Assessing Perceptions and Culture of Cybersecurity within an Energy Delivery Organization

Stuart Madnick, Richard Wang, and Mohammad Jalali

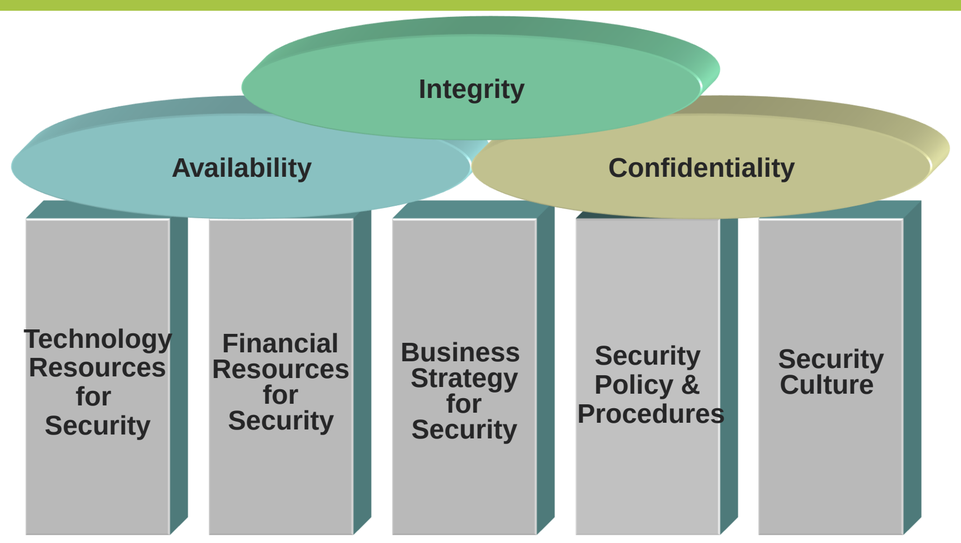
MEASUREMENT OF SECURITY PERCEPTIONS

- There are many “concrete” aspects of cyber security that people attempt to measure:
  - Number of (known) attempted attacks, mean-time-to-failure, etc.
- But it is important to understand the “non-concrete” aspects that are rarely measured, such as **attitudes** and **perceptions.**
  - As many have noted, **perception is more important than reality, because people react mainly to perception, since reality is rarely known**.

WHY ARE THEY IMPORTANT?

- Studies have shown that most cyber attacks are aided or abetted by insiders, so understanding perceptions and behavior is important.
- The government does not and cannot control all of the energy delivery cyber infrastructures, so **cooperation and assistance from the private sector is needed**.
  - So, what are their attitudes and perceptions about security?
- Furthermore, even **within the government:**
  - different groups have different attitudes and perceptions.
- **We need to understand this better**.

FRAMEWORK: CONSTRUCTS OF SECURITY



- Availability, integrity, and confidentiality are important, but do not exist in a vacuum; they are supported by various organizational factors.
- We study these eight constructs, which we call the “House of Security.”

SURVEY SECURITY ATTITUDES & GAP ANALYSIS

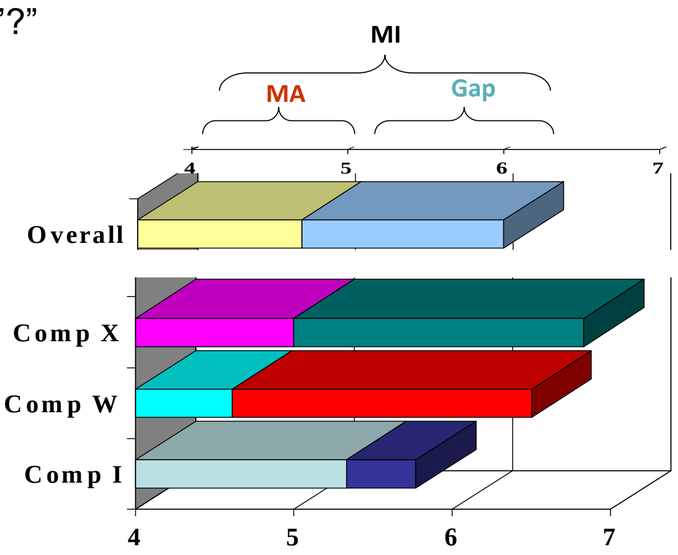
- We have developed a pilot survey instrument to measure these constructs. It has been statistically validated.
- We ask about current state and desired state, to determine the gap.
- The individual survey questions are grouped and aggregated to determine the constructs.
- A sample survey question is: “On a 7-point scale: Do you agree or disagree with the statement that ‘In our organization, people are aware of good security practices’?”

Example data results:

MA = Assessment of “My” organization (5.1)

MI = Importance for “My” organization (6.3)

Gap = difference between Assessment and Importance for “My” organization (1.2)

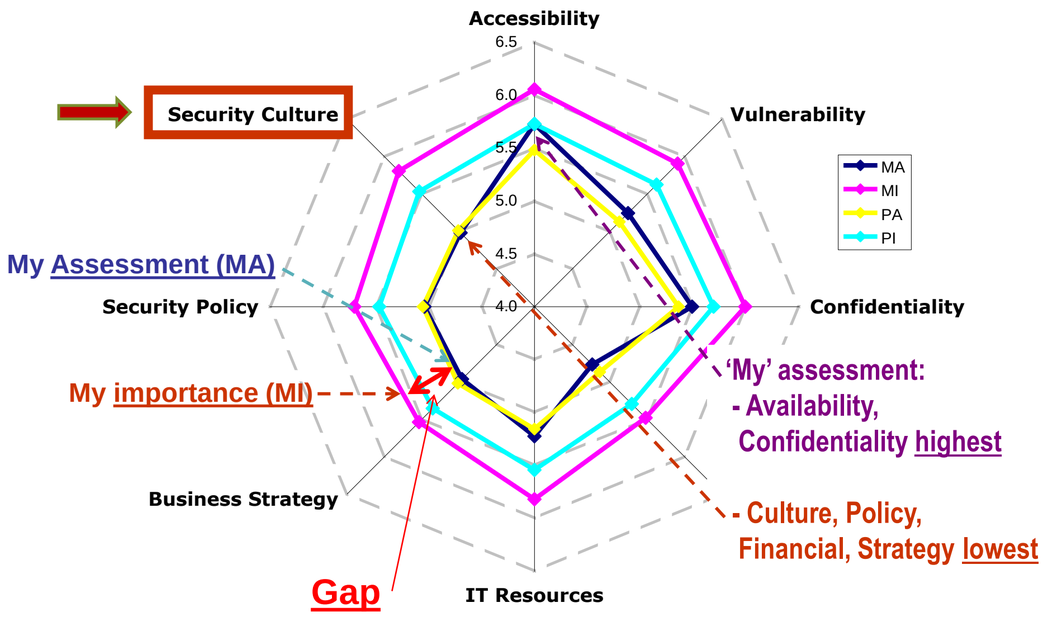


STATISTICAL ANALYSIS

We evaluated the quality of the survey instrument and the partitioning into the constructs by measuring:

- Statistical significance of the questions and the constructs.
- Reliability of the constructs (by computing Cronbach’s alphas).
- Content, convergent, and discriminant validity of the constructs.

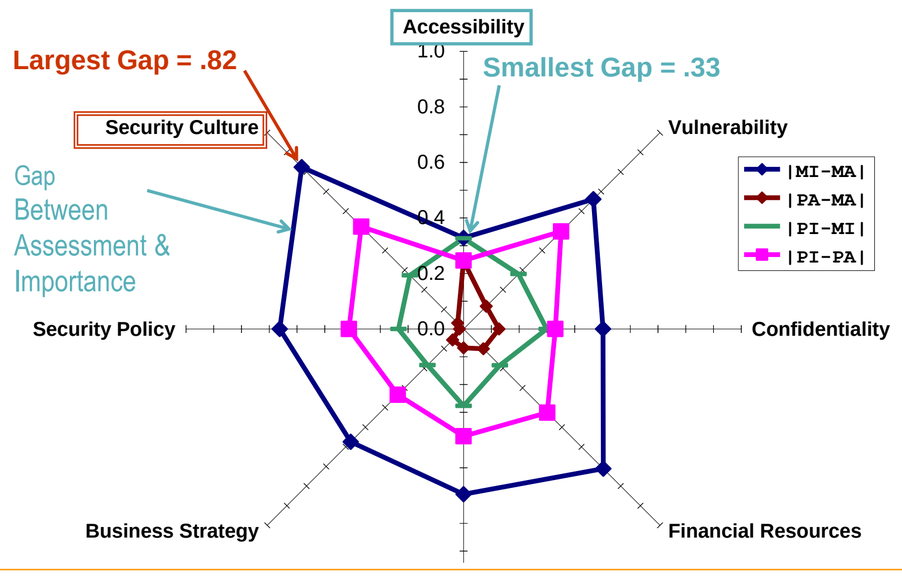
AVERAGE CONSTRUCT VALUES



Example Gap Analysis: Security Practices Construct:

- In the organization, people are aware of good security practices. [q33; gap = .78]
- People in the organization are knowledgeable about IT security tools and practices. [q08; gap = .82]
- People in the organization carefully follow good security practices. [q14; gap = 1.08] ← **Largest gap!**

CONSTRUCT GAPS: ABSOLUTE VALUES



Important to understand if and how the attitudes vary depending on company, industry, country, position, functional area (such as IT or OT), etc.

VARIATION IN PERCEPTIONS

Sample Research Issues to be Addressed:

- The survey data can be utilized to identify variations in perceptions based on different industries, different levels of an organization, or different functions.
- Example issue studied: The people at which functional areas have the biggest security gaps (differences between where they “are” and “should be”)?
  - Information Technology (IT)
  - Operational Technology (OT)
  - Other functional areas

HOW CAN YOU HELP AND PARTICIPATE?

- Suggestions on overall concept?
- **Is your organization willing to be a survey site (confidentiality assured)? Are you interested in and willing to participate in this effort?**

FUTURE EFFORTS

- Finalize shortened survey instrument and revalidate it.
- Large-scale pilot currently underway.
  - Currently analyzing results of survey data and working to understand reasons for the results.
- Identify other organizations to serve as new survey sites.
- Extend to range of organizations in different segments of energy delivery industry.

CYBER RESILIENT ENERGY DELIVERY CONSORTIUM | CRED-C.ORG

FUNDING SUPPORT PROVIDED BY THE DEPARTMENT OF ENERGY, OFFICE OF ELECTRICITY DELIVERY & ENERGY RELIABILITY