7907ICT IT & CYBERSECURITY GOVERNANCE, POLICY, ETHICS AND LAW

ASSIGNMENT 1B

SHEHRYAR MALLICK

S5328488

shehryar.mallick@griffithuni.edu.au

CONTENTS

MODULE 6: THE ETHICS OF OPEN-SOURCE SOFTWARE LICENSING

Open-Source Software: Benefits and Reservations

INTRODUCTION

The developer has utilized various open-source software (OSS) libraries to create a robust data analysis tool. This tool has the potential to bring about positive changes, such as enhancing research methodologies and helping companies make more informed business decisions. However, there is also a possibility that it could be used for negative purposes like surveillance or targeted advertising. Confronted with an ethical dilemma in choosing the most suitable OSS license that strikes a balance between innovation and ethical responsibility. This document examines the ethical considerations, assesses appropriate OSS licenses, and proposes methods to address potential ethical risks.

ETHICAL CONSIDERATIONS AND RISKS

The main ethical issue in this situation is the potential misuse of the tool, especially for surveillance and targeted advertising. Surveillance technologies can infringe on individuals' privacy rights by gathering sensitive data without consent, while targeted advertising can result in the manipulation or exploitation of users. As a developer, there is a moral responsibility to prevent the tool from being misused, as not doing so could contribute to unethical behavior (Stallman, 2010; Lessig, 2006).

The developer's obligation to the open-source community poses another ethical dilemma. This community values transparency and collaboration. Making the tool available under an open-source license can speed up progress and benefit the greater good. However, it also creates opportunities for malicious users to abuse the software. It is crucial to find the right equilibrium between promoting open knowledge and protecting against misuse (Raymond, 2001; Perens, 1999).

SELECTING THE APPROPRIATE OSS LICENSE

Two prominent licenses to consider are the GNU General Public License (GPL) and the Apache License 2.0.

- The GNU GPL is a copyleft license that mandates that derivative works must also be distributed under the same license, ensuring that the software remains open and accessible. This license would be ideal to ensure that modifications or enhancements to their tool remain open-source,

preventing private companies from taking the tool and using it for proprietary purposes (Free Software Foundation, 2007).

- The Apache License 2.0 offers greater flexibility by permitting users to alter the software and distribute it under different conditions, including for proprietary purposes. Although this license may not deter misuse by corporations, it includes clear disclaimers of liability, shielding the developer from legal accountability for the tool's usage (Apache Software Foundation, 2004; Rosen, 2004).

Considering the ethical concerns, the GNU GPL may be more appropriate for this scenario. It ensures that the software remains free and open-source, discouraging its exploitation for surveillance or targeted advertising by large corporations (Stallman, 2010).

MITIGATING ETHICAL RISKS

To further mitigate the ethical risks associated with releasing the tool under an OSS license, following strategies can be implemented.

Establish a transparent code of behavior and utilization policies that delineate appropriate and inappropriate uses of the software. While these policies are not enforceable by law, they establish a moral benchmark for the community and deter misuse (Fitzgerald, 2006).

Restrict the capabilities of the open-source version of the tool, granting access to the complete set of features solely to reliable partners or organizations that adhere to specific ethical standards. This guarantees that the software retains its utility while reducing the risk of misuse. (O'Mahony, 2003).

Educating users about ethical practices and promoting responsible use of the tool while respecting individual privacy rights should be a priority. Collaborating with advocacy groups or institutions to develop educational materials on ethical data usage could be beneficial for the developer. (Weber, 2004).

BALANCING STAKEHOLDER INTERESTS

It's important to consider the needs of various stakeholders in this situation. The developer needs to carefully consider their obligations to the open-source community, users, businesses, and government entities. Contributing to open-source software (OSS) has advantages for developers as it encourages teamwork and creativity. However, by distributing the tool under a stringent copyleft license such as the GNU GPL, the developer can retain authority over its ethical utilization. (Stallman, 2010; Von Krogh & Von Hippel, 2003).

For users, access to free and open-source tools is vital for innovation and development. By adhering to ethical guidelines and transparency, the developer can ensure that the tool is used responsibly without restricting its availability (Kelty, 2008).

Finally, governments and advocacy groups, concerned with privacy and ethical standards, can support responsible usage by adopting policies that favor ethical software development (Spinello, 2011).

CONCLUSION

The moral considerations concerning the distribution of open-source software are intricate, especially when the software could potentially be used inappropriately. Given this situation, the GNU GPL seems to be the most appropriate OSS license, as it guarantees that the software remains free and open while deterring unethical exploitation. By establishing usage guidelines, restricting functionality, and advocating for ethical education, the developer can further minimize risks. Striking a balance between the interests of developers, users, and other stakeholders is crucial for promoting ethical, responsible use of OSS.

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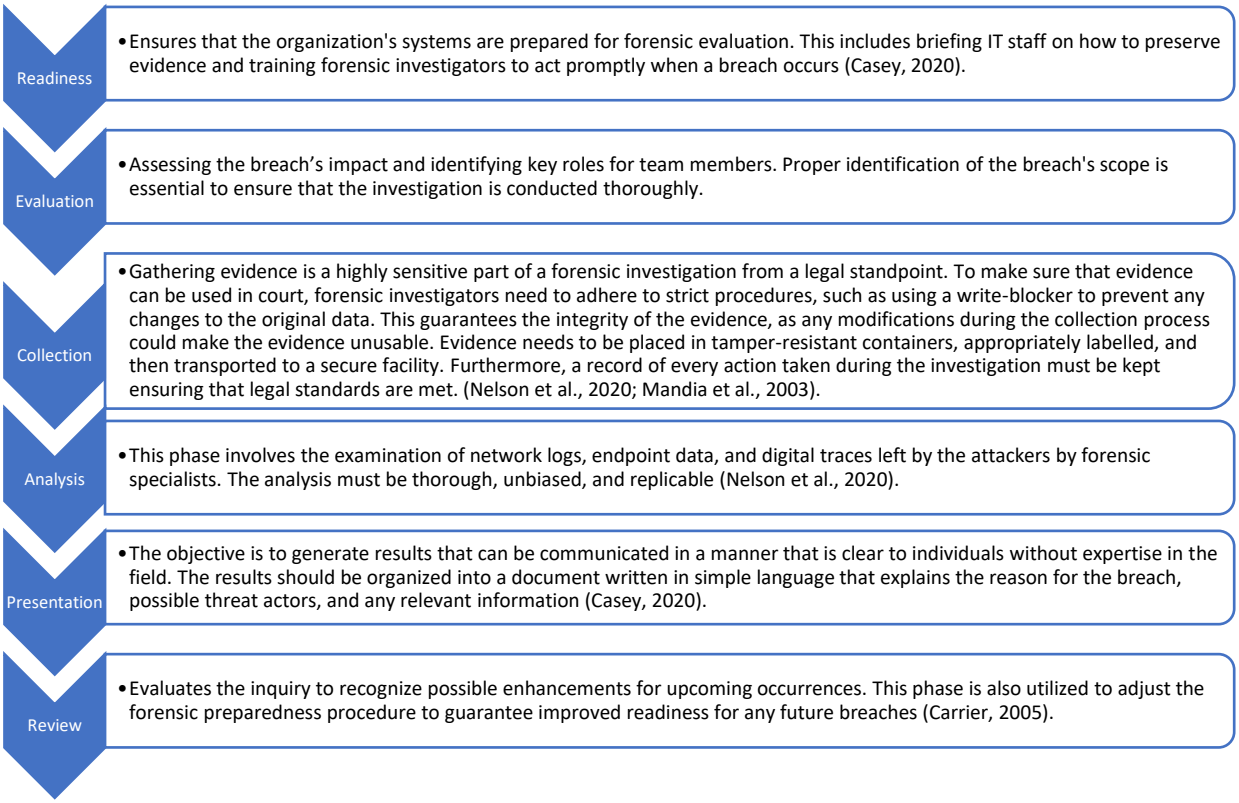
MODULE 7: CYBER FORENSICS AND INTELLIGENCE ANALYSIS

Active Mitigation and Recovery A need of modern cyber intelligence

INTRODUCTION

In case of a data breach, it is crucial to respond promptly and strategically to minimize damage and prevent future incidents. This report presents a methodical approach to conducting a cyber forensics investigation, with a focus on the legal aspects and admissibility of evidence. It also delves into leveraging cyber intelligence sources to collect information on threat actors and their methods. Furthermore, the report emphasizes the significance of establishing a Cyberthreat Intelligence Program (CIP) within the organization, integrating operational and strategic components to strengthen cybersecurity defenses and promote collaboration with external threat intelligence communities.

CYBER FORENSICS INVESTIGATION



COUNTERMEASURES EMPLOYED BY CYBER CRIMINALS:

Criminals often employ countermeasures to hinder forensic investigations. Techniques such as

- File obfuscation
- Metadata manipulation
- Data overwriting

Common strategies to make forensic analysis difficult (Mandia et al., 2003). However, these can be counteracted by using advanced recovery tools and conducting metadata analysis to identify discrepancies (Carrier, 2005).

THREAT INTELLIGENCE ANALYSIS

Gathering threat intelligence is essential to understand the nature of the attackers and their methods. Three primary sources of cyber intelligence—SIGINT (signals intelligence), OSINT (open-source intelligence), and TECHINT (technical intelligence)—can provide key insights into the breach.

- **SIGINT** involves intercepting electronic communications or signals that could reveal the adversary's methods and intentions. This intelligence source is especially useful for identifying patterns in network traffic and communication methods used by attackers (Jamal et al., 2022).
- **OSINT** focuses on publicly available information, such as threat reports, social media, and forums, that can provide context regarding the motivations and activities of threat actors. Platforms like AlienVault Open Threat Exchange aggregate data from multiple sources to give insights into ongoing threats (CrowdStrike, 2024).
- **TECHINT** analyzes adversary technologies, enabling the organization to develop countermeasures by understanding the hardware and software being exploited (ACSC, 2023).

ESTABLISHING A CYBERTHREAT INTELLIGENCE PROGRAM (CIP)

This program integrates intelligence-gathering efforts into the organization's risk management framework.

The operational aspect focuses on monitoring and identifying threats in real-time is the main focus of the operational aspect, which involves examining endpoint devices and network traffic. It is important to use Threat Intelligence Platforms (TIPs) to automatically gather and correlate threat data. (CrowdStrike, 2024; Jamal et al., 2022).

The strategic component of the CIP includes partnering with external organizations like Information Sharing and Analysis Centers (ISACs) and threat-sharing communities. These external partnerships facilitate the sharing of vital information about emerging threats. By connecting with other firms and ISACs specific to their industry, companies can anticipate potential risks and take proactive steps rather than reactive ones. (Nelson et al., 2020; Carrier, 2005).

A successful CIP involves identifying relevant data sources, such as threat intelligence feeds, and prioritizing resources toward addressing the most significant threats (ACSC, 2023). Over time, it is essential to continually refine the CIP by incorporating lessons learned from previous breaches and ensuring that the intelligence being gathered remains relevant to the organization's specific industry and threat landscape (Jamal et al., 2022).

CONCLUSION

Conducting a thorough cyber forensics investigation and leveraging diverse cyber intelligence sources are essential in addressing data breaches. By adhering to legal standards and employing strategic measures, organizations can effectively identify and respond to threats. Establishing a comprehensive Cyberthreat Intelligence Program (CIP) further enhances security efforts, allowing organizations to remain proactive in defending against evolving cyber risks and fostering collaboration with external entities for improved threat intelligence sharing.

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MODULE 8: ETHICAL AND INCLUSIVE TECHNOLOGY FOR SOCIAL GOOD

Technology and Sustainability

INTRODUCTION

In the current fast-changing world of technology, businesses have a special chance to use creativity to tackle important social and environmental issues. However, it's crucial to prioritize ethical considerations, inclusivity, and involving stakeholders throughout the process to make sure that these advancements have a positive impact. This document presents a structure for a technology company that wants to create a smart waste management solution. The framework focuses on ethical innovation, accessibility, and ongoing accountability, ensuring that the solution significantly contributes to sustainability efforts while meeting the needs of diverse communities and maintaining privacy and equity standards.

PROPOSED TECHNOLOGY SOLUTION OVERVIEW

The technology company aims to address the global issue of **sustainable waste management** by developing a **smart waste tracking and recycling system**.

VISION

This solution will leverage IoT and AI technology to monitor waste collection, improve recycling processes, and reduce the environmental footprint in urban areas. By introducing sensors in waste bins, AI-powered systems can predict waste collection times and recommend optimal routes for waste collection trucks. Moreover, the platform would enable users to track their recycling habits and reward them through gamification features to promote sustainable behaviors.

PRUPOSE

The purpose of the solution is to minimize the negative impact of waste on the environment by increasing recycling rates and promoting responsible waste disposal behaviours among communities.

IMPACT

The desired impact is to create cleaner cities, reduce landfill use, and encourage circular economy practices that can be adopted globally.

ETHICAL PRINCIPLES AND STANDARDS

- **Sustainability:** The solution must prioritize environmental sustainability by reducing waste and lowering greenhouse gas emissions associated with waste management. The technology should actively contribute to preserving

natural resources and encourage community participation in sustainable practices (Robinson, 2019).

- **Transparency and Accountability:** The data collected by the system (e.g., waste patterns, collection times) should be handled transparently. Users must have access to information on how their data is being utilized, and the company must implement robust privacy policies (Smith, 2020).
- **Respect for Privacy:** Since the solution gathers data from urban environments, strict adherence to data privacy regulations such as GDPR should be enforced to protect users' personal data (Muller & Costanza, 2018).
- **Equity:** The solution must consider diverse communities, ensuring that vulnerable populations, such as low-income or marginalized groups, are not disproportionately impacted by any technological biases (Guerra et al., 2021).
- **User Empowerment:** The solution must empower users by giving them the tools and knowledge to make informed decisions about their waste management practices. This aligns with the principle of autonomy and encourages user participation (Harvey, 2020).

PROMOTING ACCESSIBILITY AND INCLUSIVITY

Ensuring diverse communities are served and no one is left behind depends on inclusivity in technology. The digital gap should be taken into account by the company, particularly in lower-income urban areas or regions with limited internet access. Moreover, the system should be designed to be usable by people with disabilities, for example, by providing functions like voice guidance or easy-to-use interfaces (Steinfield, 2020; Warschauer, 2020).

POTENTIAL BARRIERS

- **Digital literacy:** Some users may lack the skills to interact with the technology. Tailored training programs must be developed to bridge this gap (Baker, 2021).
- **Cultural Diversity:** Language differences and cultural practices around waste disposal may hinder user engagement. The platform should offer multilingual support and be adaptable to local customs (Wang et al., 2021).

STRATEGIES

- **Universal Design:** Ensure the platform is built with accessibility features like screen readers, large icons, and intuitive navigation that cater to individuals with disabilities (Lazar et al., 2020).
- **Community Partnerships:** Collaborate with local organizations to promote digital literacy and provide access to digital tools for marginalized communities (Brown, 2021).

- **Customizable Features:** The platform should allow users to adjust its functionality according to their preferences, creating a more inclusive experience (Zhou & Zhang, 2021).

STAKEHOLDER ENGAGEMENT AND ETHICAL DECISION-MAKING

STAKEHOLDERS

- Urban communities
- Municipalities
- Waste management companies
- Technology providers
- Regulatory bodies
- Residents/People
- Government

ETHICAL DILEMMAS

Potential ethical dilemmas may arise around data privacy or unequal access to the technology. For example, waste management companies might misuse data to optimize profits at the expense of community interests (Green & Armstrong, 2019).

To resolve these dilemmas, the company should adopt an ethical decision-making framework that emphasizes transparency, informed consent, and equity.

STAKEHOLDER ENGAGEMENT

- **Consultation and Feedback:** Regular feedback loops should be established to ensure the solution meets stakeholders' expectations (Jones et al., 2020).
- **Accountability Mechanisms:** Implement regular audits and impact assessments to monitor how the technology is used and whether it aligns with ethical and environmental standards. Establish an independent ethics review board to oversee the process (Garcia & Hansen, 2020).
- **Continuous Improvement:** Engage users in beta testing and focus groups to gather insights and adjust the technology as needed (Smith, 2020).

CONCLUSION

In conclusion, implementing a framework that prioritizes ethical innovation, inclusivity, and stakeholder engagement is crucial for developing socially responsible technology solutions. By adhering to ethical standards, promoting accessibility, and ensuring continuous accountability, companies can create impactful products that address social challenges while respecting diverse needs and values.

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MODULE 9: ASSESSING CYBER RISK AND INSURANCE NEEDS

Control Measures for Ransomware

INTRODUCTION

In today's interconnected world, the rise of sophisticated ransomware and malware attacks presents significant risks to businesses across various sectors. A medium-sized manufacturing company operating across multiple countries is particularly vulnerable to these cyber threats, especially ransomware attacks like the infamous WannaCry. The WannaCry attack, which caused widespread disruption to critical infrastructure globally, serves as a warning for the manufacturing sector to prioritize cybersecurity. This report will explore Specific cybersecurity controls to prevent/mitigate this risk.

SPECIFIC CYBERSECURITY CONTROLS TO PREVENT/MITIGATE RANSOMWARE RISKS

Ransomware attacks have emerged as one of the most prevalent and harmful cybersecurity threats for businesses on a global scale. A medium-sized manufacturing company may face a variety of consequences from a ransomware attack, including production disruptions, financial losses, and enduring damage to their reputation. Preventing and reducing the risk of ransomware necessitates the implementation of strong, multi-layered cybersecurity measures aimed at defending against potential attack paths, minimizing vulnerability exposure, and ensuring swift recovery in the event of a security breach (Siddiqui, 2021; Kharraz et al., 2015).

ENDPOINT PROTECTION AND REGULAR PATCHING

Protecting all endpoints, including computers, servers, and network systems, is one of the most important cybersecurity measures to prevent ransomware. Ransomware often targets endpoints through methods such as phishing emails, malicious websites, or exploiting vulnerabilities. It is crucial to deploy comprehensive endpoint protection solutions like antivirus software, anti-malware tools, and host-based intrusion detection systems (HIDS) to detect and stop ransomware attacks before they can cause damage (Alshammari et al., 2019; Symantec, 2019).

Yet, relying solely on endpoint protection is inadequate without consistent software patching. Several ransomware attacks, such as the infamous WannaCry incident, took advantage of known software vulnerabilities that had not been addressed with security patches. Implementing a proactive patch management system guarantees that all operating systems, firmware, and applications are kept

current with the most recent security updates, thereby minimizing the potential for ransomware to exploit vulnerabilities (Trend Micro, 2020; Greenberg, 2017).

NETWORK SEGMENTATION AND ACCESS CONTROL

Network segmentation is a crucial measure to control the spread of ransomware within a company's network. This approach involves dividing a network into separate segments based on function or security level, ensuring that critical systems like industrial control systems (ICS) and supervisory control and data acquisition (SCADA) systems are isolated from general IT systems and other potentially vulnerable areas. The implementation of firewalls, demilitarized zones (DMZs), and virtual local area networks (VLANs) can help in enforcing this segmentation, thereby reducing the potential lateral movement of malware within the network. (Wang et al., 2021; Haber & Hibbert, 2020; Coleman, 2019).

ACCESS CONTROL

Access control mechanisms must be implemented to uphold the principle of least privilege (PoLP), making sure that users and systems only have the minimum level of access needed for their roles. This involves the adoption of role-based access control (RBAC), where permissions are assigned based on job functions, and the use of multi-factor authentication (MFA) to safeguard sensitive systems and data from unauthorized access. Limiting unnecessary access pathways helps to reduce the spread and impact of ransomware in case it breaches the network. (CISA, 2020; Gates, 2020; Hutchins et al., 2011)

INTRUSION DETECTION

Detecting and responding to ransomware attacks in a timely manner is essential for minimizing damage. Intrusion detection systems (IDS) and intrusion prevention systems (IPS) are created to observe network traffic, identify suspicious activities, and react to threats immediately. These systems have the capability to identify the initial phases of a ransomware attack, such as unauthorized file encryption, and activate automated response procedures to control and eradicate the threat (Ahmad, 2020; Mansfield-Devine, 2020; FireEye, 2019).

RESPONSE SYSTEMS

Systems for security information and event management (SIEM) take a more extensive approach by connecting security events from different systems, creating warnings for possible threats, and allowing security teams to react more quickly and efficiently. These measures are crucial for reducing the time between an attack and containment, lessening the overall impact on business operations (CrowdStrike, 2021; Kaspersky, 2020).

CONCLUSION

Mitigating ransomware risks requires a combination of proactive measures and reactive preparedness. By implementing a comprehensive suite of cybersecurity controls—including endpoint protection, regular patching, and network segmentation—manufacturing companies can significantly reduce their vulnerability to ransomware attacks. Although no system is completely immune to ransomware, a layered security approach can minimize the damage and facilitate a faster recovery (Fortinet, 2021)

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MODULE 10: BALANCING PRIVACY AND SECURITY IN REMOTE WORK POLICIES

Remote Work and Compliance

INTRODUCTION

Given the recent implementation of a remote work protocol designed to encourage flexibility and a balance between work and personal life, it is imperative for companies to tackle issues related to the privacy and security of data. This document presents the principles and suggestions prepared by a team responsible for cybersecurity governance in a government organization or a large company. It specifically focuses on important areas such as data security protocols, the privacy rights of employees, and adherence to relevant laws and standards.

DATA SECURITY MEASURES

- **Encryption:** All confidential information, whether stored or in motion, must be encoded using commonly accepted encryption methods. This ensures that data is shielded from unauthorized entry and security breaches (White, 2019).
- **Virtual Private Networks (VPNs):** To access sensitive information from home or public Wi-Fi networks, employees should utilize VPNs to establish secure connections to the organization's network (Brown, 2020).
- **Access Controls:** Role-specific access controls must be implemented to guarantee that staff members can only access the information required for their respective roles (Davis, 2019).

EMPLOYEE PRIVACY RIGHTS AND CONSENT

- **Inform Employees:** Ensure transparent communication about the data collection procedures and the reasons for them. It's important to keep employees informed about the types of data being collected, its usage, and their rights concerning their personal information (Smith, 2020).
- **Obtain Consent:** Organizations are required to obtain clear consent from their employees before gathering personal data, particularly for monitoring purposes. This consent must be recorded, and employees should have the ability to withdraw their consent at any point. (Anderson, 2021).

MONITORING AND SURVEILLANCE PRACTICES

- **Transparency:** Organizations need to clearly define the monitoring procedures in the remote work policy. Employees must understand which

activities are being monitored, how data is gathered, and the reasons for the monitoring (Anderson, 2021).

- **Limitations:** Surveillance should only extend to work-related tasks. Personal communications and activities during non-work hours should be kept private, and any monitoring should adhere to relevant laws and regulations (Anderson, 2021).

HANDLING AND SHARING OF SENSITIVE INFORMATION

- **Secure Communication:** Employees must utilize secure communication tools to share sensitive information. It is important to prioritize platforms that provide end-to-end encryption and comply with data protection regulations (Brown, 2020).
- **Data Classification:** Implement a data classification scheme to identify and categorize sensitive information. Employees should receive training on handling data based on its classification to minimize risks (O'Brien, 2021).

ACCEPTABLE USE OF PERSONAL DEVICES AND PUBLIC NETWORKS

- **Bring Your Own Device (BYOD) Policy:** A security requirement policy for personal devices should be developed covering factors like installing security software, enabling encryption and VPNs (Lee, 2020).
- **Guidelines for Public Networks:** Employee training on using public networks should be created to avoid sharing sensitive information on public networks (Lee, 2020).

TRAINING AND AWARENESS PROGRAMS

Organizations should conduct regular training sessions on data privacy, cybersecurity best practices, and remote work protocols. Employees should be equipped with the knowledge to identify and respond to security threats (Walker, 2020).

COMPLIANCE WITH RELEVANT LAWS AND REGULATIONS

Regularly review and update remote work policies to ensure compliance with applicable laws, such as the Privacy Act and GDPR. This includes understanding employee rights and organizational obligations regarding personal data. Conduct data protection impact assessments (DPIAs) for new remote work practices to identify potential risks and ensure appropriate measures are in place to mitigate them (Green, 2020; European Commission, 2018).

CONCLUSION

Implementing a comprehensive remote work policy requires a balanced approach that prioritizes data security while respecting employee privacy rights. By following the recommendations outlined in this report, organizations can create a

secure remote work environment that supports both organizational goals and employee autonomy.

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