Cybersecurity Risk Assessment Procedure

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1. Introduction

Cybersecurity risk assessment is a key component of the risk management lifecycle.
The purpose of this procedure is to create steps to:

- prepare for risk assessments;
- conduct risk assessments;
- communicate risk assessment results to key organizational personnel;
- maintain the risk assessments over time.

2. Definitions

Refer to *SEC-00 Information Security Glossary* definitions used in this procedure.

3. Applicability

3.1 This procedure applies to all cybersecurity risks within the scope of *SEC-05-Cybersecurity Risk Management Policy*. National host sites are encouraged, but not obligated to use the same procedure for their cybersecurity risk assessments.

3.2 Roles and responsibilities
Refer to *SEC-05-Cybersecurity Risk Management Policy* (section 3.2) for the roles and responsibilities associated with risk assessment.

4. Risk Assessment Procedure

4.1 Prepare

4.1.1. Risk categories allow us to group risks into similar areas of reporting. Review Appendix A (Risk categories) prior to starting a risk assessment. Risks must always be reported under a single category. Please select the category that best matches your risk at the time of assessment.

4.1.2. Ensure the scope is well defined, documented, and understood. Review the risk assessment matrix to understand likelihood and impact scoring.

4.1.3. Review *SEC-05-Cybersecurity Risk Management Policy* (section 4.3, Responding to risk) to look at treatment approaches

4.2 Identify

4.2.1. Identify the asset, service or component that will be assessed. The more granular the assessment the easier it will be to identify distinct or actionable risks. Keep in mind that many services have dependencies, and risks for dependencies should be assessed separately. Refer to the examples provided in the Appendix B for further guidance.

4.2.2. Review the threats identified in the risk register and list any that apply directly to the asset, service or component. If you identify a threat that is not already listed on the risk register, it can be proposed to the NSC for consideration as a new threat by email to security@tech.alliancecan.ca. In addition, avoid listing threats against dependencies.

4.2.3. Review and ensure awareness of any existing controls that relate to the threats identified in 4.2.2, and summarize. Refer to the examples provided in the Appendix C for further guidance.

4.2.4. Following the risk treatment options as indicated in *SEC-05-Cybersecurity Risk Management Policy* (Section 4.3), identify and record the risk treatment plan.

4.2.5. Identify mitigating controls in the risk treatment plan and what vulnerabilities are present given the way security control is implemented.

4.2.6. Identify the residual likelihood that the threat could compromise the asset/service and the impact to the asset/service

4.3 Analyze

4.3.1. Assess and record in the risk register the inherent likelihood of this risk on a score of 1-5 as defined in the risk matrix, and see Appendix D for examples.

4.3.2. Assess and record in the risk register the impact of this risk on a score of 1-5 as defined in the risk matrix, and see Appendix D for examples.

4.3.3. Ensure the calculated risk score, based on the likelihood and impact, is recorded in the risk register.

4.4 Evaluate

4.4.1. Evaluate the risk based on *SEC-05-Cybersecurity Risk Management Policy* (section 4.3) and follow the risk management procedures, as required.

4.4.2. Taking into account the proposed risk treatment, re-analyze residual risk score.

4.4.3. Document treatment and residual risk in the risk register.

4.5 Communicate

4.5.1. Once confirmed with the service owner, ensure result(s) are communicated to the NSC with the appropriate level of abstraction, once the assessment programs are complete. Note this will frequently result in multiple risks being communicated at the same time.

4.5.2. The risk owner is accountable for communicating information to all impacted stakeholders and sharing risk-related information to the community. Refer to *SEC-05-Cybersecurity Risk Management Policy* (section 4.6) for further details.

4.6 Maintain

4.6.1. The risk register should be reviewed on a regular basis. Refer to *SEC-05-Cybersecurity Risk Management Policy* (section 4.5) for further details.

4.6.2. It is recommended to schedule a review to ensure ongoing reassessment of risks

5. References:

SEC-05-Cybersecurity Risk Management Policy

Appendix A: Risk Categories

Each risk category below includes sub categories. Risks are recorded against an individual sub category. Refer to the Risk Register for examples of risks already recorded against sub categories for additional guidance.

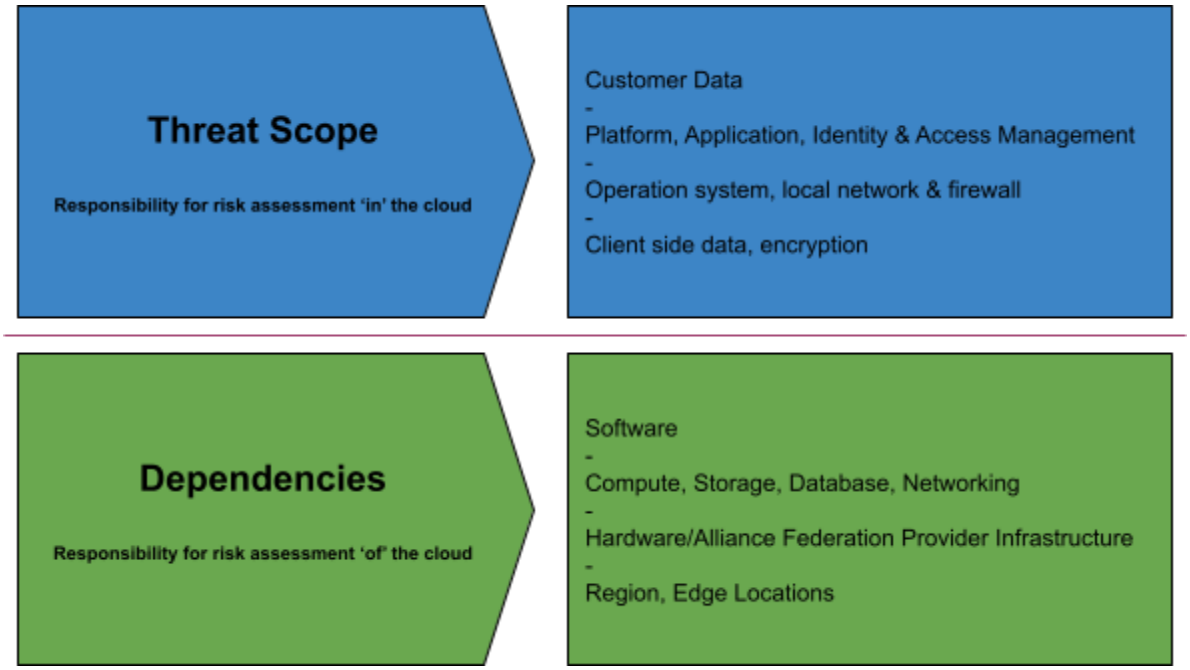
Risk Category	Sub Categories	Notes
Human resources and factors	Inadequate support Insufficient skills and knowledge Inadequate resource management Personnel misconduct Social engineering	Includes risks related to human factors such as training, social engineering, and behaviour.
Physical	Theft of physical assets Environmental failure and natural disaster Inadequate datacenter security control	This category includes risks to assets which process, convey, or store information (e.g. servers, thumb drives, network cables, etc.), physical controls (e.g. locks, walls, etc.), and the environments in which these assets & controls reside (e.g buildings, data rooms, conduits, etc.).
System operation	Unmanaged data flow Misconfiguration Resource saturation Documentation error Hardware failure Service unneeded or unauthorized Inability to detect anomalies	Operational issues that create risk, typically related to system resources, their availability and/or correct function and configuration.
Telecommunications	Unauthorised network access Data interception DOS and network congestion	Risks related to networking including denial of service, both malicious or otherwise and unauthorized use of the network.
Software	Malicious software Inadequate software lifecycle Software failure Unauthorised software access	Software related risk, malicious or otherwise - note that misconfiguration of software falls under system operation, this captures bugs and vulnerabilities related to the software itself. Or access to software (IP) that is

		unauthorized.
Access Control and Identity Management	Inadequate repudiation Inadequate access control Inadequate authenticity/identity Abuse of access rights Account compromised	All risks related to identity management, authentication, authorization, and related secrets included insufficient protections.
Data Security and privacy	Inadequate personal information protection Confidentiality breach Integrity breach Availability breach	Risks related to data & information: this is distinct from the technical controls employed to protect it - this captures the risk should one of these breaches occur or lack of adequate practices to prevent them.
Governance	Inadequate ITSM lifecycle management Inadequate accountability Inadequate governance documents	Risks related to governance, typically relating to oversight, policies and procedures or a lack thereof.

Appendix B

Identifying what's in scope

The assessment would look at the configuration of what's in scope for the particular threat, drawing a line between the threat scope and the dependencies that may be realized. With the example of a MFA server VM in Arbutus Cloud.



Example 1: Insufficient authentication controls on the VM vs Insufficient authentication controls on the Data Center Firewall.

- Impact would be isolated to the VM, and its internal dependencies.
- The likelihood of an actor being able to log into the VM and the likelihood of the Firewall are unrelated.

Example 2: Unpatched operating system vs Unpatched Openstack Neutron element.

- Impact would be isolated to the VM and the applications that reside on that system, and its internal dependencies vs the potential impact to all systems in the Openstack environment.
- The likelihood of an actor being able to exploit the vulnerability on the operating system of a VM is unrelated to the ability to exploit the vulnerability in Openstack.

Appendix C

Examples of existing controls that relate to threats

Example 1: Unauthorized network access due to the weak network segmentation.

Example 2: Compromised account due to accidental exposure in clear password, one control would be MFA.

- Identify possible threats related to the risk category and risk sub-category list.
- Talk to the security experts and sysadmins to record the current controls (Current Controls Description in risk register).
- Analyze the current controls as a reference for scoring the likelihood and the impact.

Risk Register:

Risk Category	Risk Sub-category	Possible Threats	Current Controls Description
Telecommunications	Unauthorized network access	Malicious users can access network segment beyond their scope	Network segmentation; Perimeter Firewall & Host Firewall
Access Control and Identity Management	Account compromised	Non-Privileged Account is compromised and may be used by malicious users	Require All Remote Login to Use Multi-Factor Authentication

Appendix D

Examples of using the matrix to achieve risk scores

When calculating the risk score, it is important that everyone adopt a standard approach when considering the likelihood and impact. The following outlines how to approach each score by expanding on the descriptions from the matrix:

Likelihood						
Almost Certain / has occurred	5	5	10	15	20	25
Likely	4	4	8	12	16	20
Possible	3	3	6	9	12	15
Unlikely	2	2	4	6	8	10
Rare	1	1	2	3	4	5
		1	2	3	4	5
		Insignificant	Minor	Moderate	Major	Critical
		Impact				

Likelihood:
Remember as with the examples in the previous section, existing controls must be taken into account when considering Likelihood.

- **Almost Certain (5)**: Is occurring now or is almost certain to occur within the foreseeable future.
    - Meaning that this risk is known to be occurring currently in other locations. A good example of this might be an exploit that is currently being used by bad actors in the wild at other similar organizations or on other similar infrastructure.

- **Likely (4)**: Likely to occur within the foreseeable future (is known to have occurred at other similar institutions with similar configurations and/or controls)
    - In this case, there is awareness that this has occurred at other similar organizations or on their infrastructure but there is no indication it is happening right at this moment. Similar to the example above, this may relate to a

vulnerability that has been exploited in similar environments but there is no evidence of current exploitation.

- **Possible (3)**: May occur within the foreseeable future (is known to have occurred elsewhere)
    - This score relates to risks that have occurred infrequently in other different environments, in a different industry, country, or with different conditions. There is no evidence it has occurred in similar circumstances, though.

- **Unlikely (2)**: Not likely to occur within the foreseeable future but is still possible
    - There is no evidence this has ever occurred; however, it doesn't require the same exceptional circumstances to occur (compared to score 1), so it can be set apart from score 3 by lack of evidence and score 1 because exceptional circumstances are not required for it to occur.

- **Rare (1):** Unlikely to occur except in exceptional circumstances
    - This score refers to risk that is almost theoretical in nature. Examples include floods in an area that has never flooded, meteor impacts, civil unrest causing damage to a data centre etc...

Impact:
When considering Impact, there are many factors that can be taken into account (see the table below) When thinking about Impact, assume what would happen if the risk occurs. Then estimate the impact. Look through all the possible factors and find the one that has the highest score. That is the score that should be used when calculating the risk score. Even if all the other factors may be insignificant if even one was critical then the score would be critical.

Factors	Insignificant	Minor	Moderate	Major	Critical
Functional	No effect for sites' ability to provide all services to all users	sites can still provide all critical services to all users but has lost efficiency	Impacted sites have lost the ability to provide a critical service to a subset of system users or a national service is	All sites have lost the ability to provide a critical service to a subset of system users	All sites are no longer able to provide some critical services to any users
Information	No information is exfiltrated, changed, deleted, or otherwise compromised	Low risk information is confirmed to be exfiltrated, changed, deleted, or otherwise compromised	Medium Risk information is suspected to be exfiltrated, changed, deleted, or otherwise compromised	High or Very-High risk information is suspected to be exfiltrated, changed, deleted, or otherwise compromised OR Medium Risk information is confirmed to be exfiltrated, changed, deleted, or otherwise	High or Very-High risk information is confirmed to be exfiltrated, changed, deleted, or otherwise compromised.
Compromised Accounts	Single non-privileged user account is suspected to have been compromised	Single non-privileged user account was compromised	Single privileged user account is suspected to have been compromised or More than a single user account was compromised or suspected to	Privileged user account was compromised and has been used in the past by an un-authorized user OR A significant number of user accounts have been compromised	A privileged user account was compromised and is actively being used by an un-authorized user and/or More than one privileged user accounts have been compromised or suspected to have been compromised
Recoverability	Time to recovery is predictable with site existing resources	Time to recovery is predictable with internal resources	Time to recovery is unpredictable with internal resources; outside helps are not	Time to recovery is unpredictable with outside helps	Recovery from the incident is not possible (e.g., sensitive data exfiltrated and posted publicly); launch investigation
Productivity & Human Factors	No impact	Minor staff disruption, or minor loss of productivity (<30	Minor job losses, or significant loss of productivity (> or = 30 person	Risk of death or injury related higher than insignificant, or major job losses	Actual or high risk of death or injury
Reputation	Insignificant impact to user experience/public perception	Some loss of confidence for impacted services only	Some loss confidence for impacted site(s)	Significant loss of confidence for impacted site(s)	Significant loss of confidence in the Alliance Federation; name becomes a byword for organizational misconduct or
Regulatory	No regulator interest; report to regulator is	Regulator requires regular reporting until resolution	Regulator issues an enforceable undertaking	Regulator issues notice to comply under penalty of service termination	One or more site shut down, or executives face personal legal liability

Example 1: Unauthorized network access due to the weak network segmentation.

In this example there is evidence that Unauthorized network access has occurred in other similar organizations. There is no evidence of current exploitation however. Also taking into account the current controls such as Network segmentation; Perimeter Firewall & Host Firewall there is no evidence of this occurring in a similar environment but it is certainly possible. This results in a likelihood score of 3.

Looking at impacts if this risk occurred is less straightforward and different people may assess different factors somewhat differently, however, when considering impacts the highest score that seems reasonable for this risk is Moderate (3)

Using the matrix with an Impact of 3 and a Likelihood of 3 the risk score is 9

Example 2: Non-Privileged Account is compromised and may be used by malicious users.

In this example we have evidence that this has occurred within our own infrastructure. There is no evidence it is currently happening. Given the current controls there is a good chance it will happen again and the likelihood score is assessed at Likely (4)

For impact it is important to note this is a non-privileged account, when considering all the impact factors it is assessed at between Minor (2) and Moderate (3)

Using the matrix with an Impact of 3 and a Likelihood of 4 the risk score is 12

Simulated Risk Register example:

Risk Category	Risk Sub-category	Possible Threats	Current Controls Description	Threat Likelihood (1-5)	Impact (1-5)	Risk Score (Likelihood × Impact) (1-25)
Telecommunications	Unauthorised network access	Malicious users can access network segment beyond their scope	Network segmentation; Perimeter Firewall & Host Firewall	3	3	9
Access Control and Identity Management	Account compromised	Non-Privileged Account is compromised and may be used by malicious users	Require All Remote Login to Use Multi-Factor Authentication	4	3	12