SARNET Alliance

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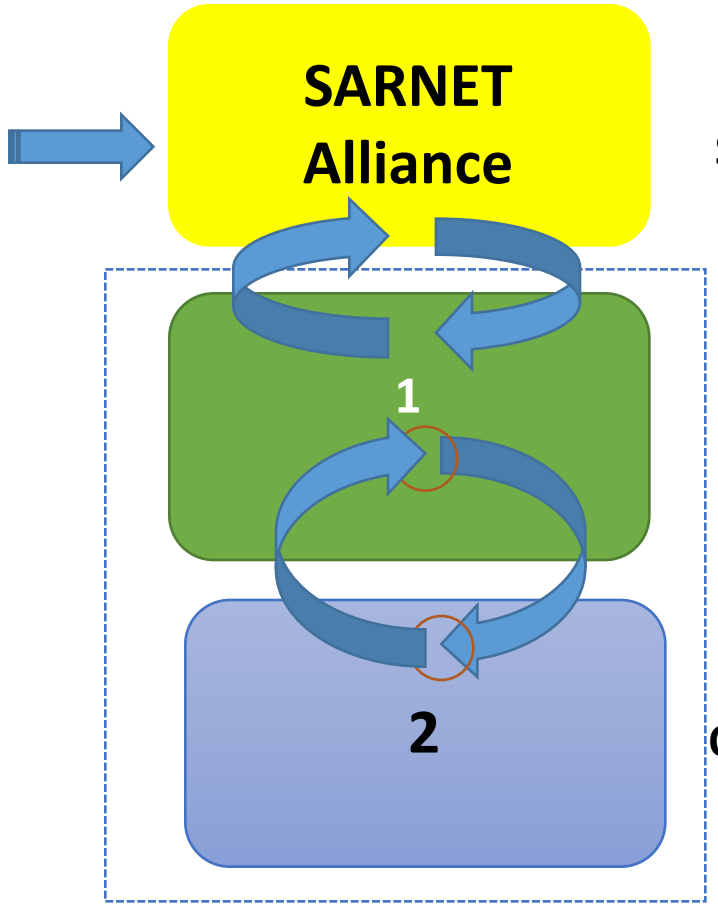
Security Autonomous Response NETwork Research

Ameneh Deljoo

Why we need SARNET Alliances? Model autonomous SARNET behaviors to identify risk and benefits for SARNET stakeholders.



Strategy Level

Tactical Level

Stojan Trajanovski

Operational Level

Ralph Koning

Motivation

- Creating SARNET Alliance
- Collaborative defense.
- Sharing Cyber Security Information.
- Autonomous response.
- To enhance cooperation.
- Attack against one member is considered as an attack against all.
- Each participant must **trust** other participants to correctly detect and mitigate cyber threats.

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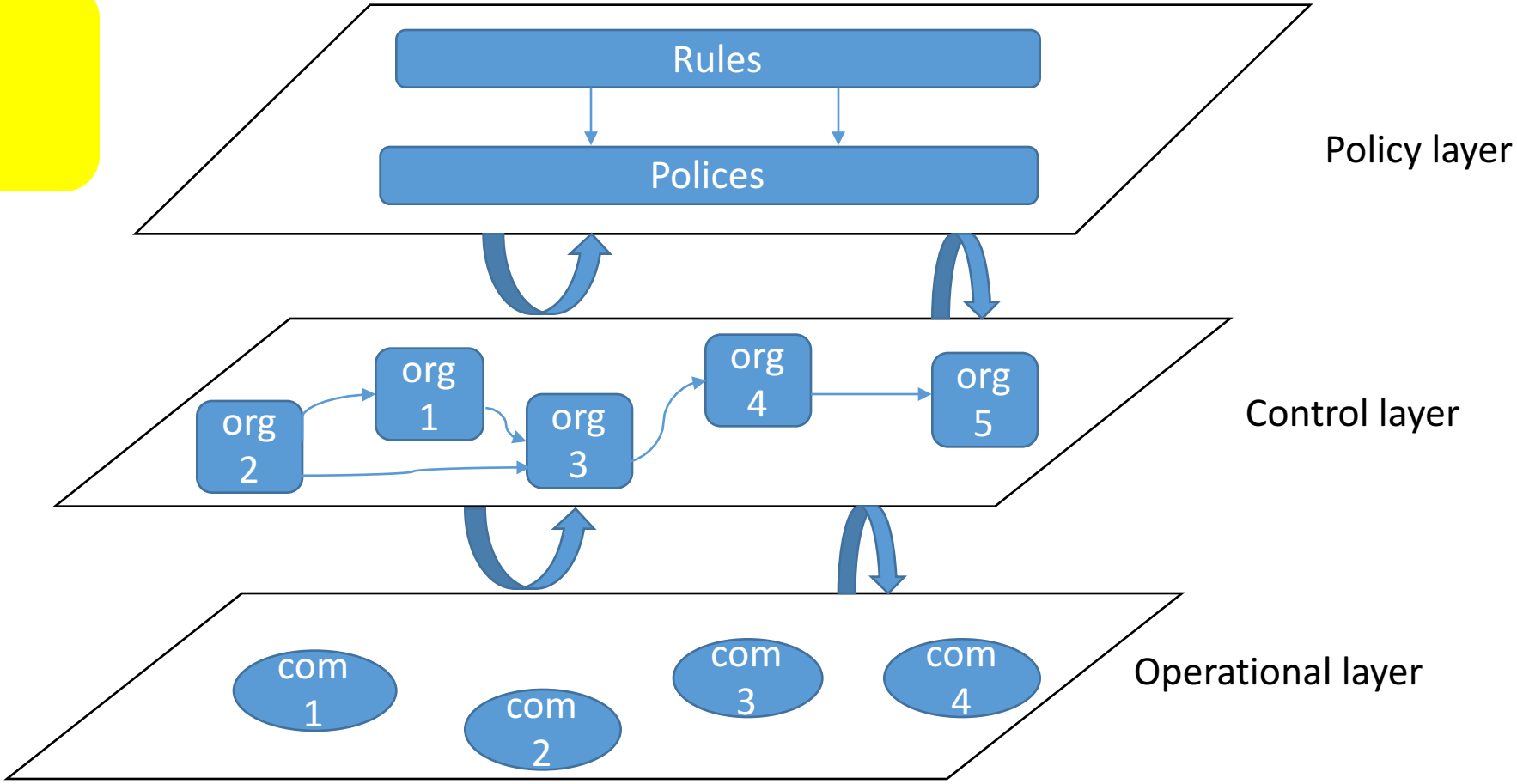
Trust must be organized and maintained across multi-domains.

Trust must be organized and maintained

- ! Well-defined Trust
    - No Information Sharing
    - High Risk
    - Cost
    - Vulnerable to Attack

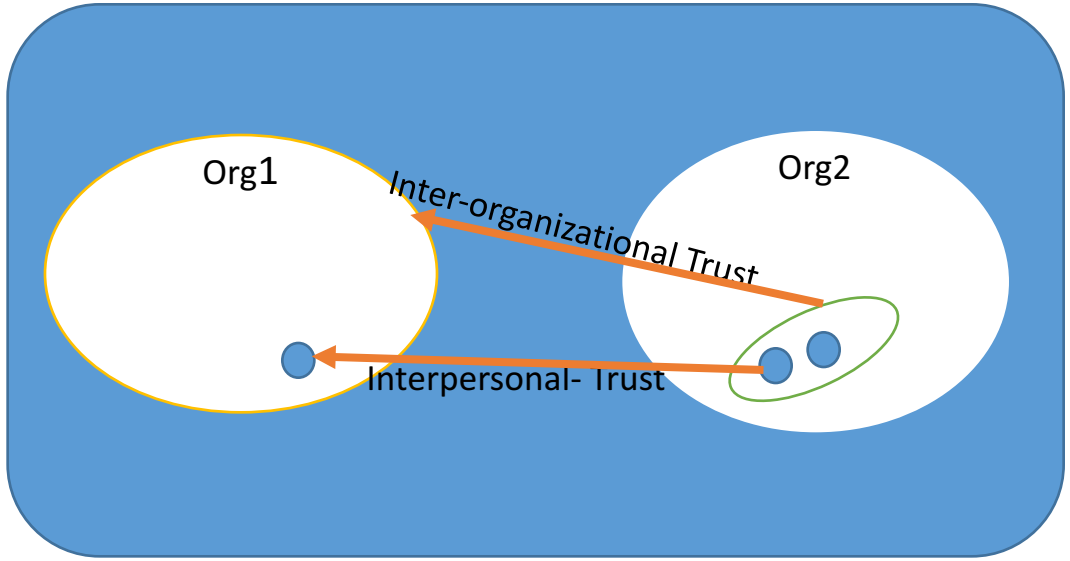
SARNET Alliance

SARNET Alliance

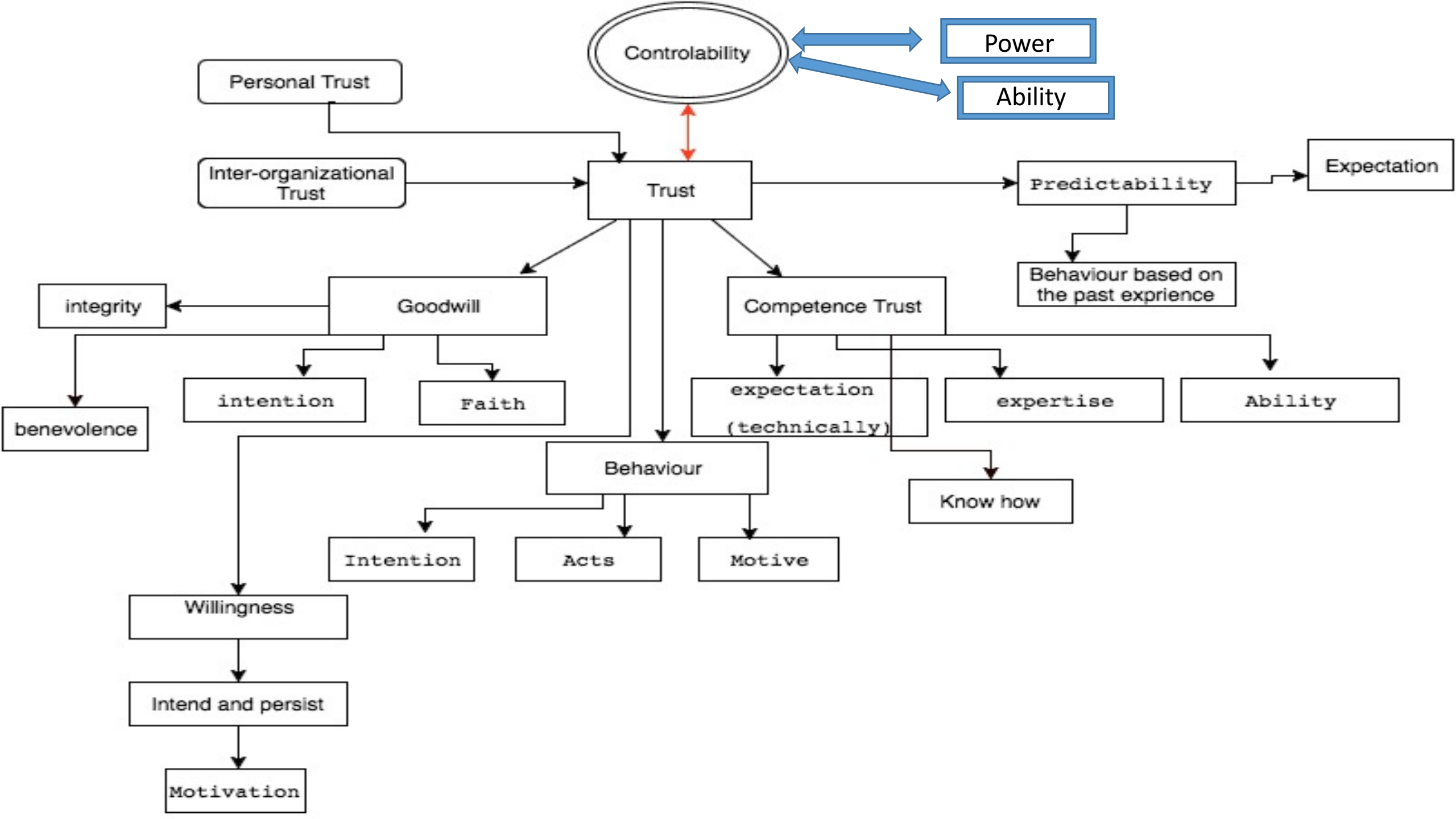


Inter-organizational and Interpersonal Trust

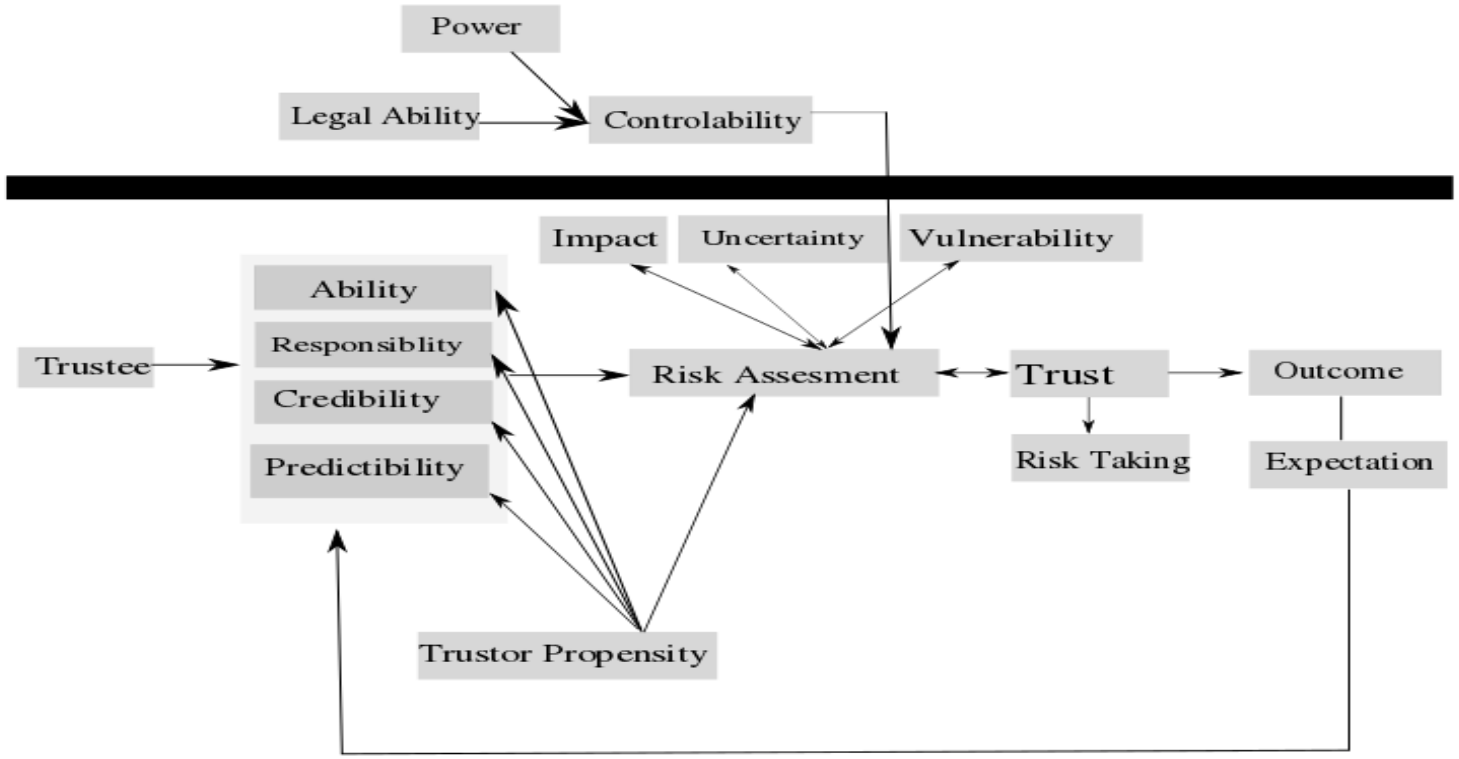
- Impact of trust at different levels on collaborative micro to macro level (entity/co-entity).
- (Positive) Relationship between the extent of interpersonal trust and inter-organizational trust.
- Top – down approach and bottom-up approach and their impact on trust.

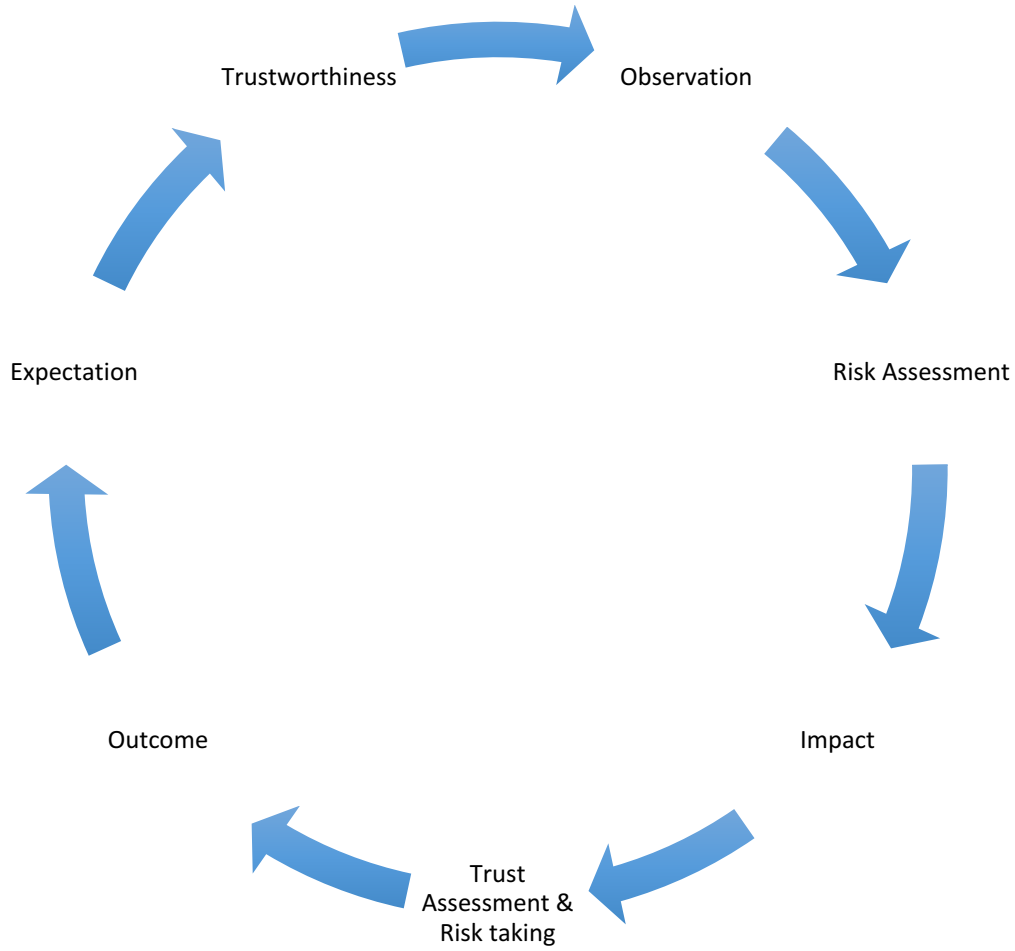


System Trust


Controlability
Power
Ability
Personal Trust
Inter-organizational Trust
Trust
Predictability
Expectation
Behaviour based on the past exprience
integrity
Goodwill
Competence Trust
benevolence
intention
Faith
expectation (technically)
expertise
Ability
Behaviour
Know how
Intention
Acts
Motive
Willingness
Intend and persist
Motivation

Trust Framework





The Digital Prisoners' Dilemma

- **Agent based model Demo**

  - Apply an Evolutionary Prisoners' Dilemma to cyberspace
  - Different Players
  - Different Strategies to choose From (e.g. Always Defect, TFT, Always Cooperate).

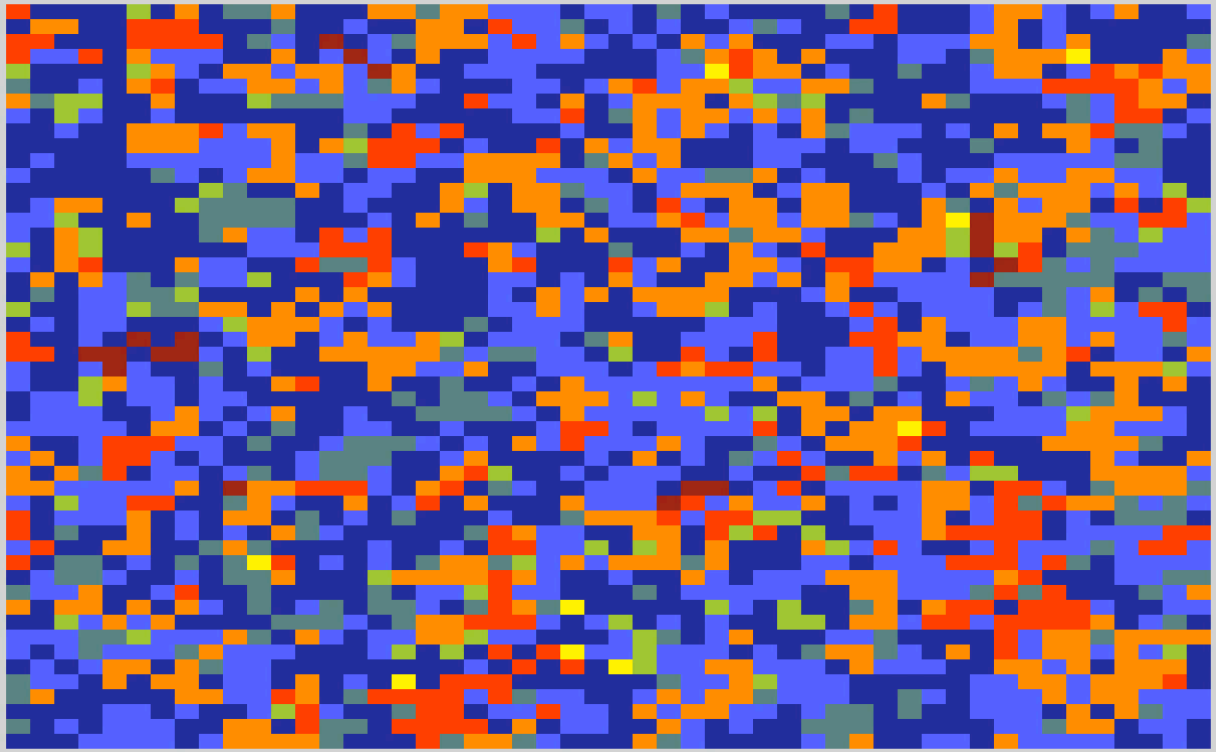
- **Goal**
  - Evolutionary Prisoners' Dilemma
  - Good Strategy
  - Learn from game
  - Observe members' behavior

- **Outcome**
  - We have to cooperate to save our organization.
  - Lacking Trust and fear of the other's betrayal motivates both prisoners to testify against each other.
  - Predicts our opponents' next move.
  - Over time the proportion of the population choosing the strategy cooperate eventually becomes extinct.
  - Challenges and opportunities for cooperation.

Evolutionary Prisoner's Dilemma

Game Type Rules Strategies

Main Display



Player Type

Very 'Nice': 0.36 %
Mostly Cooperative: 2.88 %
Cooperative: 8.44 %
Balanced ('nice'): 27.16 %
Balanced ('nasty'): 34.88 %
Tendency to Defect: 17.8 %
Mostly Defects: 7.72 %
Very 'Nasty': 0.76 %

Population Fitness Stats

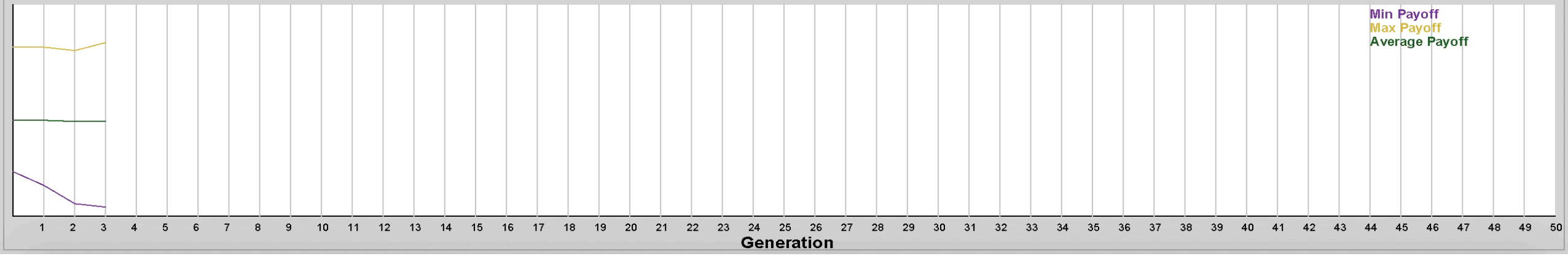
Minimum Payoff: 0.1925
Maximum Payoff: 4.105
Average Payoff: 2.24

(•) Use an Evolutionary Algorithm
( ) Use a Genetic Algorithm

Start | Stop

View Fittest Individual | View Weakest Individual

Graph



The Importance of Trust

- Productive **relationships** are based on trust – often **unrecognized** and taken for granted;
- It's a resource that **increases** with use;
- Enables **coordination** without coercion;
- Enables **commitments** to be undertaken in **high risk situations.**


Trust
=
Speed
Cost

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