

# Trust-based Approaches for Network Security



S&T Campaign: Information Sciences  
Science of Cyber Security

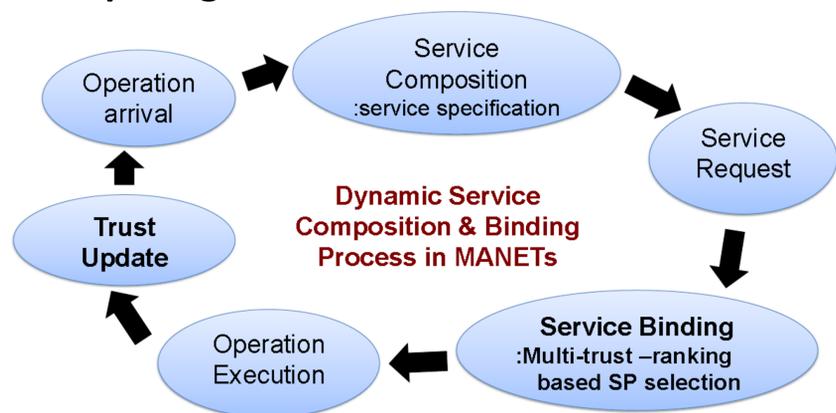
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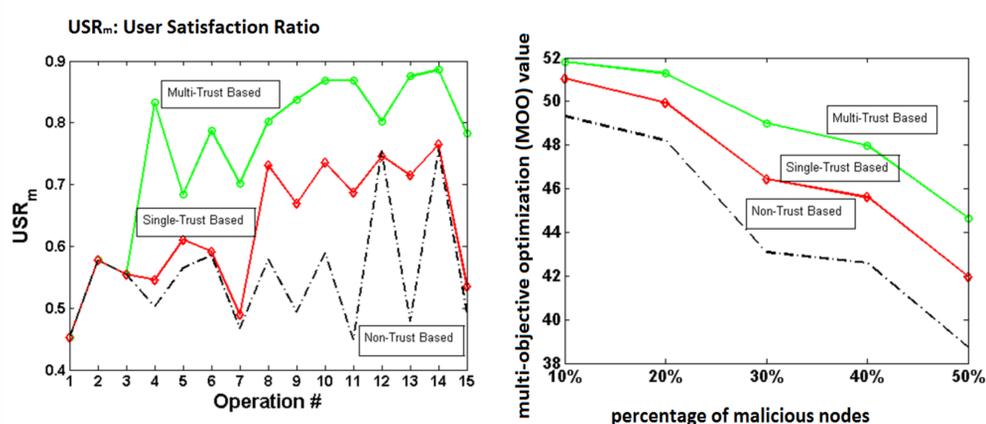
## Research Objective

- Enhance Soldiers' decision making capability and mission performance by providing decision making criteria based on assessed trustworthiness of participating entities in tactical networks



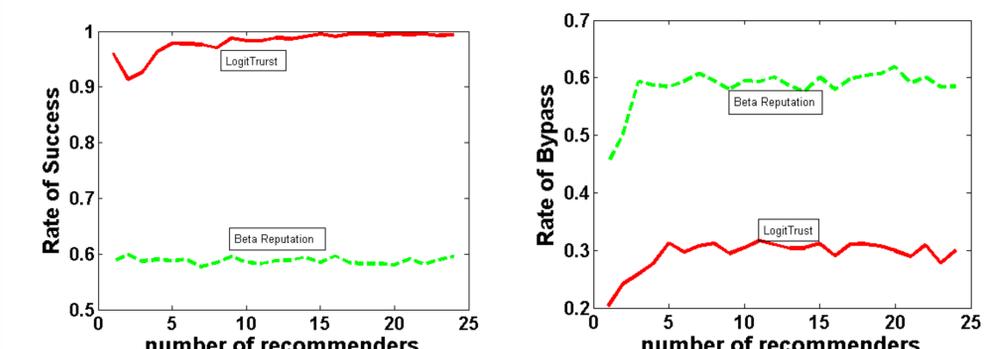
## Trust-based Service Composition and Binding

- Objective:** Investigate trust management schemes for service-oriented Mobile Ad Hoc Networks to maximize mission performance
- Result:** Multi-trust based schemes outperforms single-trust and non-trust based counterparts



## LogitTrust: A Logit Regression-based Trust Model

- Objective:** Develop a logit regression-based trust model using observations of behavioral patterns of entities
- Result:** LogitTrust outperforms Beta Reputation in both true positive (rate of success) and false positive (bypass) rates for decision making



## Challenges

- Conflicting and limited understanding of trust concept in a tactical multi-genre network
- Lack of metrics quantifying trust-based mission effectiveness leading to difficulty in validation
- Lack of understanding in how to fuse multiple uncertain, conflicting evidence for decision making

## ARL Facilities and Capabilities Available to Support Collaborative Research

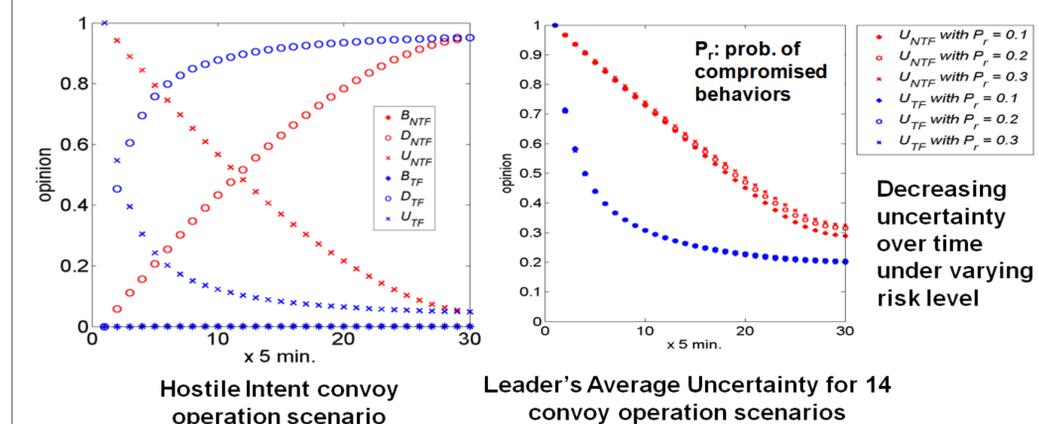
- Trust model implementation in the CORE (Common Open Research Emulator) platform in ARL's Network Science Research Lab

## Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Expertise in network security & cognitive modeling
- Expertise in game theoretic approaches to model characteristics of and games between smart attackers and defenders

## Trust-based Information and Decision Fusion

- Objective:** Enhance Soldiers' decision capability by providing information with high certainty
- Result:** Trust-based fusion algorithm (TF) outperforms non-trust-based counterpart (NTF) by providing information with higher certainty



## Publications

- Cho, Chan, and Mikulski, "Trust-based Information and Decision Fusion for Military Convoy Operations," IEEE MILCOM 2014
- Wang, Chen, Cho, Chan and Swami, "Trust-based Service Composition and Binding for Tactical Networks with Multiple Objectives," IEEE MILCOM 2013.
- Wang, Lu, Chen, Cho, Swami, Lu, "LogitTrust: A Logit Regression-based Trust Model for Mobile Ad Hoc Networks," PASSAT 2014.