

AI for Integrated Thinking: Bridging Financial and Non-Financial Reporting

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Abstract

This study examines how Artificial Intelligence (AI) can operationalise integrated thinking to bridge financial and non-financial reporting into a single, decision-useful narrative. Synthesising contemporary reporting standards and management practices, we propose an AI-enabled framework that connects strategy, risk, and performance across multiple capitals. The framework employs natural language processing to ensure narrative consistency, machine learning to link metrics and detect anomalies, and knowledge graphs to deliver semantic data integration and lineage information. We find that AI improves data quality and connectivity between ESG drivers and financial outcomes, enhances materiality assessment (including double materiality), supports real-time monitoring, and mitigates greenwashing risk through traceable evidence and control. It also streamlines the drafting (the MD&A and sustainability sections), automates iXBRL tagging, and strengthens assurance readiness. Practically, we outline data architecture, governance, controls, and change-management steps, and highlight pilot-ready use cases, such as linking climate risk to impairment testing and human-capital metrics to productivity and retention. This study contributes an actionable, ethics-aware, AI-powered integrated reporting model that elevates reporting from compliance to strategic intelligence.

Keywords: *Integrated thinking, integrated reporting, artificial intelligence, ESG, materiality assessment, knowledge graph, natural language processing, machine learning, assurance, iXBRL.*

I. Introduction

A. Background on Integrated Thinking and Reporting

Integrated thinking and reporting have transformed corporate reporting by combining financial

and non-financial information to provide a comprehensive view of how organisations create value over time. Integrated reporting enhances corporate environmental performance by linking financial reports with sustainability aspects such as environmental and social performance (Omran et al., 2020). It originated to bridge the gap between traditional financial reporting and the evolving demands for sustainability information, making corporate disclosures more decision-useful by incorporating sustainability and governance factors (Bektur & Arzova, 2020; Donkor et al. 2024).

B. The Need for Bridging Financial and Non-Financial Reporting

Corporations have increasingly recognised the importance of non-financial information, such as sustainability and corporate social responsibility (CSR), in assessing long-term viability and value creation. Integrated reporting aims to present a unified narrative that reflects both financial metrics and sustainability efforts, thus providing stakeholders with a more balanced understanding of a company's impact and strategy. This cohesive approach is necessary because traditional financial reporting does not fully capture the socio-environmental responsibilities integral to a company's long-term success (Dimes & De Villiers, 2023; Donkor et al., 2024).

C. The Role of AI in Enhancing Integrated Reporting

Artificial Intelligence (AI) plays a pivotal role in refining the efficiency and effectiveness of integrated reporting. AI technologies enhance data analysis, ensuring that both financial and non-financial data are accurate, timely, and comprehensive. This capability is crucial for addressing the complexities of sustainability reporting, where data collection and quality remain significant challenges. For instance, AI can streamline data collection, improve the consistency and assurance level of Environmental, Social, and Governance (ESG) reporting, and facilitate more robust and reliable corporate disclosures (Chen, 2024; Emon & Khan, 2025).

Additionally, AI-driven tools can help companies address potential pitfalls, such as greenwashing, where sustainability claims are exaggerated or misleading. By deploying AI, organisations can ensure transparency and accountability in sustainability reporting, aligning corporate practices with regulatory standards and stakeholder expectations. This strategic integration not only enhances reporting quality but also supports the broader enterprise goal of sustainable value creation (De Villiers et al., 2023).

II. Understanding Integrated Thinking

A. Definition and Core Principles of Integrated Thinking

Integrated thinking is a holistic approach to organizational decision-making that emphasises the consideration of multiple capitals, such as financial, human, social, and natural, to promote value creation and sustainability. This requires a shift from traditional siloed thinking to a more connected approach that aligns business strategies with sustainable development goals. The principles of integrated thinking include integrated awareness and understanding, leadership commitment and capability, structures, organizational performance management, and external communication (Maroun et al., 2022).

B. Benefits of Integrated Thinking for Organizations

The adoption of integrated thinking provides several benefits to organisations.

1. **Enhanced Value Creation:** By considering diverse capitals and their interactions, integrated thinking enables organisations to create sustainable value over the long term. This approach supports informed decision-making that balances financial goals with social and environmental responsibilities (Tirado-Valencia et al., 2020).
2. **Improved Transparency and Accountability:** Integrated thinking fosters greater transparency within organisations by clarifying the interconnections between the different aspects of business operations. This enhanced clarity improves accountability and communication with stakeholders, leading to stronger relationships (Maroun et al., 2022).
3. **Strengthened strategic planning:** Organisations utilising integrated thinking can develop more holistic and resilient strategies. By aligning their business models with sustainability goals, they are better equipped to anticipate and adapt to changes in the external environment (Tirado-Valencia et al., 2020).

C. Challenges in Implementing Integrated Thinking

Implementing integrated thinking within organisations can present several challenges.

1. **Limited Connectivity and Integration:** One major challenge is the poor connectivity of information across various departments and the lack of a coherent link between

materiality analysis and strategy formulation. This can lead to insufficient forwardlooking perspectives and impede the holistic view required for effective, integrated thinking (Tirado-Valencia et al., 2020).

2. **Cultural and Organizational Barriers:** Organizational culture can significantly hinder the adoption of integrated thinking. Resistance to change, rigid hierarchies, and a lack of leadership commitment can hinder the integration of this holistic approach (Maroun et al., 2022).
3. **Complexity and Resource Intensiveness:** The comprehensive nature of integrated thinking requires substantial resources and capabilities, such as advanced data management systems and cross-disciplinary collaborations. Organizations may face resource constraints and lack the necessary capacity to fully implement integrated thinking (Tirado-Valencia et al., 2020).

Despite these challenges, integrated thinking remains a crucial enabler of sustainable business practices, encouraging organisations to develop strategies that balance economic, social, and environmental objectives.

III. The Current State of Financial and Non-Financial Reporting

A. Traditional Financial Reporting Practices

Traditional financial reporting revolves around the preparation of financial statements, such as balance sheets, income statements, and cash flow statements, which provide a quantitative snapshot of a company's financial position and performance. These reports are typically produced according to established accounting standards, such as Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS), which ensure the consistency, reliability, and comparability of financial information across different entities (Barrett, 1976; Daske, 2006). Traditional financial reporting focuses primarily on historical financial data and is often critiqued for its lack of forward-looking information and incapacity to capture intangible assets, such as intellectual capital and brand value (Hopkins et al., 2008).

B. Evolution of Non-Financial Reporting

Non - financial reporting has evolved significantly in response to increasing stakeholder

demands for information related to Environmental, Social, and Governance (ESG) performance. Initiatives such as the Global Reporting Initiative (GRI) and the Non-Financial Reporting Directive in the EU have encouraged companies to disclose information about their environmental impact, social responsibility, and governance practices (Caputo et al., 2021; Traversi & Fornasari, 2024). These reports aim to provide a more comprehensive view of a company's performance beyond financial metrics, highlighting its sustainability practices and corporate social responsibility (CSR) efforts (Sannikova & Semikolenova, 2024).

The transition from voluntary to mandatory non-financial reporting, especially in the EU, reflects the growing recognition of the importance of sustainable business practices and transparency in corporate governance (Cuomo et al., 2022; Stolowy & Paugam, 2018).

C. Gaps Between Financial and Non-Financial Reporting

Despite advancements in non-financial reporting, significant gaps remain between financial and nonfinancial disclosures. A major issue is the lack of integration between these two types of reporting, which often results in disconnected narratives that fail to provide a holistic view of a company's overall performance and strategy (Petrov, 2024). Non-financial reports are frequently criticised for their lack of standardisation and comparability, making it difficult for stakeholders to evaluate and compare corporate performance across entities (Saini et al., 2022).

Moreover, while financial reports are deeply rooted in established standards that ensure consistency and accuracy, non-financial reporting still struggles with diverse frameworks and metrics, which can lead to inconsistent and ambiguous disclosures (Hoffmann et al., 2018; Stolowy & Paugam, 2018). This gap underscores the need to integrate financial and nonfinancial elements in corporate reporting (also known as integrated reporting) to facilitate a more cohesive approach that enhances transparency, accountability, and sustainability (Ahern, 2016).

IV. AI Technologies for Integrated Reporting

A. Overview of Relevant AI Technologies

1. **Natural Language Processing (NLP):** NLP enables the processing and analysis of large volumes of textual data, extracting valuable insights from unstructured data sources such as documents and communication logs. In integrated reporting, NLP

assists in understanding and categorizing large amounts of textual information quickly and accurately, thereby facilitating the analysis of complex narratives in reports (Ssetimba et al., 2024; Wen et al., 2019).

2. **Machine Learning (ML):** ML algorithms enhance integrated reporting by analyzing vast datasets to identify patterns, trends, and anomalies. This capability is leveraged to provide predictive analytics and improve the decision-making process. ML's role in integrated reporting is crucial for distilling insights from financial and non-financial data and aiding in the synthesis of complex information for comprehensive reporting (, 2024; Endo et al., 2024).
3. **Computer Vision:** Computer vision, a part of AI technology, is used to process and analyse visual data, such as images or video frames. Although not commonly applied directly in integrated reporting, its applications in data validation and verification are emerging, particularly in analysing graphical elements and infographics that accompany integrated reports (Yaseen & Rather, 2024).

B. AI Applications in Data Collection and Analysis

AI technologies automate the collection and synthesis of data, ensuring real-time processing and reducing manual effort. NLP systems process vast amounts of unstructured data to extract insights efficiently, whereas ML models analyse structured and unstructured data for better accuracy in forecasting and risk assessments. These technologies enable organisations to handle big data efficiently, providing a seamless flow of information necessary for integrated reporting (Ssetimba et al., 2024; Wen et al., 2019).

C. AI-Driven Insights and Decision-Making Support

AI enhances decision-making by providing predictive insights and simulations. ML algorithms offer predictive capabilities, identify potential risks and opportunities, and enable proactive strategic planning. NLP supports decision-making by synthesising vast quantities of narrative data into useful insights. The integration of these technologies ensures that decision-makers have access to comprehensive, reliable, and timely information, thus improving the quality and accuracy of the integrated reports (Qatawneh et al., 2024; Yaseen & Rather, 2024).

Overall, the role of AI in integrated reporting is transformative, offering enhanced capabilities

in data processing, analysis, and decision support while minimising traditional inefficiencies and errors.

V. Bridging Financial and Non-Financial Reporting with AI

A. Enhancing Data Integration and Consistency

AI technologies significantly enhance the integration and consistency of financial and nonfinancial reporting. Machine learning (ML) algorithms enable the processing of large datasets from diverse sources, ensuring that data related to financial performance and non-financial elements, such as sustainability and ESG criteria, are consistently integrated into cohesive reporting frameworks. These advanced AI systems automate data handling, reducing errors and inconsistencies arising from manual processes, thereby providing a single version of the truth for both financial and non-financial aspects of reporting (Antwi et al., 2024; Saiyed, 2025).

B. Improving Materiality Assessment and Risk Management

AI is pivotal in enhancing the materiality assessment of financial and non-financial factors that impact organizational reporting. By employing predictive analytics and reinforcement learning models, AI tools can assess the significance of various risk factors and opportunities, tailoring insights that inform more strategic and material-driven reports. These systems also facilitate improved risk management by continuously monitoring financial transactions, identifying potential anomalies, and refining credit risk assessments using real-time analytics. This integration offers a proactive approach to risk management, ensuring that organisations remain agile and responsive to potential financial threats (Abikoye et al., 2024; Ju & Zhu, 2024).

C. Facilitating Real-Time Reporting and Dynamic Updates

AI-driven systems are transforming traditional reporting by enabling real-time financial and non-financial updates to be provided. These technologies allow organisations to automate and expedite the collection, validation, and analysis of data, thereby delivering timely and up-to-date reports. Real-time financial monitoring systems equipped with AI provide continuous oversight, enhance accuracy, and offer immediate insights into emerging trends and risks. This capability not only aligns reporting practices with regulatory deadlines but also empowers stakeholders with current information to make informed decisions quickly (Abikoye et al., 2024; Antwi et al., 2024).

Thus, AI technologies bridge the gap between financial and non-financial reporting by providing robust solutions for data integration, enhanced risk management, and real-time operational oversight, leading to more effective and consistent reporting practices.

VI. AI-Powered Integrated Reporting Frameworks

A. Adapting Existing Frameworks for AI Integration

Existing reporting frameworks can be adapted for AI integration by incorporating AI-driven technologies, such as machine learning and natural language processing, to automate and streamline data analysis, enhance the accuracy of reporting, and ensure regulatory compliance. AI technologies facilitate the processing and interpretation of complex datasets, allowing for the enhanced analysis of financial and non-financial information. By seamlessly integrating AI with current frameworks, organisations can achieve more efficient and accurate regulatory reporting, thereby improving compliance (Nembe et al., 2024; Tillu et al., 2023).

B. Developing New AI-Centric Reporting Models

To fully leverage AI's potential of AI in integrated reporting, developing new AI-centric models is essential. These models are designed to utilise AI capabilities, such as predictive analytics and machine learning, for real-time monitoring, risk assessment, and decision-making support. AI-centric reporting frameworks emphasise automation, enabling dynamic updates and realtime provision of insights, thus facilitating more responsive and proactive reporting processes. This approach not only enhances operational efficiency but also supports strategic efforts to align reporting practices with organizational sustainability objectives (Schwaeke et al., 2025; Tillu et al., 2023).

C. Ensuring Compliance and Standardization

Ensuring compliance and standardisation in AI-powered reporting frameworks requires the establishment of robust governance and ethical guidelines. It is crucial to address ethical considerations, such as transparency, accountability, and bias mitigation, in algorithmic decision-making. By aligning AI implementations with existing regulatory frameworks and incorporating best practices for ethical AI use, organisations can adhere to compliance requirements while fostering innovation in the field. This alignment ultimately supports the development of standardised reporting practices that maintain integrity and reliability across various industries (Adhikari et al., 2024; Nembe et al., 2024).

The integration of AI into reporting frameworks offers transformative opportunities to improve data accuracy, operational efficiency, and compliance standards, ensuring that organisations remain agile in a rapidly evolving regulatory landscape.

VII. Data Management and Governance for AI-Enhanced Reporting

A. Data Quality and Reliability Considerations

In AI-enhanced reporting, data quality and reliability are critical because AI systems heavily rely on high-quality input data to produce accurate outputs. Ensuring data integrity involves establishing robust data governance frameworks that address issues such as data bias, incomplete information, and technological uncertainties that can undermine the accuracy of AI decision-making. Effective data governance strategies mitigate the risks associated with poor data quality by implementing rigorous data validation and cleaning processes and maintaining comprehensive audit trails (Ball Dunlap & Michalowski, 2024; Guan et al., 2022).

B. Ethical Use of AI in Reporting Processes

The ethical considerations in AI reporting processes encompass transparency, accountability, and mitigation of algorithmic bias. AI systems should be designed with ethical frameworks that promote responsible data usage, ensuring that the decisions and predictions made by AI are transparent and justifiable. Ethical guidelines are essential for preventing the misuse of AI technologies, such as data manipulation and discriminatory practices. Initiatives focusing on AI ethics advocate for clear protocols and mandatory training to raise awareness of ethical AI use among stakeholders (Ball Dunlap & Michalowski, 2024; Mirek-Rogowska et al., 2024).

C. Data Security and Privacy Measures

Data security and privacy are paramount in the AI era because AI systems often handle sensitive and personal data. Organisations must implement robust data protection strategies that comply with international regulations, such as the GDPR and HIPAA, focusing on data ownership, informed consent, and cybersecurity practices. Continuous updates and audits are necessary to safeguard the data against unauthorised access or breaches. Transparency and secure data governance are crucial for maintaining trust and ensuring the ethical use of AI technologies in reporting and other applications (Huang 2023; Zangana et al. 2025).

Overall, a comprehensive approach to data management and governance in AI-enhanced reporting includes ensuring data quality, adhering to ethical standards, and maintaining strict data-security measures. These factors collectively ensure that AI technologies are used effectively and responsibly in modern reporting.

VIII. Overcoming Implementation Challenges

A. Technical Barriers and Solutions

The implementation of AI technologies across industries faces numerous technical barriers, including data quality issues, algorithmic complexity, integration with existing systems, and regulatory compliance challenges. High-quality and diverse datasets are essential for the effective training of AI models. Solutions to technical barriers include adopting advanced data management practices, investing in the development of robust machine learning algorithms that can handle incomplete or biased data, and ensuring interoperability with existing systems (Ivakhnenkov, 2023; Vieriu & Petrea, 2025). Furthermore, ongoing collaboration with regulatory bodies to develop standards and compliance frameworks is crucial for seamless AI integration and deployment (Li et al., 2023).

B. Organizational Change Management

Successful AI implementation requires a well-structured organizational change management strategy. This involves fostering a culture that embraces digital transformation, enhancing employee skills through training programs, and incorporating AI literacy across teams to overcome resistance and build trust in AI-driven processes. Leadership must support continuous learning and encourage interdisciplinary collaboration to align AI initiatives with an organisation's strategic goals (Leffia et al., 2024; Okwor et al., 2024). By creating an adaptive and innovative environment, organisations can effectively integrate AI technology into their operations.

C. Addressing Stakeholder Concerns and Expectations

Addressing stakeholder concerns involves creating transparency in AI decision-making and aligning AI applications with ethical guidelines to ensure their accountability. Stakeholders often express concerns regarding data privacy, algorithmic fairness, and potential job displacement resulting from AI integration. Organisations can address these issues by engaging stakeholders early in the implementation process, providing clear communication about the

benefits and limitations of AI technologies, and establishing robust governance frameworks to monitor AI applications (Hidayat et al., 2024; Mellouli et al., 2024). By proactively managing expectations and demonstrating responsibility, organisations can foster trust and support AI initiatives.

Overall, overcoming AI implementation challenges requires a multifaceted approach that addresses technical barriers, integrates change management strategies, and effectively communicates with stakeholders to build trust and ensure ethical and responsible deployment.

IX. The Future of AI in Integrated Thinking and Reporting

A. Emerging AI Technologies and Their Potential Impact

Emerging AI technologies, such as machine learning, natural language processing, and deep learning, are poised to significantly influence integrated thinking and reporting by enhancing data analytics, predictive modelling, and real-time decision-making. These technologies enable organisations to process large datasets more efficiently, derive valuable insights, and streamline the reporting processes. The application of AI in business intelligence and customer engagement is transforming how organisations plan and communicate their strategies, offering more personalised and context-aware experiences (Eboigbe et al., 2023; Tula et al., 2024).

B. Predictions for the Evolution of Integrated Reporting

As AI becomes more integrated into corporate systems, it is expected to drive the evolution of integrated reporting by enhancing transparency, accuracy, and accountability. AI-powered analytics will allow for more detailed and timely insights into financial and non-financial performance, aligning with stakeholders' growing demands for comprehensive disclosures. Digital transformation tools, such as AI and blockchain, are already improving transparency in financial reporting, particularly in emerging markets, where they address challenges such as limited infrastructure and regulatory inconsistencies (Alonge et al., 2024).

C. Preparing for the Future of AI-Driven Corporate Reporting

To prepare for an AI-driven future in corporate reporting, organisations must prioritise investment in digital infrastructure and AI literacy programs. Fostering a culture of continuous learning and innovation is crucial for the effective integration of AI technologies. There is also a need to address challenges such as data privacy concerns, ethical considerations, and

regulatory compliance issues. A collaborative approach involving AI experts, industry professionals, and policymakers is essential for developing ethical AI practices and building trust among stakeholders (Ashrafuzzaman et al., 2025; Ozay et al., 2024). By taking these steps, organisations can leverage AI technologies to achieve more integrated, transparent, and effective reporting in the digital age.

X. Conclusion

A. Recap of Key Points

Artificial Intelligence (AI) has been showcased across numerous sectors, illustrating its transformative potential in enhancing efficiency, personalisation, and decision-making. Key discussions highlighted the integration of AI in fields such as business intelligence, customer engagement, and financial reporting, illustrating its improved accuracy and strategic innovation. The literature underscores that AI facilitates data-driven approaches, offering insights that enhance organizational capabilities and accountability (Artene et al., 2024; Jejenywa et al., 2024).

B. The Transformative Potential of AI in Integrated Thinking and Reporting

AI's transformative power lies in its ability to process complex datasets, automate tasks, and provide predictive insights. In integrated thinking and reporting, AI enhances the quality and timeliness of financial information, ensuring integrity and compliance. Its applications, like natural language processing and machine learning, facilitate comprehensive reporting, enabling organizations to better communicate strategic objectives and performance insights to stakeholders. Moreover, AI-driven techniques can offer personalized, real-time data analysis, leading to more informed decision-making processes (Artene et al., 2024; Jejenywa et al., 2024).

C. Call to Action for Organizations and Professionals

As organizations navigate the AI-driven landscape, they must prioritize the integration of AI technologies with a balanced approach. This involves investing in digital infrastructure and human capital to realize AI's full potential. Emphasizing ethics, data security, and transparency is critical to build trust and ensure responsible AI use. Professionals should embrace continuous learning and innovation to adapt to evolving technological demands. Collaboration among industry leaders, educators, and policymakers is essential to create supportive regulatory

frameworks that drive sustainable growth and innovation. Organizations are encouraged to leverage AI strategically to achieve competitive advantage while maintaining ethical standards (Azman & Tmkaya, 2025; Oyekunle & Boohene, 2024).

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