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

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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

Resilience is measured by this area Michel Bruneau, et al., 2003

II. Performance Metric vs Competency Metric

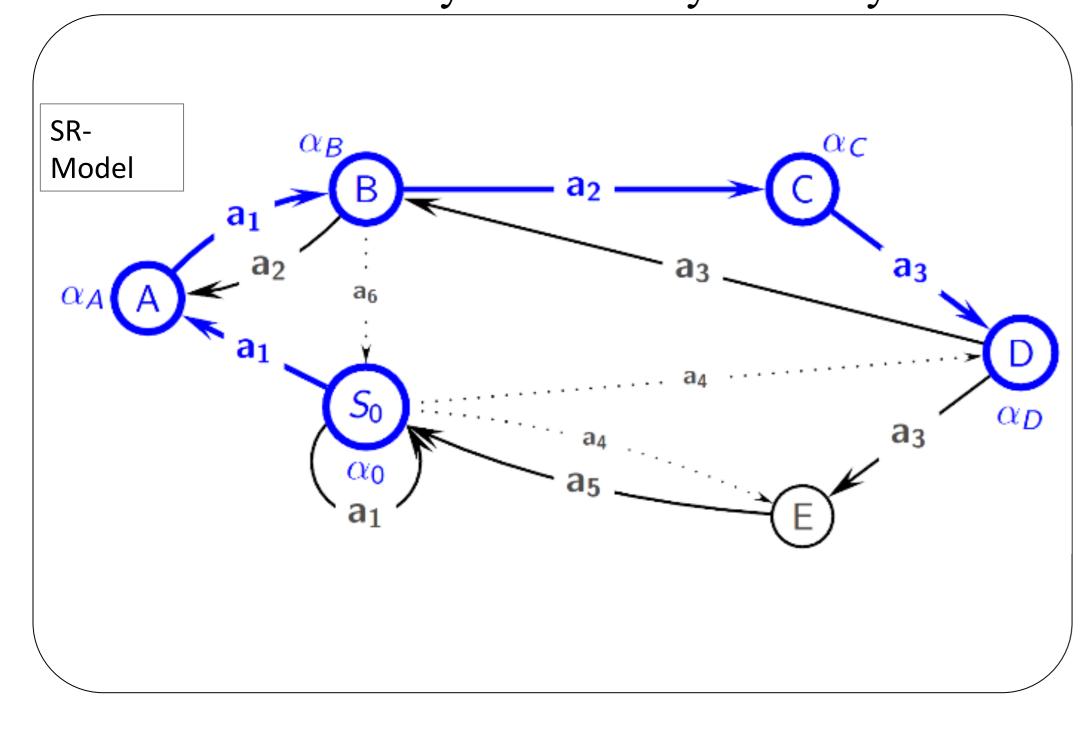
Performance Metric

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

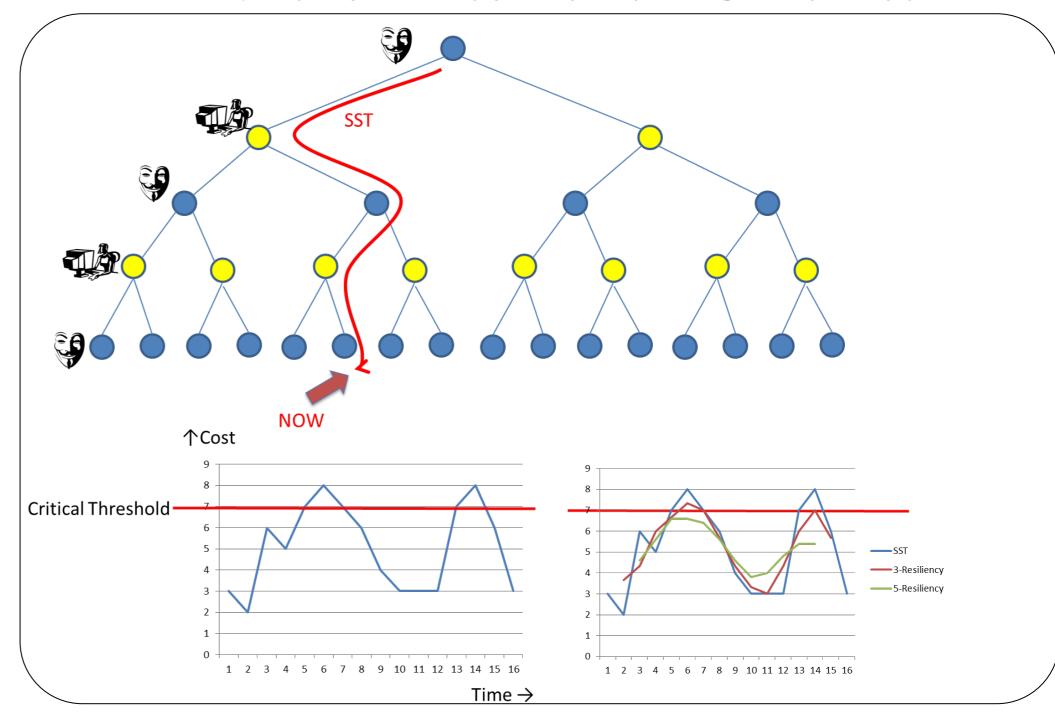
Competency Metric

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

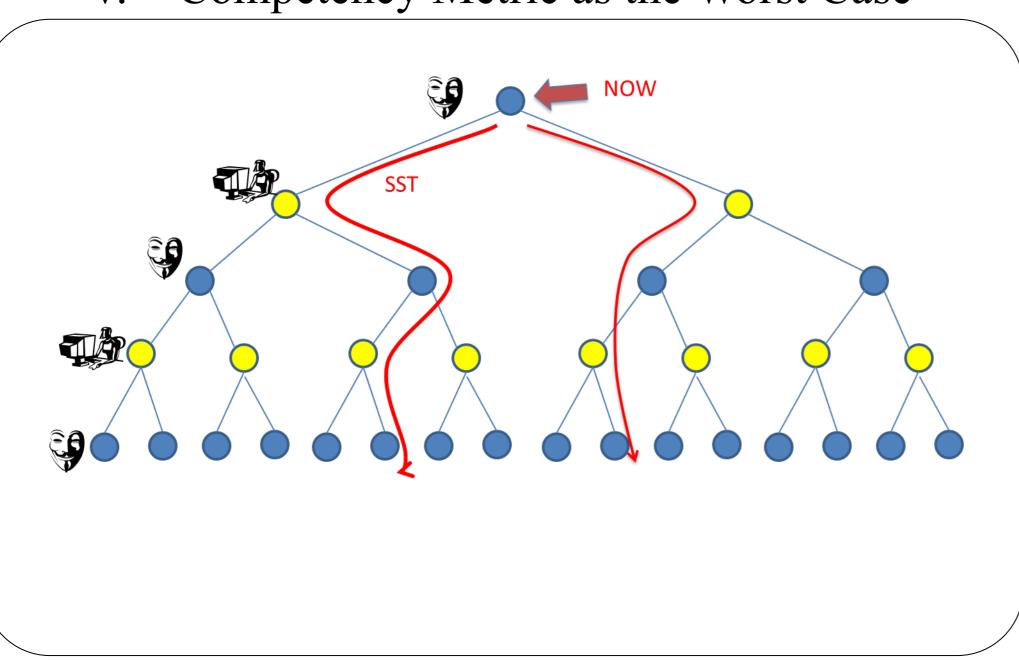
Ⅲ. SR-Model: System as a Dynamic System



IV. Performance Metric in Game Tree

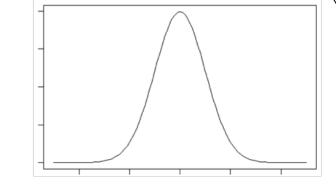


V. Competency Metric as the Worst Case



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 for all t<H) < ε

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