Establishing market based mechanisms for CYBer security information Exchange (CYBEX)

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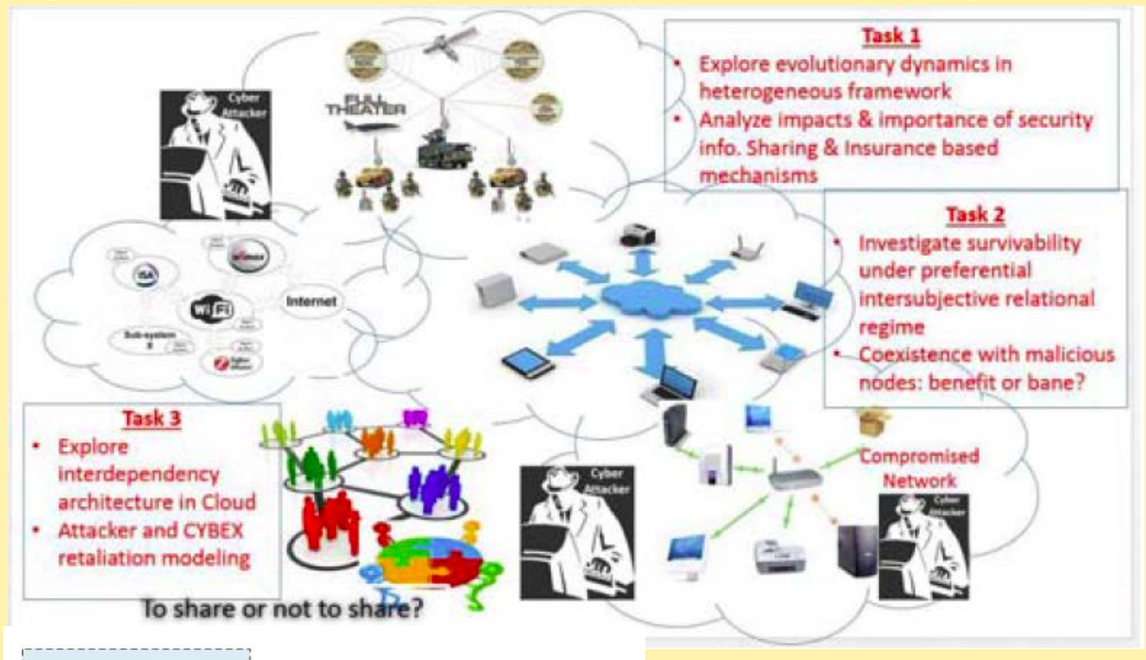
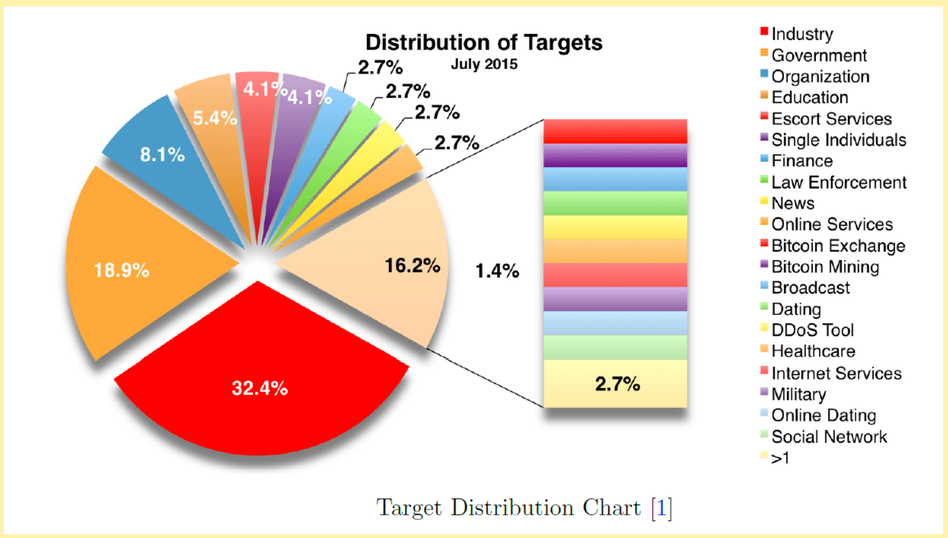
Objective

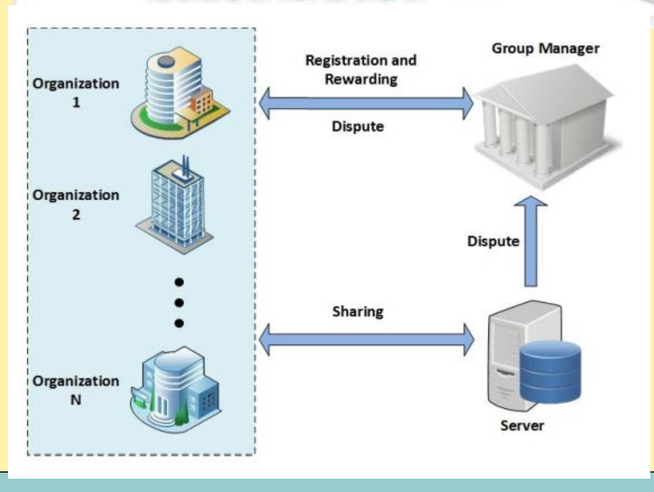
In this project, by using micro and macro-economic theory as a substrate, we intend to establish market based mechanisms for enabling Cyber Security Information Exchange (CYBEX).

The transformative nature of the proposed research lies in its potential to identify, model, and analyze the competition process among entities inhabiting the evolutionary and adaptive multi-dimensional environment with intertwined competitions.





Target Distribution Chart [1]



CYBEX

Benefits:
(1) fostering cyber situational awareness,
(2) developing proactive defense mechanisms,
(3) clarity in understanding the threat landscape, malicious actors, security loopholes etc.

Challenges:
(1) lack of incentivization with respect to a organization's sharing contribution.
(2) the possibility of information exploitation through such exchange as the sharing organizations may not trust the other participants,
(3) organizations' market reputation might get negatively affected

Game Formulation

	Participate & Share	Not Participate
Participate & Share	$Sa\log(1+I)-x-c,$ $Sa\log(1+I)-x-c$	$a\log(1+I)-x-c,$ $a\log(1+I)$
Not Participate	$a\log(1+I),$ $a\log(1+I)-x-c$	$a\log(1+I),$ $a\log(1+I)$

I – amount of investment made by the firms
a - simple scaling parameter that maps user satisfaction/benefit to a dimension equitable to the price/monitory value
c - cost of participation in the CYBEX framework
S – Scaling benefits of sharing

$$g'(\alpha^*_{sol_1}=0)=-x-c$$
$$g'(\alpha^*_{sol_2}=1)=-(S-1)a\log(1+I)+x+c$$
$$g'(\alpha^*_{sol_3}=\alpha_{sol_3})=(x+c)-\frac{(x+c)^2}{(S-1)a\log(1+I)}$$

By modeling Transformation Speed in this game we can observe that achieving Evolutionary State Strategy is conditioned upon the wise choice of the incentive/participation cost (c) as well as initial population proportion taking sharing approach

References
[1] http://www.hackmageddon.com/2015/08/10/july-2015-cyber-attacks-statistics/

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