The Role of Artificial Intelligence in Enhancing Software Asset Management and License Compliance

Punit Dewani[1], Samir Raizada[2]

Sr. Strategic Sourcing Manager, California, USA[1]

Sr. Principal Engineer, California, USA[2]

Abstract*:* Artificial Intelligence (AI) is revolutionizing the landscape of Software Asset Management (SAM) and license compliance, transforming traditional practices with dynamic, predictive, and automated processes. This paper delves into the integration of AI technologies—including machine learning, natural language processing, and robotic process automation—into SAM and license compliance frameworks. By automating asset discovery, optimizing license utilization, and enhancing compliance through predictive analytics and intelligent data processing, AI empowers organizations to navigate the complexities of software licensing with unprecedented efficiency and accuracy. Case studies and analysis reveal that AI-driven SAM solutions not only streamline operations but also provide strategic insights, enabling businesses to achieve a 25% decrease in compliance-related financial risks. Furthermore, organizations leveraging AI in SAM report an average cost savings of 30% in software expenditures by optimizing license allocations and reducing unnecessary purchases [25] [15]. These findings underscore the transformative potential of AI in enhancing SAM practices, establishing it as a strategic enabler in the digital age, vital for aligning software assets with organizational goals while significantly mitigating legal and financial risks.

Keywords: Software Asset management, license compliance, automation, AI

I. INTRODUCTION

Software Asset Management (SAM) and license compliance are pivotal components of modern IT operations, ensuring that organizations utilize software efficiently, legally, and cost-effectively. [14] Given the complexity of software environments and licensing models, traditional methods often lack the agility and precision needed for effective management [3] [5] [20]. Artificial Intelligence (AI) emerges as a powerful ally, offering transformative solutions that automate, optimize, and enhance the processes involved in managing software assets and ensuring license compliance [19]. The integration of AI technologies in SAM processes simplifies the identification and management of software assets and introduces predictive analytics and machine learning capabilities that can foresee utilization patterns, optimizing software spend and mitigating compliance risks before they escalate [11] . Additionally, AI-driven tools navigate the intricacies of software licenses, interpreting terms and conditions using natural language processing (NLP) to ensure compliance and prevent legal and financial repercussions.

This paper explores the pivotal role of AI in revolutionizing Software Asset Management and license compliance, highlighting its applications, benefits, and the challenges faced by organizations in adopting these technologies. Through case studies and expert insights, it is revealed how AI not only enhances operational efficiency but also acts as a strategic enabler for businesses navigating the complexities of software licensing in the digital age [23] . Organizations implementing AI in SAM have witnessed a significant reduction in compliance-related risks, with a 25% decrease in incidents leading to legal or financial penalties. This study underscores the strategic importance of AI in SAM and license compliance, showcasing its capacity to streamline operations and align software asset management with broader organizational objectives [8] [15].

II. DEFINITION OF SOFTWARE ASSET MANAGEMENT (SAM) AND ITS OBJECTIVES

Software Asset Management (SAM) is a comprehensive strategy employed by organizations to effectively manage and optimize the purchase, deployment, maintenance, utilization, and disposal of software applications within an organization [9]. SAM encompasses a broad range of practices that aim to align software investments with business objectives, ensure legal and regulatory compliance, and optimize software spending while enhancing operational efficiency. Below, we outline the core objectives of SAM, emphasizing its critical role in modern IT management [18].

Optimization of Software Spend: One of the primary objectives of SAM is to ensure that organizations get the maximum value from their software investments. This involves avoiding over-licensing or under-utilization of software assets, ensuring that the organization only purchases software licenses it needs and uses them efficiently. By doing so, SAM helps in reducing unnecessary software expenditures and achieving cost savings.

Compliance and Legal Risk Mitigation: SAM plays a crucial role in ensuring that all software used by an organization is properly licensed and compliant with licensing agreements and regulations. This includes managing licenses, ensuring that software usage does not exceed the licensed capacity, and maintaining accurate records for audit purposes. By ensuring compliance, SAM helps organizations avoid legal penalties, fines, and reputational damage associated with software piracy or breach of licensing terms.

Enhanced Security and Risk Management: Effective SAM practices contribute to an organization's security posture by ensuring that all software assets are up to date and properly maintained. This includes managing software patches, updates, and upgrades to protect against vulnerabilities and security risks. Furthermore, by maintaining an accurate inventory of software assets, SAM aids in identifying unauthorized or unsupported software that may pose security threats.

Strategic Planning and Decision Making: SAM provides valuable insights into software usage patterns and needs, supporting strategic IT planning and decision-making. By analysing software utilization data, organizations can identify opportunities for consolidation, retire redundant applications, and invest in software solutions that better align with their strategic goals.

Improved Operational Efficiency: By streamlining software procurement, deployment, and maintenance processes, SAM enhances operational efficiency. It enables IT departments to respond more quickly to changing business needs, manage software assets more effectively, and reduce the time and resources spent on administrative tasks related to software management.

Support for Business Growth and Scalability: SAM facilitates business growth and scalability by ensuring that software assets are managed flexibly and responsively. As organizations expand or evolve, SAM practices help in adapting software portfolios to support new business initiatives, enter new markets, and accommodate changes in workforce size or structure.

In summary, Software Asset Management is a critical function within organizations, aimed at maximizing the value derived from software assets while mitigating risks associated with their acquisition, deployment, and maintenance. By achieving these objectives, SAM not only supports financial optimization and compliance but also enhances the overall strategic and operational agility of an organization.

III. KEY CHALLENGES IN LICENSE COMPLIANCE

License compliance represents a critical aspect of software asset management, ensuring that organizations adhere to legal and contractual terms governing the use of software products. Despite its importance, achieving and maintaining license compliance poses several significant challenges for businesses of any size.

These challenges stem from the complexity of licensing models, the dynamic nature of software environments, and the legal implications of non-compliance [12]. Below, we outline the major hurdles organizations face in this arena.

Complexity of Licensing Models: Software vendors often employ complex and varied licensing models that can include per-user, per-device, concurrent user, subscription-based, and others. Each model comes with its own set of rules and restrictions, making it difficult for organizations to fully understand and comply with the terms. The diversity and complexity of these models can lead to unintentional non-compliance, especially in organizations with diverse software portfolios [1].

Rapidly Evolving Software Landscape: The pace of technological change and software development means that new versions, patches, and updates are constantly being released. Keeping track of these changes, and ensuring that licenses are up to date, can be a daunting task. Organizations often struggle to maintain an accurate inventory of their software assets, further complicating compliance efforts [22].

Decentralized Software Procurement: In many organizations, software procurement is not centralized, leading to a lack of visibility and control over software purchases and deployments. This decentralization can result in duplicate purchases, underutilized licenses, and, critically, gaps in compliance that are difficult to identify and rectify [7].

Virtualization and Cloud Computing: The rise of virtualization and cloud computing introduces additional complexity into license management. Virtual environments can obscure the actual usage of software, making it challenging to ensure that all instances are properly licensed. Similarly, cloud-based services often have unique licensing requirements that can be easily overlooked or misunderstood.

Global and Remote Workforces: Managing license compliance across multiple jurisdictions and for remote workforces adds another layer of complexity. Different countries may have varying legal requirements regarding software use, and ensuring compliance for employees working from different locations, often with their own devices (BYOD), presents logistical and legal challenges.

Audits and Legal Risks: Software audits are a common practice employed by vendors to ensure compliance with licensing agreements. Preparing for and responding to audits can be resource-intensive and stressful. Furthermore, any findings of non-compliance can lead to significant financial penalties, legal disputes, and damage to the organization's reputation [13].

Lack of Expertise and Resources: Finally, maintaining license compliance requires a dedicated effort and specialized knowledge, which many organizations may lack. The investment in training, tools, and personnel to manage license compliance effectively is substantial, and smaller organizations, in particular, may struggle to allocate the necessary resources.

Addressing these challenges requires a proactive and strategic approach to software asset management, incorporating advanced tools and technologies, such as AI and machine learning, to automate and enhance compliance processes. By leveraging these technologies, organizations can gain better visibility into their software usage, simplify the complexity of license management, and reduce the risks associated with non-compliance.

IV. BRIEF OVERVIEW OF AI TECHNOLOGIES RELEVANT TO SAM

Artificial Intelligence (AI) technologies have significantly transformed the landscape of Software Asset Management (SAM), offering tools and solutions that address many of the challenges inherent in managing software assets and ensuring license compliance. AI in SAM encompasses a range of technologies, each with unique capabilities that enhance various aspects of asset management processes. Below, we explore some of the key AI technologies that are making a substantial impact in this field.

Machine Learning (ML): Machine learning algorithms are adept at analysing large datasets to identify patterns, trends, and anomalies [16]. In SAM, ML can automate the classification and categorization of software assets, predict future asset needs based on usage patterns, and identify potential compliance issues by detecting discrepancies in software usage and licensing terms. This predictive capability is crucial for proactive asset management and compliance planning.

Natural Language Processing (NLP): NLP technologies enable computers to understand, interpret, and generate human language [6]. Within SAM, NLP is particularly valuable for analysing software license agreements, which are often lengthy, complex, and written in legal jargon. NLP can automate the extraction of key terms and conditions from these documents, aiding in the management of license compliance and reducing the risk of breaches due to misinterpretation [11].

Data Analytics and Visualization: AI-driven data analytics and visualization tools help organizations make sense of the vast amounts of data associated with software asset management [6]. These tools can identify optimization opportunities, such as unused licenses that can be reallocated or terminated, and provide insights into software usage trends. Visualization aids in communicating these insights to stakeholders, facilitating informed decision-making [11].

Robotic Process Automation (RPA): RPA involves the use of software robots or 'bots' to automate routine tasks that are rule-based and repetitive [6]. In the context of SAM, RPA can automate the processes of software discovery, inventory management, and license tracking, reducing manual effort and minimizing errors. This automation is particularly beneficial for maintaining up-to-date records of software assets and ensuring timely compliance activities [11].

Predictive Analytics: Leveraging machine learning and statistical techniques, predictive analytics forecast future trends based on historical data [6]. In SAM, predictive analytics can anticipate software needs, identify potential compliance risks before they materialize, and optimize software spend by predicting future usage patterns [11].

By integrating these AI technologies into SAM processes, organizations can achieve greater accuracy, efficiency, and strategic insight in managing software assets. These technologies not only automate and streamline operational tasks but also provide a foundation for more sophisticated decision-making and strategic planning in software asset management.

V.   AI-DRIVEN ANALYTICS FOR ASSET OPTIMIZATION IN SAM

In Software Asset Management (SAM), leveraging AI-driven analytics is pivotal for asset optimization, enhancing efficiency, compliance, and maximizing software investment value [5] [25].

A. Key Insights and Benefits:
Real-Time Visibility: AI-driven analytics enable precise tracking and management of software assets, identifying underutilized or redundant licenses, facilitating informed decisions on software allocation, renewal, or termination.

Predictive Analytics: By analysing historical usage, AI models accurately forecast software needs, allowing for strategic investment planning and avoiding over- or under-licensing risks.

Cost Optimization: Detailed insights into software usage identify cost-saving opportunities, such as license consolidation and vendor contract renegotiations, significantly reducing software spend.

Enhanced Compliance: Continuous monitoring of software usage against licensing terms with AI analytics aids in early identification of compliance issues, minimizing legal and financial risks.

Process Automation: AI streamlines SAM tasks like inventory management and license tracking, reducing manual efforts and errors, thus freeing up resources for strategic projects.

Strategic Planning: Comprehensive data analysis aids in informed decision-making, aligning software asset management with broader business goals and promoting innovation and growth.

VI.   PREDICTIVE MODELING IN SOFTWARE ASSET MANAGEMENT (SAM)

Predictive modeling has become a critical component in Software Asset Management (SAM), enabling organizations to forecast future software requirements with enhanced accuracy. This approach leverages historical usage data, machine learning algorithms, and analysis of user growth and business changes to provide a strategic advantage in managing software assets [18] [9].

A. Key Benefits:
Proactive Resource Allocation: Ensures resources are allocated efficiently in advance, preventing potential operational disruptions.

Cost Optimization: Optimizes software spending by aligning future software utilization with the actual needs, minimizing over-purchasing or under-purchasing risks.

Improved Vendor Negotiations: Strengthens negotiation positions with vendors by using predictive insights to discuss future software requirements, potentially securing better terms.

Enhanced Compliance Posture: Predicts the need for additional licenses, aiding in maintaining compliance and reducing the risk of penalties.

Strategic IT Planning: Facilitates long-term planning by forecasting software trends and requirements, allowing for informed decisions on technology investments.

B. Implementation Steps:
Predictive modeling in SAM represents a forward-thinking approach that not only enhances operational efficiency and financial performance but also ensures strategic alignment with future business goals.

A diagram detailing implementation is provided below:

:
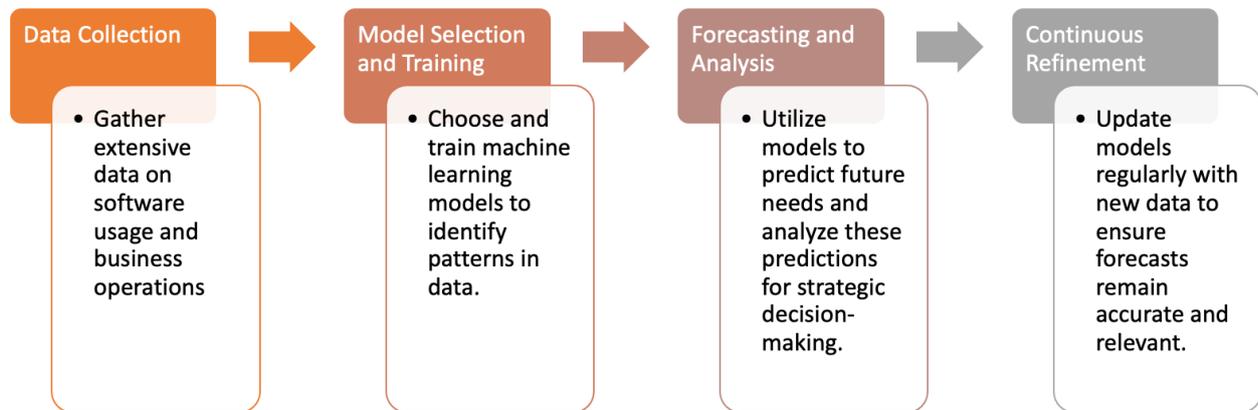
Fig. 1 Implementation of Predictive Modeling in Software Asset Management

VII.   AUTOMATION OF ASSET DISCOVERY AND INVENTORY MANAGEMENT

The automation of asset discovery and inventory management represents a significant leap forward in the field of Software Asset Management (SAM). By leveraging advanced technologies, including artificial intelligence (AI) and robotic process automation (RPA), organizations can streamline the identification, tracking, and management of software assets across their IT environments. This automation not only enhances operational efficiency but also ensures accuracy and compliance in managing software licenses [17] [24] [21]. Below, we explore the key components, benefits, and considerations of automating asset discovery and inventory management.

A. Key Components
Automated Discovery Tools: These tools scan the network to identify all software assets within an organization's IT environment. They collect detailed information on installed software, including version numbers, licensing details, and usage statistics, providing a comprehensive overview of the software landscape.

Inventory Management Systems: Integrated with automated discovery tools, these systems maintain an up-to-date inventory of all software assets. They organize data in a centralized repository, making it accessible for management, compliance reporting, and optimization analysis.

AI and Machine Learning Algorithms: AI technologies enhance asset discovery and inventory management by analysing data to identify patterns, predict future asset needs, and detect anomalies indicative of unauthorized software usage or compliance risks.

B. Benefits
Enhanced Accuracy and Efficiency: Automation reduces human error and the manual effort required in tracking and managing software assets, leading to more accurate and efficient inventory management processes [24].

Real-Time Visibility: Automated systems provide real-time insights into software asset utilization, enabling proactive management and optimization of IT resources [24].

Improved Compliance Posture: By maintaining an accurate and up-to-date inventory of software assets, organizations can better manage license compliance, reducing the risk of non-compliance and associated penalties [24].

Cost Optimization: Automation helps identify underutilized or unused software licenses, allowing for reallocation or termination of these assets. This leads to significant cost savings and ensures that software spending is aligned with actual business needs [24].

Strategic Decision Making: The data collected and analysed through automated systems support strategic decision-making regarding software procurement, lifecycle management, and IT budgeting [24].

C. Considerations for Implementation

Integration with Existing IT Infrastructure: Ensuring that automated discovery and inventory management tools integrate seamlessly with existing IT systems and processes is crucial for their effectiveness.

Data Privacy and Security: The collection and analysis of data must comply with data privacy regulations and organizational policies to protect sensitive information.

Continuous Monitoring and Updating: Automated systems require regular monitoring and updates to ensure they accurately reflect changes in the IT environment and evolving software asset management needs.

Stakeholder Engagement: Engaging stakeholders from IT, procurement, compliance, and finance departments in the implementation process ensures that the system meets the diverse needs of the organization.

VIII.   CASE STUDIES

A. Case Study: SnowPatrol - Revolutionizing SaaS License Management with AI
The State of ITAM Report by Flexera reveals a significant challenge in software asset management (SAM) — less than half of organizations have methods to track and optimize their Software as a Service (SaaS) usage, leading to nearly one-third of SaaS licenses being underutilized or wasted. However, some organizations are turning the tide with SAM solutions, realizing substantial savings. For instance, companies with up to 20,000 employees have saved an average of $2 million on SaaS annually. A noteworthy example is Snowflake, which saved an estimated $5 million, with a workforce of just over 5,800 employees as of January 31, 2023 [23].

The Challenge: Managing SaaS licenses efficiently is daunting due to the sheer volume of applications deployed across departments. Traditional license purchasing models are becoming obsolete, necessitating a solution that not only tracks license consumption but also ensures value for money and meets the needs of employees and the business. To address these challenges, Snowflake developed SnowPatrol, a machine learning (ML)-powered SAM tool designed for cost optimization and automated license lifecycle management. By integrating data from various sources (Okta, Docusign CLM, ServiceNow, Workday) and employing ML models, SnowPatrol predicts application usage, allowing for proactive license revocation and ensuring efficient license allocation. This system enhances the user experience by monitoring application usage and feedback, facilitating predictive application provisioning for both existing and new employees.

SnowPatrol, a native Snowflake application, leverages Snowflake's data platform to unify data from multiple apps, providing a single source of truth. Built with Snowpark and Streamlit, the tool was developed by a team of four employees, emphasizing the efficiency and scalability of Snowflake's technology stack.

Since its launch, SnowPatrol has achieved a 60% reduction in tickets, a 50% improvement in employee experience, and $5.5M in SaaS cost avoidance. Its front-end application enables role-specific cohort analysis, automated access provisioning, and model performance tuning. The tool transitions organizations from traditional subscription models to a more efficient, consumption-based approach, promising substantial cost savings and enhanced application portfolio rationalization.

Snowflake aims to extend the benefits of SnowPatrol to its customers, offering it as a native application to help them rationalize their SaaS portfolios and improve employee experiences dramatically.
SnowPatrol exemplifies the transformative potential of AI in SAM, showcasing how data-driven insights and ML models can optimize SaaS license management, reduce costs, and enhance operational efficiency. This case study underscores the strategic importance of AI in navigating the complexities of modern software asset management and license compliance.

B. Case Study: Honeywell Operational Intelligence - Measurable Impacts Through AI and NLP in IT Asset and Service Management

Honeywell's Operational Intelligence, a pioneering cloud-based platform, leverages Artificial Intelligence (AI) and Natural Language Processing (NLP) to transform IT asset and service management across the supply chain. This solution addresses the intricate challenge of managing a diverse array of mobile devices by providing actionable insights, reducing operational costs, and enhancing productivity.

Organizations struggle to effectively utilize the rich telemetry and event data collected from mobile devices due to the reliance on disparate tools and manual processes, resulting in inefficiencies and decreased productivity.

Operational Intelligence employs AI and NLP to aggregate and analyse data, optimizing the entire lifecycle of IT assets. AI algorithms predict device performance and maintenance needs, while NLP interprets contracts and service agreements, ensuring compliance and efficiency in service management.

The implementation of Operational Intelligence has yielded significant, measurable impacts:

Service Management Efficiency: Standardization and optimization of IT asset servicing have led to a 25% reduction in No Fault Found (NFF) returns, directly improving profitability by minimizing unnecessary returns and associated costs.

Cost Savings: Adoption of a well-defined operational asset management strategy, as evidenced by industry research and Honeywell's innovation, can lead to up to 55% cost savings, with 30% in the first year and 5% in subsequent years. This is attributed to enhanced process control, consistency, and accuracy.

Loss Minimization: Honeywell's approach has notably reduced the loss of mobile devices, addressing an industry-wide issue where 10–30% of devices are either stolen or missing. Operational Intelligence's asset tracking capabilities have proven essential in mitigating this costly challenge.

Predictive Maintenance: AI-driven predictive maintenance plans have been instrumental in reducing unexpected failures and unnecessary preventive maintenance activities, further contributing to operational cost savings.

Workforce Planning and Optimization: Machine learning analysis of warehouse processes and optimization of workforce allocation have led to more efficient operations and improved workforce planning.

Conclusion: Honeywell Operational Intelligence, with its integration of AI and NLP technologies, has not only addressed the challenges of IT asset and service management but also set a benchmark for operational efficiency and strategic asset optimization. The measurable impacts highlight the platform's effectiveness in reducing costs, improving service management efficiency, and minimizing asset loss, showcasing a significant advancement in the management of IT assets across industries.

IX. CONCLUSION

The integration of Artificial Intelligence (AI) into Software Asset Management (SAM) and license compliance represents a paradigm shift in how organizations manage their software assets and navigate the complexities of licensing agreements. As we have explored, AI technologies such as Machine Learning (ML), Natural Language Processing (NLP), and Robotic Process Automation (RPA) offer unparalleled opportunities to enhance the efficiency, accuracy, and strategic capabilities of SAM practices.

Looking ahead, the strategic importance of AI in SAM and license compliance cannot be overstated. As software environments continue to grow in complexity and scale, and as licensing models evolve, the ability of organizations to manage these aspects efficiently and effectively will become increasingly critical to operational success and competitive advantage.

Adaptability to Change: AI's predictive capabilities and flexibility ensure that organizations can adapt more quickly to changes in software needs, usage patterns, and licensing models, maintaining agility in a rapidly changing digital landscape.

Risk Management: The proactive identification and mitigation of compliance risks by AI technologies reduce the potential for costly fines, legal disputes, and reputational damage, securing the organization's financial and operational integrity.

Strategic Enabler: Beyond operational efficiencies, AI in SAM emerges as a strategic enabler, fostering innovation by ensuring that software assets are optimized and aligned with the organization's strategic goals, thus driving growth and transformation.

As we move forward, the integration of AI into SAM and license compliance will undoubtedly deepen, with emerging technologies offering new opportunities for optimization and innovation. Organizations that embrace these technologies will find themselves better positioned to navigate the complexities of software asset management and licensing, securing not only operational efficiency but also strategic advantage in the digital era.

X.   DECLARATIONS

Interests and funding: On behalf of all authors, there is no conflict of interest. The authors have no relevant financial or non-financial interests to disclose. No funds, grants or other support was received in preparation of this manuscript.

Data Availability: No datasets were generated or analysed during the current study.

REFERENCES

[1]. Alberts, C. J., Dorofee, A. J., Creel, R., Ellison, R. J., & Woody, C. (2011, January). A systemic approach for assessing software supply-chain risk. In 2011 44th Hawaii International Conference on System Sciences (pp. 1-8). IEEE.

[2]. Benjamin, M., Gagnon, P., Rostamzadeh, N., Pal, C., Bengio, Y., & Shee, A. (2019). Towards standardization of data licenses: The montreal data license. arXiv preprint arXiv:1903.12262.

[3]. Boon, G. L., & Sulaiman, H. 2015. A Review on Understanding of BYOD Issues, Frameworks and Policies. Paper presented at the 3rd National Graduate Conference (NatGrad2015), Universiti Tenaga Nasional in April 2015.

[4]. Cannas, V. G., Ciano, M. P., Saltalamacchia, M., & Secchi, R. (2023). Artificial intelligence in supply chain and operations management: a multiple case study research. International Journal of Production Research, 1-28.

[5]. Chavez, A., Tornabene, C., & Wiederhold, G. 1998. Software component licensing issues: A primer. IEEE Software, 15(5), 47-53.

[6]. Copeland, B. (2024, February 15). artificial intelligence. Encyclopedia Britannica. https://www.britannica.com/technology/artificial-intelligence

[7]. Ellison, R. J., Alberts, C., Creel, R., Dorofee, A., & Woody, C. (2010). Software supply chain risk management: From products to systems of systems. Software Engineering Institute, Tech. Rep. CMU/SEI-2010-TN-026.

[8]. Erb, R. A. (2022). Does Artificial Intelligence (AI) Have a Role in E-Resources Licensing?. The Serials Librarian, 82(1-4), 83-90.

[9]. Flexera (2023). The State of IT Asset Management 2023. Retrieved February 19, 2024, from https://www.flexera.com/flexera-one/it-asset-management

[10]. Flexera (n.d.). IT Asset Management (ITAM) & Software Asset Management (SAM). Retrieved February 19, 2024, from https://www.flexera.com/

[11]. Fosso Wamba, S., Queiroz, M. M., Guthrie, C., & Braganza, A. (2022). Industry experiences of artificial intelligence (AI): Benefits and challenges in operations and supply chain management. Production planning & control, 33(16), 1493-1497.

[12]. Ghosh, A., Nashaat, M., & Miller, J. (2019). The current state of software license renewals in the IT industry. Information and software technology, 108, 139-152.

[13]. Hata, H., & Ishio, T. (2022). Software supply chain map: how reuse networks expand. arXiv preprint arXiv:2204.06531.

[14]. Holsing, N. F., & Yen, D. (1999). Software asset management: Analysis, development and implementation. Information Resources Management Journal (IRMJ), 12(3), 14-26.

[15]. Honeywell. (2023, February 14). Operational Intelligence Revolutionizes. Retrieved February 19, 2024, from https://sps.honeywell.com/us/en/support/blog/productivity/operational-intelligence-revolutionizes

[16]. Hosch, W. L. (2024, February 15). machine learning. Encyclopedia Britannica. https://www.britannica.com/technology/machine-learning

[17]. InvGate. (2024, February 1). IT Asset Discovery and Inventory Management: Best Practices. Retrieved from https://invgate.com/insight/it-asset-discovery-tool/

[18]. Martins, L. M. O. P. R. (2015). Software asset management in an organization (Master's thesis).

[19]. Nadimpalli, M. (2017). Artificial intelligence risks and benefits. International Journal of Innovative Research in Science, Engineering and Technology, 6(6).

[20]. Nancy, S. K. 2008. The software licensing dilemma. Brigham Young University Law Review, 2008(4), 1103-1164.

[21]. Nozomi Networks. (2024, February 15). Automate Your OT Asset Inventory Management. Retrieved from https://www.nozominetworks.com/solutions/iot-ot-asset-inventory-management

[22]. Phipps, S., & Zacchiroli, S. (2020). Continuous open source license compliance. Computer, 53(12), 115-119. https://doi.org/10.1109/MC.2020.3024403

[23]. Snowflake. (2023, February 14). Software Asset Management: Predict Your SaaS Needs. Retrieved February 19, 2024, from https://www.snowflake.com/blog/software-asset-management-predicting-saas-needs/

[24]. Virima. (n.d.). 5 benefits of automated asset discovery for your business. Retrieved from https://www.virima.com/blogs/

[25]. Wall, A. M. (2021). Guidelines for artificial intelligence-driven enterprise compliance management systems (Doctoral dissertation).