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OPEN SOURCE SOLUTIONS - RISKS MITIGATION

EIT Manufacturing

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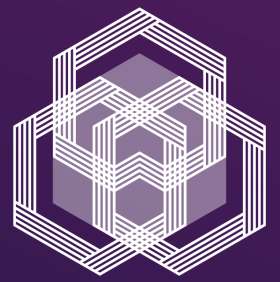
AGENDA

- Introduction
- Exchange problems in adopting 3Os
- Diversification
- 4Emerging Technologies: focus on the AI or Blockchain
- Recommendations and tips for businesses to mitigate the risks of open source solutions



The main objectives of this course

- Identify and explain the main exchange problems that businesses may encounter when using open source solutions, such as opportunism, uncertainty, complexity, etc.
- Describe how businesses can diversify their sources of value and revenue when using open source solutions, such as offering complementary products or services, creating platforms or ecosystems, etc.
- Discuss the specific risks and opportunities of using open source solutions in the context of AI or Blockchain.

Learning outcomes

By the end of this course, you will be able to:

- Assess the suitability and feasibility of open source solutions for different business scenarios
- Apply strategies and tools to mitigate the risks and maximize the opportunities of open source solutions
- Evaluate the impact and potential of open source solutions for AI and Blockchain applications

Background

- Open source solutions are freely available for anyone to use, modify, and distribute, encompassing software, hardware, and data.
- Businesses benefit from open source solutions with lower costs, faster innovation, higher quality, and greater flexibility.
- Risks associated with open source solutions include legal, technical, operational, and strategic concerns.
- These risks can impact business relationships with customers, suppliers, partners, and competitors.

Exchange problems in adopting 3Os

- Exchange problems in open source solutions stem from conflicting interests, information, and expectations.
- Restrictive licenses in open source software can hinder modification and commercialization.
- Poor documentation and support for open source hardware increase vulnerability to failures and breaches.
- Sharing open data may lead to loss of control over quality and usage.

Challenges related to exchange problems

Complexity

The difficulty of understanding, managing, or integrating open source solutions due to their diversity, variability, or interdependence.

Uncertainty

The lack of information or knowledge about the quality, performance, or compatibility of open source solutions.

Opportunism

The risk that one party may act in a self-interested or dishonest way, exploiting the other party's vulnerabilities or resources.

Strategies and practices to overcome exchange problems

01

Choose the right open source solution based on functionality, quality, license, and community support for organizational needs and goals.

02

Understand and adhere to legal and ethical obligations when using open source solutions, respecting intellectual property, privacy, and social norms.

03

Engage in effective communication and collaboration with open source communities by contributing to development, testing, and support, and providing feedback to contributors.

04

Establish clear policies for using open source solutions, defining roles, standards, processes, and tools for selection, integration, management, and security.

Examples of addressing exchange problems

Opportunism

A study by Rossi et al. (2006) found that some open source software developers may engage in opportunistic behaviour, such as withholding contributions, free-riding, or defecting, which can undermine the collaboration and trust among the community. To prevent or reduce this behaviour, the study suggested that businesses should use appropriate licensing models, such as the GNU General Public License (GPL), that require the developers to share their modifications and improvements with the community, or offer incentives, such as recognition, reputation, or rewards, that motivate the developers to contribute and cooperate with the community.

Uncertainty

A study by Stewart et al. (2006) found that open source software users may face uncertainty about the quality, reliability, and security of the software, which can affect their adoption and satisfaction decisions. To address or mitigate this uncertainty, the study suggested that businesses should provide adequate documentation, such as user reviews, ratings, or testimonials, that demonstrate the performance and benefits of the software, or offer support, such as help desk, troubleshooting, or warranty, that ensure the functionality and usability of the software.

Complexity

A study by Bonaccorsi et al. (2006) found that open source hardware projects may face complexity challenges, such as coordinating the design, production, and distribution of the hardware, which can increase the costs and risks of the projects. To cope or overcome this complexity, the study suggested that businesses should foster contribution, such as crowdsourcing, co-creation, or open innovation, that leverage the collective intelligence and creativity of the community, or use standards, such as protocols, interfaces, or formats, that facilitate the compatibility and interoperability of the hardware.

Deep Dive References

Rossi, C., Bonaccorsi, A., & Giannangeli, S. (2006)	Open source software communities: A study of organization and institutionalization.
Stewart, K. J., Ammeter, A. P., & Maruping, L. M. (2006)	Impacts of license choice and organizational sponsorship on user interest and development activity in open source software projects.
Bonaccorsi, A., Giannangeli, S., & Rossi, C. (2006)	Entry strategies under competing standards: Hybrid business models in the open source software industry

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Diversification

- Diversification in open source solutions involves creating and capturing value from various sources like products, services, and markets.
- It helps businesses reduce dependence on a single source of revenue, mitigating long-term risks.
- For example, a business offering open source software products may face competition from free alternatives, highlighting the need for diversification.
- Similarly, businesses providing services based on open source hardware or data may encounter challenges due to technological advancements or market saturation.

Diversification strategies

01

Offering complementary products or services: providing value-added offerings like support, training, and customization for open source solutions.

02

Creating platforms or ecosystems: establishing networks for users, developers, and partners to interact and share resources around the open source solutions.

03

Leveraging data insights: using data from open source solutions to develop new products, services, or processes like analytics and personalization.

Examples of diversification

Complementary Products or Services

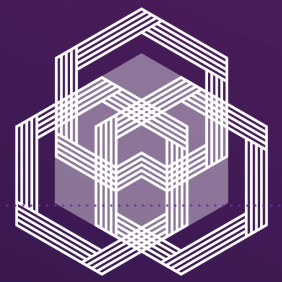
- IBM generated significant revenue by offering services like consulting, installation, maintenance, and hosting to customers.
- IBM differentiated its services by providing high quality, reliability, and security, enhancing the functionality, usability, and convenience of the software.

Platforms or Ecosystems

- Android created a vibrant ecosystem of users, developers, and device manufacturers, contributing to innovation and diffusion of the platform.
- Android leveraged network effects by providing an open and flexible architecture, enabling interaction and exchange of resources among ecosystem members.

Deep Dive References

West, J., & Gallagher, S. (2006)	Challenges of open innovation: the paradox of firm investment in open-source software.
Tiwana, A., Konsynski, B., & Bush, A. A. (2010)	Platform evolution: Coevolution of platform architecture, governance, and environmental dynamics.
Chesbrough, H. W., & Appleyard, M. M. (2007)	Open innovation and strategy.



4Emerging Technologies: focus on the AI or Blockchain

AI Definition	AI is the ability of machines or systems to perform tasks that require human intelligence like reasoning, learning, decision making.
Blockchain Definition	Blockchain is a distributed ledger technology enabling secure and transparent transactions among multiple parties without intermediaries.
Benefits of AI and Blockchain	AI and Blockchain benefit from open source solutions, fostering innovation, collaboration, and accessibility.
Industry Impact	AI and Blockchain are transforming industries like healthcare, education, finance with their innovative capabilities.

AI and Blockchain risks

AI risks encompass bias, fairness, accountability, transparency, and privacy. Businesses must align AI use with stakeholder values and be able to justify outcomes.

Blockchain risks involve scalability, security, governance, and compliance. Businesses need to ensure compatibility with industry standards and monitor performance.

Open source AI and Blockchain introduce additional ethical, legal, social, and technical challenges beyond proprietary solutions.

Principles and practices to adopt

Ethical principles guide the design and deployment of open source solutions for AI and Blockchain, including fairness, transparency, and privacy.

Legal practices encompass rules like intellectual property rights and liability in the use of open source solutions for AI and Blockchain.

Social practices involve stakeholder interactions, promoting participation and inclusion in open source solutions for AI and Blockchain.

Technical practices ensure quality and security through methods like testing and validation in open source solutions for AI and Blockchain.

Best practices and solutions to address challenges and risks

AI

- Use open and trustworthy data sources for AI applications.
- Apply robust and rigorous methods and models in AI development.
- Implement ethical and responsible principles and frameworks in AI projects.
- Engage and empower users and beneficiaries of AI solutions.

Blockchain

- Utilize open and interoperable platforms and protocols in Blockchain implementations.
- Apply secure and reliable methods and mechanisms in Blockchain technology.
- Implement effective and efficient governance and management structures in Blockchain projects.
- Collaborate and coordinate with participants and stakeholders of Blockchain solutions.

Examples of addressing Ethical, Legal, Social practices

Ethical Principles

A study by Morley et al. (2019) found that open source AI may raise ethical concerns, such as privacy, accountability, fairness, and human dignity, as it may enable the creation and dissemination of harmful or malicious applications, such as deepfakes, autonomous weapons, or surveillance tools. The study proposed a framework of ethical principles and methods for open source AI, such as the Asilomar AI Principles, the IEEE Ethically Aligned Design, and the Montreal Declaration for a Responsible Development of Artificial Intelligence, that can guide the ethical decision making and behaviour of the open source AI community.

Legal Practices

A study by Finck (2018) found that open source Blockchain may face legal uncertainties, such as intellectual property rights, contractual obligations, liability, and jurisdiction, as it may challenge the existing legal frameworks and norms, such as patentability, enforceability, or responsibility. The study suggested some legal practices for open source Blockchain, such as the use of smart contracts, the adoption of hybrid or dual licensing models, and the development of self-regulatory or co-regulatory mechanisms, that can address the legal issues and facilitate the legal compliance of the open source Blockchain projects.

Social Practices

A study by O'Neil (2016) found that open source AI may have social implications, such as bias, discrimination, and inequality, as it may reflect or amplify the existing prejudices and power structures in the data, algorithms, or systems. The study recommended some social practices for open source AI, such as the involvement of diverse and representative stakeholders, the promotion of public awareness and education, and the establishment of oversight and audit bodies, that can ensure the social justice and inclusion of the open source AI initiatives.

Examples of addressing Technical practices

Verification

A study by Ametrano (2016) found that open source Blockchain projects may rely on formal verification, such as mathematical proofs, logic, or cryptography, to ensure the correctness and consistency of the protocol, transactions, or smart contracts.

Certification

A study by Wüst and Gervais (2018) found that open source Blockchain projects may benefit from security certification, such as audits, reviews, or ratings, to ensure the robustness and resilience of the network, system, or platform.

Testing

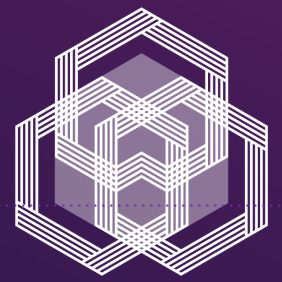
A study by Zhang et al. (2018) found that open source AI projects may require rigorous and comprehensive testing, such as unit testing, integration testing, or system testing, to detect and correct errors, bugs, or failures in the code, data, or models.

Validation

A study by Dignum (2019) found that open source AI projects may need ethical validation, such as ethical impact assessment, ethical review, or ethical certification, to ensure the alignment and compliance of the applications with the ethical principles and values.

Deep Dive References

Morley, J., Floridi, L., Kinsey, L., & Elhalal, A. (2019)	From what to how: An overview of AI ethics tools, methods and research to translate principles into practices.
Finck, M. (2018)	Blockchains and data protection in the European Union. European Data Protection Law Review.
O'Neil, C. (2016)	Weapons of math destruction: How big data increases inequality and threatens democracy. Broadway Books.



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Key Takeaways - 1

1. Open source solutions offer lower costs, higher quality, faster innovation, and greater flexibility for businesses.

2. Businesses face risks and challenges with open source solutions, including legal, technical, operational, and strategic issues.

3. To mitigate risks, businesses must understand and address the challenges while maximizing the benefits of open source solutions.

4. Strategies like offering complementary products or services and creating platforms can help businesses overcome challenges and diversify sources of value and revenue with open source solutions.

Key Takeaways - 2

1. Open source solutions can benefit AI and Blockchain by fostering innovation, collaboration, and accessibility.

2. AI and Blockchain using open source solutions may face risks like ethical, legal, social, and technical challenges.

3. Businesses must responsibly address the risks associated with open source solutions for AI and Blockchain while leveraging their potential.

Recommendations and tips for businesses to mitigate the risks of open source solutions

Select open source solutions based on business needs, considering costs, benefits, and risks.

Engage with the open source community to share feedback, resources, and innovations for mutual benefit.

Adhere to best practices and standards of the open source community, including licensing and documentation.

Regularly assess the performance and impact of open source solutions, making necessary adaptations and improvements.

Consult with professional experts for legal, technical, or operational guidance on open source solutions.

Monitor and evaluate the performance and impact of open source solutions, and adapt or improve them as needed.