Section 1: Week 2: Importance of Risk Mitigation Strategies

Nate Bachmeier

TIM-7030: Managing Risk, Security, and Privacy

June 14, 2020

North Central University

# Importance of Risk Mitigation Strategies

## Process for categorizing risks for privacy and security

CyberSecurity refers to a collection of mechanisms and processes that constrain risk to business systems by ensuring they meet performance and consistency expectations, even under erroneous conditions (Mickens, 2018). These erroneous conditions arise due to malicious and negligent scenarios, degrading our service offerings' confidentiality, integrity, and availability.

When categorizing these risks, a taxonomy needs to consider the incentives and origin of the risk (Li & Liao, 2018). Incentives of malicious and negligent behavior are drastically different and require unique approaches. Kosub (2015) proposes the terms cyber-risk (negligence) and cyber-crime (maliciousness) to distinguish between these scenarios. For instance, technical support staff wants to follow the cultural norms set by their employer and minimize any friction in completing their assignments (Weston, Conklin, & Drobnis, 2018). Meanwhile, malicious actors seek to exploit espionage, sabotage, and subversion attacks (Matsubara, 2014). While policies and training can reduce the impact of erroneous technicians, those solutions do not apply to external criminals.

The next level of the taxonomy includes specific situations involving various people, processes, and products. Privacy and cyber risks to a process can come from insufficient authorization and auditing controls. For instance, failure to maintain accurate inventory records can cause inaccurate accounting of the corporate position. Another example might come from a weak authorization policy that allows low-level employees to reboot mission-critical systems. In contrast, cyber-crime might leverage repudiation attacks against a process like requesting a refund before completing the purchase.

Bit-rot is technical jargon for describing a product that is not consistently maintained. Over time a lack of attention to patch management and policy updates results in fragile systems that are less secure and increase the risk to data privacy. For instance, malware predominately targets vulnerabilities that are over one year old (Emery, 2017). Another common challenge comes from abandoning partial state on these devices, allowing unintentional access for malware and other intruders to discover.

## Importance and value of corporate data and the cost of ownership

Corporate data is the fuel that powers decision processes, creates value differentiation, and customizes the experience for individual users (Knabke & Olbrich, 2018). Facebook has a roughly $650 billion market cap predominately because of its personalized data feeds, not because it invented a better user forum. As business processes mature, they can unlock hidden potential by transforming data into business intelligence, resulting in competitive advantages through more informed actions (Obeidat, North, Richardson, Rattanka, & North, 2015). However, as with any fuel, there is a risk of fire.

This metaphorical fire comes from the challenges associated with confidentiality, integrity, and availability of information. For instance, confidentiality breaches can come from malicious theft – such as an attacker compromising a user’s account or malware exfiltrating sensitive documents. A loss of confidentiality can also arise from negligent handling of information, such as storing personally identifiable information (PII) on unencrypted thumb drives. If that device becomes lost on an Uber, then all control is lost. When these security incidents occur, there can be regulatory repercussions and political fallout from users. For example, California and Delaware have stringent privacy laws that provide litigators teeth for seeking damages. Internationally, the General Data Protection Regulation (GDPR) enables the European Union to levy fines for abusing the public trust (Kovacs, 2017). These various laws force data maintainers to be mindful of their customer’s rights.

Not all sensitive information is confidential, and other scenarios exist where ensuring integrity is more critical. For instance, a mortgage contract contains public information but needs to be verifiable. Challenges exist around maintaining the integrity of information, such as ensuring malicious actors do not tamper with documents. Mitigations also need to exist for managing data corruption scenarios from network glitches or application faults.

Information that is unavailable promptly has little to no value (Hawking, 2012). These disruptions can come from situations like hardware failures, software outages, and erroneous deletions. The Site Reliability Engineering (SRE) team needs to have business continuity and IT contingency strategies to restore access for information consumers (Kosub, 2015). Suppose the organization fails to maintain high availability of data accessibility. In that case, users of the service will seek out new solutions often from competitors. Internal customers that must continue using the data service will apply political pressures and related tactics to force change.

## Process of risk assessment or analysis

Formally, a vulnerability exists at the intersection of three conditions; system susceptibility, threat accessibility, and threat capability (Baskerville, Rowe, & Wolff, 2018). Therefore risk assessment needs to identify these junctions and devise a strategy to remove one or more predicates. Cybersecurity professionals can choose between various frameworks for assessing risk and analyzing business processes. For instance, the National Institute of Standards and Technology (NIST) provides the Cybersecurity Framework; meanwhile, the International Standard Organization (ISO) has 27000 and 27001. Other organizations have established their specific implementation, such as COBIT and the Risk Management Framework.

While there are distinctions between these systems, they all follow a similar feedback loop of plan-do-check-act (Radhakrishnan, 2015). Each iteration through the loop enumerates the critical resources and available methods for interacting with those systems. Controls must exist on each interaction to perform authentication, authorization, and auditing of the caller. After discovering insufficient controls, the administrators need to create a proposal for hedging or removing that risk. For instance, a management service lacks proper controls and is prohibitively expensive to upgrade or replace. In this situation, using network access controls (NACLs) could remove the threat accessibility, and therefore the vulnerability. The protections require tests to confirm it sufficiently prevents unauthorized access. Perhaps the vulnerable management service is accessible from three subnets, and only two are blocked. When these mitigations turn out to be partial solutions, it requires another iteration of planning and additional effort.

## Risk management strategies and countermeasures

When choosing a risk management strategy, the organization needs to consider the threat impact and likelihood (Baskerville, Rowe, & Wolff, 2018). If the impact is critical, the business will need to transfer that risk or avoid the scenario entirely. For instance, foreign markets lack intellectual privacy protections, which might discourage releasing cutting-edge technology to those audiences (Krebs, 2019). In other scenarios, avoiding a hostile market or business activity is impossible, making hedging with insurance a more appropriate response. For example, it might be prohibitively expensive to have redundant manufacturing plants, while unlikely, the organization would go out of business if the building burnt down. These situations of catastrophic failure are ideal for insurance and other risk transference solutions. If the situation is less impactful, then the company might choose either self-insurance or self-protection. A self-insurance strategy might be cash reserves or options contracts to acquire resources during extreme demand or short supply. The business needs to rely on controls that promptly detect and react to failures (Kosub, 2015). These might include technologies such as anti-virus and Intrusion Detection/Prevention Systems (IDS/IPS).

Another strategy is to form tighter integrations between the system components to reduce the attack surface (Baskerville, Rowe, & Wolff, 2018). For instance, if the network topology requires a user to maintain five accounts with different password complexities, the security of those passwords will decrease to offset the lost convenience (Busby, Green, & Hutchison, 2017). Instead, exposing Single Sign-On (SSO) capabilities improve the user experience and encourages more desirable credential management. Another technical gain comes from removing redundant components, each with the potential to contain incorrect application code or configuration settings. Removing redundancies also aids in more consistency through centralized policy management and enforcement.

## Definition of each information security role

|  |  |
| --- | --- |
| Role | Description |
| Chief Risk Management Officer | Reduces the blast radius of process failures across the corporate strategy |
| Chief Information Security Officer | Accountable for the corporate strategy that protects business technology assets |
| Director of Information Security | Defines the policies that enact the corporate security strategy |
| Director of Privacy and Compliance | Ensures following of regulatory requirements around the handling of data |
| Security Engineer | Validates the implementation details of the security policy decisions |
| Everyone Else | Interacts with those policies and is critical for their successful execution |

## Relationship between roles and role of cybersecurity professional

Multiple security personas work together to deliver a consistent and coherent risk management strategy that encompasses all people, processes, and products. Suppose that strategy lacks sponsorship from the executive level or does not resonate with the troops. In that case,t is unlikely to succeed (Weston, Conklin, & Drobnis, 2018). Instead, cultural alignment ensures that the standard operating procedure makes safe decisions that minimize risk and privacy concerns.

The Chief Risk Management Officer (CRMO) and Chief Information Security Officer (CISO) set the stage by determining which risks are acceptable to business continuity. While smaller organizations combine these roles, the CRMO focuses on general risk, versus the CISO is more concerned with the subdomain of information confidentiality, integrity, and availability (Grobler, 2018). Their broad policies and expectations form the corporate vision and guidelines that the Director of Information Security (DIS) must meet. For instance, the CISO might require customer data protections for Health Insurance Portability and Accountability (HIPAA) compliance. The DIS would break that down into a series of process changes and define a roadmap for achieving this goal. Incrementally delivering on the roadmap comes from teams of security engineers that decompose problem statements into specific work items and validate policy decisions.

Last but not least is everyone else, as it is security-critical that policies enable the business versus create artificial blockades (Weston, Conklin, & Drobnis, 2018). Suppose the other team members lack insights into the intent of a policy. In that case, they will follow the specific ask, not similar permutations of the rule. For example, the timely installation of operating system patches reduces the risk of malware spreading through the organization. While no one asked for similar updates to Java, Flash, and Adobe reader are equally vulnerable. Only through associating the request to policy to the roadmap to the vision are these additional risks addressed.

## Conclusion

Addressing risk management requires a feedback loop that centers around plan-do-check-act cycles. At the beginning of that process are exercises that identify business-critical resources and enumerate threats against those systems. These threats can come in the form of cyber risk or cyber-crime against the organization’s people, processes, and products. Corporate data is a precious artifact, as it enables business intelligence and platform differentiation. However, several risks exist to owning information, specifically maintaining its confidentiality, integrity, and availability. When those security properties degrade, the company risks alienating its customer base, violating privacy regulations, and failing to make timely decisions.

Various frameworks exist for formally make risk assessments and evaluating the quality of mitigating controls. Those controls must enforce authentication, authorization, and auditing capabilities where possible. However, general security controls are not appropriate or possible in every scenario, requiring alternative strategies such as risk transference or avoidance.

A successful risk management solution needs sponsorship and agreement from the top-to-bottom of the organization. C-Level members like the CRMO and CISO establish the corporate norms and vision for the future. That vision must align with the desires of other executives, enabling the business to deliver on its core mission safely. Directors-level establish a roadmap and oversee security engineers that build and validate those requirements. Finally, everyone in the organization needs to understand how they fit into the risk management strategy and map the policies to roadmaps and grander visions.

# References

Baskerville, R., Rowe, F., & Wolff, F. (2018). Integration of information systems and cybersecurity countermeasures. *SIGMIS Database. Volume 49*, 33-52. doi:https://doi.org/10.1145/3184444.3184448.

Busby, J., Green, B., & Hutchison, D. (2017). Analysis of Affordance, Time, and Adaptation in the Assessment of Industrial Control System Cybersecurity Risk. *Risk Analysis: An International Journal, 37*(7), 1298-1314. doi:https://doi-org.proxy1.ncu.edu/10.1111/risa.12681

Emery, A. (2017, Summer). Zero-day responsibility: the benefits of a safe harbor for cybersecurity research. *Jurimetrics: The Journal of Law, Science & Technology, 57*(4), 483-503. Retrieved from https://search-ebscohost-com.proxy1.ncu.edu/login.aspx?direct=true&db=a9h&AN=126542986&site=eds-live

Grobler, J. (2018). The cyber risk from a chief risk officer perspective. *Journal of Risk Management in Financial Institutions, 11*(2), 125-131. Retrieved from https://search-ebscohost-com.proxy1.ncu.edu/login.aspx?direct=true&db=bth&AN=128885445&site=eds-live

Hawking, P. (2012). Business Intelligence Excellence: A Company’s Journey to Business Intelligence Maturity. *International Journal of Technology, Knowledge, and Society, 8*(2), 91-99. doi:https://doi.org/10.18848/1832-3669/CGP/v08i02/56274

Knabke, T., & Olbrich, S. (2018). Building novel capabilities to enable business intelligence agility: results from a quantitative study. *Information System E-Business Management, 16*, 493-546. doi:https://doi.org/10.1007/s10257-017-0361-z

Kosub, T. (2015). Components and challenges of integrated cyber risk management. *Zeitschrift für die gesamte Versicherungswissenschaft, 104*(5), 615-632. doi:https://doi.org/10.1007/s12297-015-0316-8

Kovacs, L. (2017). Cybersecurity policy and strategy in the European Union and NATO. *Revista Academiei Fortelor Terrestre, 23*(1), 16-24. Retrieved from https://search-ebscohost-com.proxy1.ncu.edu/login.aspx?direct=true&db=a9h&AN=128789540&site=eds-live

Krebs, C. (2019, April 23). Keynote by Christopher Krebs, Director, Cybersecurity, and Infrastructure Security Agency. *International Conference on Consumer Electronics.* Las Vegas, Nevada, USA. Retrieved from YouTube: https://www.youtube.com/watch?v=aVfcgNhHSDM

Li, Z., & Liao, Q. (2018, January). Economic solutions to improve the cybersecurity of governments and smart cities via vulnerability markets. *Government Information Quarterly, 35*(1), 151-160. doi:https://doi.org/10.1016/j.giq.2017.10.006

Matsubara, M. (2014). Countering Cyber-Espionage and Sabotage. *RUSI Journal: Royal United Services Institute for Defence Studies, 159*(1), 86-93. doi:https://doi-org.proxy1.ncu.edu/10.1080/03071847.2014.895263

Mickens. (2018, August 16). *Why Do Keynote Speakers Keep Suggesting That Improving Security Is Possible?* Retrieved from YouTube: https://www.youtube.com/watch?v=ajGX7odA87k

Obeidat, M., North, M., Richardson, R., Rattanka, V., & North, S. (2015). Business Intelligence Technology, Applications, and Trends. *International Management Review, 11*(2), 47-56. Retrieved from https://search-ebscohost-com.proxy1.ncu.edu/login.aspx?direct=true&db=bth&AN=109929818&site=eds-live

Radhakrishnan, S. (2015). COBIT Helps Organizations Meet Performance and Compliance Requirements. *COBIT Focus, 5*, 1-5. Retrieved from https://search-ebscohost-com.proxy1.ncu.edu/login.aspx?direct=true&db=bth&AN=102026122&site=eds-live

Weston, H., Conklin, T., & Drobnis, K. (2018). Assessing and resetting culture in enterprise risk management. *Assurances et Gestion Des Risques, 85*(1), 131-166. doi:https://doi-org.proxy1.ncu.edu/10.7202/1051319ar