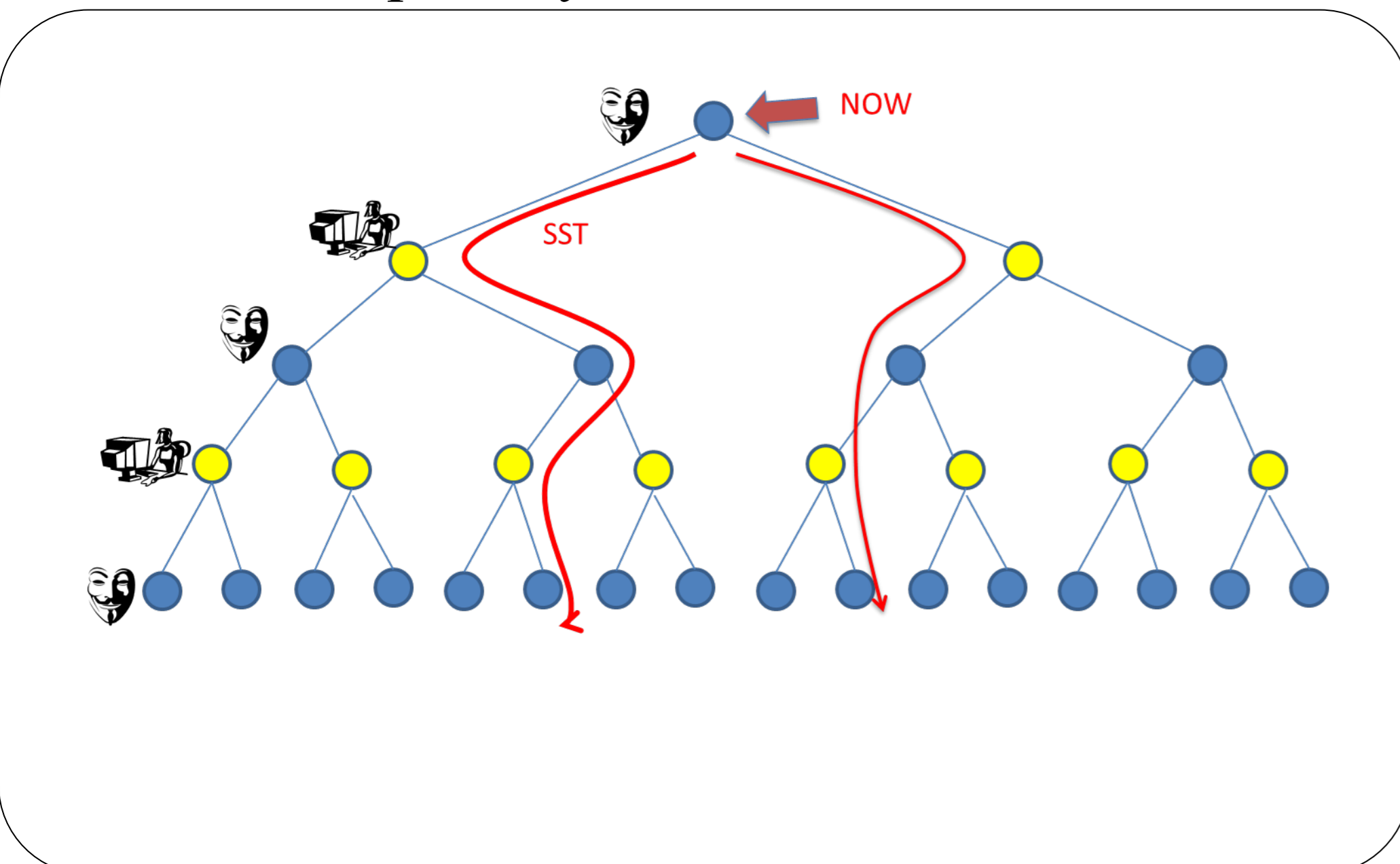
III. SR-Model: System as a Dynamic System



IV. Performance Metric in Game Tree

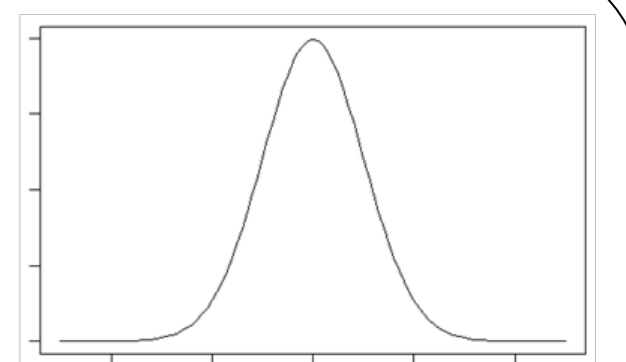


V. Competency Metric as the Worst Case



VI. Implication

- Example: Random Walk (each turn is i.i.d.)
 - Attacker increases the cost (Prob. 0.5)
 - Defender decreases the cost (Prob. 0.5)
- If we consider unlimited timeline, for any $p > 0$ and any $Th > 0$,
 - $Prob(cost(S_t) > Th \text{ for some } t > 0) = 1$
- Given horizon H , we can determine the ranges of p and q s.t.
 - $P(cost(S_t) > Th \text{ for all } t < H) < \epsilon$



➡ Competency resilience is meaningful only when there is a time horizon (finite time)