Cyber Defense Resources & Vulnerabilities



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Problem

Investment in security is aimed at reducing losses due to security breaches and typically determined by calculating annualized loss expectancy (ALE) metrics. However, in the cybersecurity space there is inadequate data on the frequency of breaches, the costs associated with those breaches, and the effectiveness of countermeasures, for organizations to be able to perform meaningful ALE calculations. With rising rates of both IT security spending and online attacks, surveys indicate that many business and government executives are unsure of how to allocate resources for defense and whether their investments in security measures are making any

Key Questions

- How do private and public organizations make decisions about allocating resources for defense against cyber attacks, malware and online abuse and how do they assess whether those decisions were worthwhile or successful?
- Where do private organizations and government agencies ultimately end up allocating these resources?
- How can a deeper understanding of the different factors that contribute to defense decisions map onto a new understanding of different categories of attacks and vulnerabilities?

Methods

Comparative Case Studies & Interviews:

 Case studies of defense resources allocated by private companies in different sectors and government agencies, including U.S. Cyber Command and the Department of Homeland Security

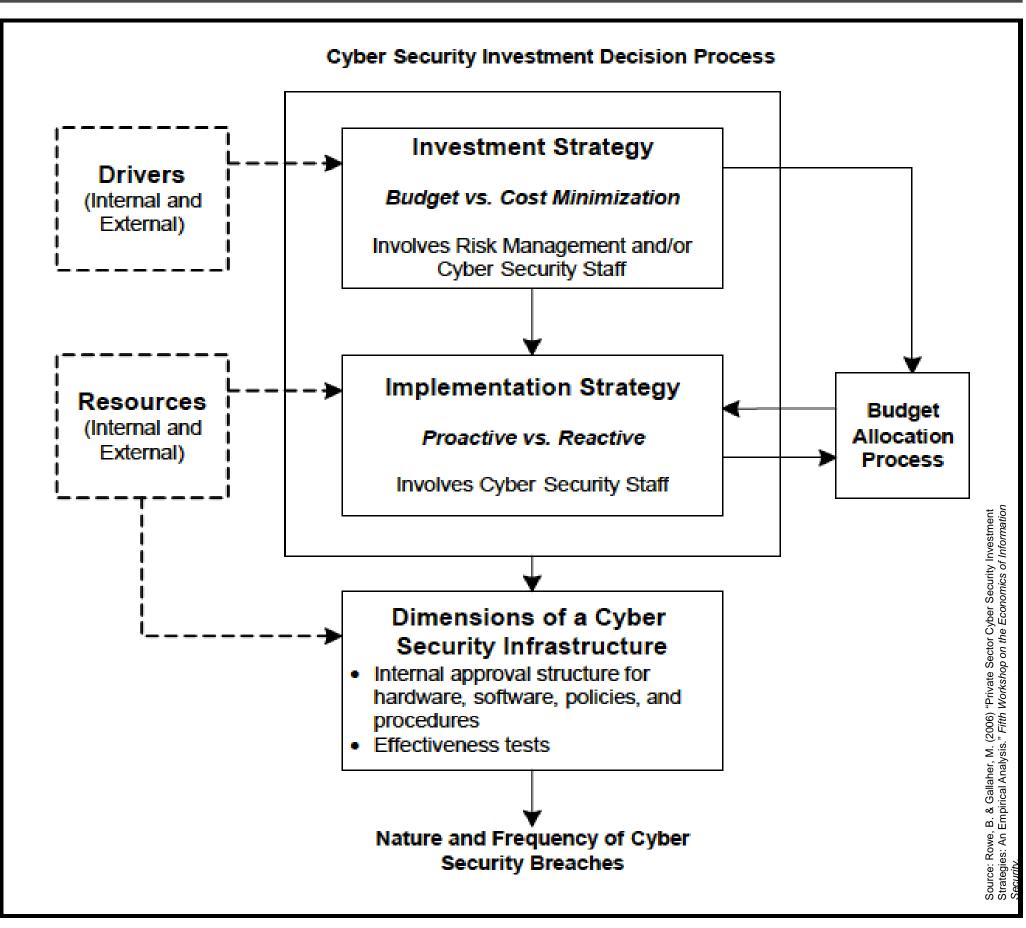
Process Tracing:

 Analysis of decision-making processes for implementing defense measures **Document Analysis:**

 Assessment of formal documents used for outlining defense strategies and metrics

Proposed Research

Investment in Cyber Defense Measures



Qualitative case studies enable analysis of *how* organizations make decisions about whether or not to invest in specific cyber defenses — what drives these decisions, who makes them, and how budgets are determined — as well as what the final defense outcomes of these decisions are and what defense measures are ultimately implemented.

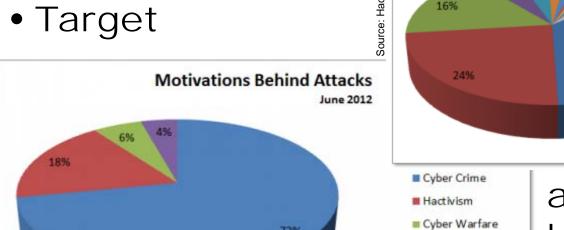
> Online Services Organization: Other

Organization: Politica

Defense-Based Taxonomy of Attacks

Cyber attacks have been classified according to a variety of different elements, including:

- Motivation
- Technique



■ Spear Phishing DNS Poisoning

■ Military Health Social Network ■ Entertainment ■ Law Enforcement

However, a crucial determinant of an

attack's success is the extent to which it has been anticipated and protected against, factors that are not incorporated into most existing attack taxonomies.

Expected Contributions

- Comparative analysis of the processes by which different private companies and government agencies decide how to allocate resources for defense against cyber attacks and information security breaches and methods used to assess the effectiveness of those allocations
- Characterization of the different elements involved in defense against cyber attacks
- Assessment of where and how different types of organizations ultimately end up spending their resources for defense
- Mapping of defense resource allocations onto a taxonomy for distinguishing between different types of attacks by understanding how well they have been defended against

Literature Review

Gordon & Loeb (2006) found that less than 25% of firms reported using economic analysis to inform investments in information security, while an earlier survey found that many firms employ a "wait-andsee" approach, deferring investments in online security until after their systems are breached (Gordon et al., 2003). Rowe & Gallaher (2006) identified several factors driving firms' investment in information security, but little work has been done to understand how these decisions are made or characterize the resulting cyber defense landscape.

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