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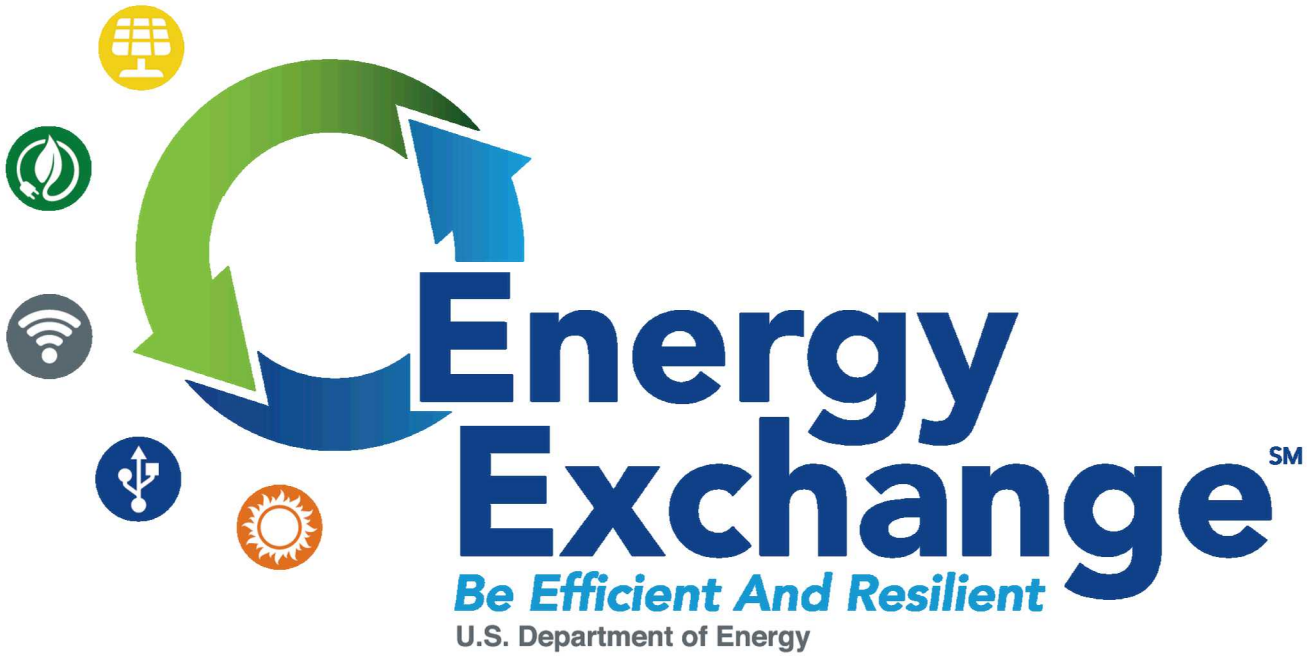

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Adversarial Risk Assessment

A Contrarian View

Which site are you more likely to attack?

Answer: It depends…

- Are you trying to steal gold? Or people's wallets and credit cards?
- Are you trying to make a "statement"? Or trying to cause casualties?
- Do you even care if you win the battle?

Review: Risk is…

Risk can be thought of as answers to 3 questions:

- *What can happen?* *(scenario)*
- *How likely is it?* *(probability / frequency)*
- *How bad is it?* *(consequence)*

Risk is the collection of these answers, *not a number!*

Scenario	Consequence	Likelihood
S_1	C_1	P_1
S_2	C_2	P_2
S_3	C_3	P_3
S_4	C_4	P_4
S_5	C_5	P_5
S_6	C_6	P_6
…	…	…

Safety and security risk assessments require different ways of thinking

Safety Analysis	
Hazard (likelihood)	*Tornado*
↓	↓
Sequence of System Events	*Power fails, Roof caves in*
↓	↓
Consequences	*Flooded, Damaged and Failed IT or OT Equipment*

Security Analysis	
Objectives (Consequences)	*Steal handgun ammo*
↓	↓
How someone could cause this (attack scenario)	*Break into gun store after hours to steal*
↓	↓
Who would want to	*List Candidates Here…*
↓	↓
Are there more attractive options for an adversary?	*Big-box store has less security??*
↓	↓
Likelihood I am targeted	*Gun store less likely??*

** Examples are notional and for illustration purposes only.*

Likelihood of attack is highly uncertain and can change rapidly

- Depends on attacker's capability, motivation & intent
- Depends on attacker's other opportunities inside *and* outside the system.
- Predicting likelihood makes risk hard to use for security decision making

A different way to think about security risk:

- An attack scenario is higher risk if:
  - It is easier for an adversary to confidently accomplish,
  - It results in a more desirable outcome for the adversary, and
  - An adversary does not have other alternatives that are obviously superior.

Attack scenarios:

Easy

&

High-Consequence

=

High Risk

One practical security risk management method

Be as systematic as possible!

1. Identify vulnerabilities – things an adversary could exploit in an attack
2. Work these into full attack scenarios that result in consequences
   - *Identify the expected consequences*
3. Identify other easier ways for adversary to cause same or greater consequences
   - *Looking for other more attractive options for the adversary – especially at your facility*
   - *Prioritize mitigation of "highest risks" – easier ways for adversary to cause each outcome of concern*
4. Use good systems engineering to find & rank mitigation options for higher risks
   - *Ways to ↓ consequence and/or ↑ difficulty of the attack scenario*
5. Continue throughout project lifecycle – keep track of all you have learned


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