*Corporate and Financial Markets Law*

# Bridging Traditional Corporate Governance and Technology: the 'AI Corporate Design' Framework to Computational Corporate Governance Model

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**Abstract**

Emerging technologies like artificial intelligence and big data are rapidly transforming social, political, and economic landscapes. This technological revolution is reshaping business organization and operations, leading to new corporate governance forms where AI is integrated into various managerial functions. However, the uncritical integration of AI poses risks, including transparency and accountability issues. To mitigate these risks, the paper proposes an 'AI by Corporate Design' framework, aimed at integrating AI solutions through reengineering corporate mechanisms and processes, ensuring adherence to ethical, legal, and algorithmic standards. This framework combines corporate governance rules, business process management (BPM) techniques, legal provisions like 'privacy by design', and recommendations for responsible AI use from regulators. However, since the framework is voluntary, it is advisable to consider technology as a fourth dimension of corporate structure, along with organizational, administrative, and accounting structures, thus incorporating it into the realm of director's duties.

## I. Introduction

Emergent technologies such as artificial intelligence (AI) and big data, characterized by simultaneous and breath-taking improvements over the recent decades, are becoming pervasive in the social, political and economic domains.

The ongoing technological and digital revolution is also affecting the organization and operation of businesses, as well as the processes through which a corporation is managed.

For instance, in 2014, Deep Knowledge Ventures, a Hong Kong venture capital firm, announced to media that it 'appointed' as a corporate director an AI program - named *Vital* - capable of making investment recommendations to the other component of the board.[1]

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[1] E. Zolfagharifard, 'Would you take order from a Robot? An artificial intelligence becomes the world's first company director' *Daily Mail*, available at https://tinyurl.com/5n8kftta (last visited 30 September 2024). See also F. Moslein, 'Robots in the Boardroom: Artificial Intelligence and Corporate Law', in W. Barfield and U. Pagallo eds, *Research Handbook on the Law of Artificial Intelligence* (Cheltenham: Edward Elgar Publishing, 2017), 649-670. Even if legally speaking Vital has not acquired the status of corporate director under the corporate laws of Hong

On April 2016, the first blockchain venture capital fund was established in the form of a decentralized autonomous organization (the 'DAO'). This organization was characterized by decentralization, automatic transaction governance, transparency, and token-based membership.[2]

More recently, and in particular in August 2022, NetDragon Websoft Holdings Limited (a Chinese gaming company) made an announcement regarding the 'appointment' of an AI-powered virtual humanoid robot (the so called 'Ms Tang Yu') as the rotating CEO of its flagship subsidiary, Fujian NetDragon Websoft Co Ltd.[3]

Although there is no unanimous opinion among commentators on the extent to which technological breakthroughs will change corporate governance, the aforementioned examples demonstrate the relentless interpenetration between the corporate and technology fields.

This underscores the need to re-evaluate the current regulatory models of corporate governance, as well as the set of mechanisms and processes by which a company operates, in light of the significant changes and risks arising from the widespread adoption of AI technologies.[4] To achieve this, adopting an interdisciplinary approach that encompasses legal, economic, and technological dimensions, all deeply integrated with an ethical and human-centered view, appears necessary.[5]

Based on these premises, the paper is structured as follows: Section 2 explores the impact of AI on corporate governance and business processes, and introduces the concept of a new corporate governance model, the so-called '*Computational Corporate Governance Model*', referring to the future's inextricable integration of AI into corporate operations. Section 3 introduces the '*AI by Corporate Design*' framework, aimed at integrating AI technologies into business processes and

Kong, nor the equality in voting on all the financial decision made by the company, it is already known as the '*world first intelligence company director*'. See, 'Algorithm appointed board director' *BBC*, available at https://tinyurl.com/ydp3ay6b (last visited 30 September 2024). For more details, cf N. Burridge, 'Artificial intelligence gets a seat in boardroom' *Nikkei Asian Review*, available at https://tinyurl.com/54b8yxh8 (last visited 30 September 2024).

[2] C. Jentzsch, 'Decentralized Autonomous Organization to Automate Governance', available at https://tinyurl.com/mswj4f6n (last visited 30 September 2024). The main goals of the project were to create an organization in which participants would have maintained direct real-time control of contributed funds through governance rules formalized, automated and enforced using smart contract technology.

[3] 'NetDragon Appoints its First Virtual CEO' *PR Newswire*, available at https://tinyurl.com/ymmju8sr (last visited 30 September 2024). The company declared that 'Ms. Tang Yu' serves to streamline process flow, to enhance quality of work tasks, and to improve speed of execution, by helping as a real-time data hub and analytical tool to support rational decision-making in daily operations, as well as to enable a more effective risk management system.

[4] M. Fenwick and E.P.M. Vermeulen, 'Technology and Corporate Governance: Blockchain, Crypto, and Artificial Intelligence' *ECGI Working Paper Series in Law*, (2018); M.T. Zagar, 'A New Chapter for ICONOMI: Transformation of Corporate Governance and Issuance of Equity Tokens *Medium*', available at https://tinyurl.com/bdz2mwa5 (last visited 30 September 2024).

[5] Echoing the words of M. Coeckelbergh: 'The technology is always also social and human: AI is not only about technology, but also about what humans do with it, how they use it, how they perceive and experience it, and how they embed it in wider social-technical environments' (M. Coeckelbergh, *AI Ethics* (The MIT Press Essential Knowledge Series, 2020), 79.

corporate governance structures, while simultaneously addressing risks from privacy and transparency to explainability and accountability. Section 4 advocates for the acknowledgment of the technological dimension as a fundamental component of the corporate structure, alongside the organizational, administrative, and accounting dimensions, consequently recognizing the adequacy of such dimension to emerge as a new director's duty. Section 5 concludes.

## II. The Impact of AI on Corporate Governance: Toward a Computational Corporate Governance Model?

In the academic community, it is commonly acknowledged that the advanced capabilities of AI in data collecting, valorisation and processing – particularly through machine learning and deep learning algorithms - will profoundly affect all corporate governance operations: from monitoring function and strategy setting to decision-making and compliance activities.

However, the extent to which AI will affect business processes and corporate governance structure remains controversial. In this regard, it is possible to refer to two macro-opinions.[6]

On the one hand, there are scholars who argue that AI will change the current corporate governance paradigm, addressing longstanding relevant challenges such as the so-called 'agency problem'.[7] This perspective also encompasses the belief that AI's role will evolve beyond merely assisting directors and managers, by replacing them in their decision-making functions, potentially acting as an autonomous board member. In the context of this paper, we refer to them as 'Tech Proponent'.

On the other hand, there is a more moderate opinion which argues that AI will improve governance procedures and practices without making the role of corporate boards and managers obsolete. Proponents of this perspective, while arguing that the functioning of corporate boards will be supported and improved by the implementation of AI, challenge the assumption that AI would entirely or significantly alter the core function of both the board and the management. In the context of this paper, we refer to them as 'Tech Moderates'.

The primary divergence in these opinions primarily revolves around the expected growth in the capabilities of AI, specifically in terms of its prospective applications in corporate governance.

[6] For an in-depth analysis of the different positions in scholarship, see L. Enriques and D.A. Zetzsche, 'Corporate Technologies and the Tech Nirvana Fallacy' *Hastings Law Journal*, (2019).

[7] Agency theory predicts that the divergences of interests between managers and shareholders could lead to 'agency problem', that is, managers engage in activities for their own self-interest rather than the benefits of the shareholders. The costs experienced by the principal to limit this misalignment of interests are known as 'agency costs', defined as the sum of the monitoring expenditures by the principal, the bonding expenditures by the agent, and the residual loss. See C. Michael et al eds, 'Theory of the firm: managerial behaviour, agency costs and ownership structure' *Journal of Financial Economics*, 305 (1976).

Specifically, Tech Proponents assume that AI can already (i) support corporate functions and improve board's decision-making (the so called 'assisted AI')[8] and/or (ii) assist in resolving complex problems and making informed decisions by formulating and answering relevant questions, along with creating and analysing detailed scenarios and simulations (the so called 'augmented AI').[9]

In this regard, it has been said that assisted and augmented AI will soon be able to replace corporate boards in making the administrative tasks, by doing them faster, better, and at a lower cost.[10]

Tech Proponents also assume that AI will enhance the decision-making process of the board of directors.[11] From an economic perspective, the functions performed by AI will significantly lower the cost of administrative and predictions tasks.[12]

Moreover, Tech Proponents anticipate a future where a traditional board member is replaced by a technological board (the so-called 'Algo-Board'). In contrast to the conventional human-led board, this Algo-Board would operate through algorithms, processing extensive data, assessing strategic alternatives instantaneously, and executing decisions based on data that align with the company's goals and values.

This view is grounded on three assumptions: (i) the improvement of the so-called 'general artificial intelligence' (an AI able to understand or learn any intellectual task that a human being can);[13] (ii) AI solutions will be able to perform both administrative and judgment tasks better than humans;14 (iii) humans will become less fit to serve as board members than machines, or will be less willing to do so.[15]

While acknowledging the positive impacts of these technologies, Tech Moderates assume that replacing human board members with AI algorithms may not necessarily improve decision-making from the shareholders' perspective. Therefore,

[8] Examples of commonly used AI systems of this nature are Apple's Siri and Google Assistant.

[9] Examples for the category of advisory or augmented AI include IBM's Watson platform. (C. Forrest, 'IBM Watson: What are companies using it for?' *ZDNet,* available at https://tinyurl.com/yeymk2vr (last visited 30 September 2024).

[10] V. Kolbjørnsrud et al, 'The Promise Of Artificial Intelligence: Redefining Management In The Workforce Of The Future', available at https://tinyurl.com/yzn7d5sf (last visited 30 September 2024). The study mentions tasks such as note taking, scheduling, reporting, maintaining scorecards, managing shift schedules, and generating investor statements and management reports as specific examples of AI-led administrative work.

[11]For instance, the AI will play an important role in the evaluation of a merger or an acquisition, by instantly analysing the amount of data at a firm's disposal, creating accurate reports and suggesting the best decision to take, while considering the relevant regulation. M. Beck et al, 'AI in the Boardroom: The Next Realm of Corporate Governance' *MIT Sloan Management Review*, available at https://tinyurl.com/3u9ea8y2 (last visited 30 September 2024).

[12] A. Agrawal et al, 'The Simple Economics of Machine Intelligence' *Harvard Business Review*, available at: https://tinyurl.com/y8wvj54h (last visited 30 September 2024).

[13] H. Hal, 'DeepMind and Google: the battle to control artificial intelligence' *The Economist*, available at https://tinyurl.com/2frw875h (last visited 30 September 2024). S. Henry et al, 'The limits of machine intelligence: Despite progress in machine intelligence, artificial general intelligence is still a major challenge' *EMBO Reports*, 20 (2019).

[14] M. Petrin, 'Corporate Management in the Age of AI' *UCL Working Paper Series*, 30 (2019).

[15] M. Fenwick and E.P.M. Vermeulen, 'Technology and Corporate Governance: Blockchain, Crypto, and Artificial Intelligence' 1 *Texas Journal Business Law*, 2 (2019).

they envision a scenario where such technologies have a more limited role on boards, primarily providing insights about opportunities to board members, without replacing their monitoring and mediating functions.[16]

Despite ongoing debates concerning the extent of AI's impact on corporate governance, there is a continuous and increasing integration of AI into business processes and corporate governance structures.[17]

The extraordinary evolution of AI systems, along with their ability to provide significant competitive advantages in terms of efficiency and cost reduction for enterprises, if maintained over a reasonable period, is likely to lead to the emergence of what can be termed as the 'Computational Corporate Governance Model' - a model that foresees the inextricable integration of AI technologies, such as predictive analysis systems, automated decision-making, and natural language processing, into board functions and corporate processes.[18]

However, the growing complexities and inherent risks associated with AI underscore the need for advocating a responsible and ethical integration of AI into corporate governance and business structure.

To achieve this outcome, there is an urgent need to align the conventional principles of corporate governance and business operations with the main technical characteristics of AI.

## III. 'AI by Corporate Design': A Proposed Framework to Manage the Corporate Governance Transition Toward the New Technological Paradigm

The integration of AI systems into business processes and corporate governance structures brings a multitude of challenges and risks related to area such as privacy, security, safety, bias, ethics, transparency, explainability, accountability, and so on.

[16] L. Enriques and A. Zetzsche, 'Corporate Technologies and the Tech Nirvana Fallacy' *Hastings Law Journal*, 71 (2019).

[17] B. Leavy, 'Integrating AI into business processes and corporate strategies to enhance customer value' 51 *Strategy & Leadership*, 3-9 (2023).

[18] The term 'Computational' in the context of the 'Computational Corporate Governance' model is adopted to highlight the critical role of computation in AI development and operation. 'AI Computing' is defined as 'the math-intensive process of calculating machine learning algorithms, typically using accelerated systems and software. It can extract fresh insights from massive datasets, learning new skills along the way. It's the most transformational technology of our time because we live in a data-centric era, and AI computing can find patterns no human could'. R. Merrit, 'What is AI Computing?' NVIDIA, available at https://tinyurl.com/bdz7aknp (last visited 30 September 2024). Thus, the improvement in computational capacity is strictly connected with AI technological evolution. For more in-depth insight, see also 'Computational Power and AI' *AINowInstitute*, available at https://tinyurl.com/4sb3khwj last visited 30 September 2024); 'Computation used to train notable artificial intelligence systems' *Ourworldindata*, available at https://tinyurl.com/5fr8m7uf (last visited 30 September 2024); J.M. Gòrriz et al, 'Computational approaches to Explainable Artificial Intelligence: Advances in theory, applications and trends' 100 *Information Fusion*, (2023).

The implementation of AI within corporations, if not properly managed, could affect the entire organizational structure, potentially jeopardizing both the effectiveness of corporate functions and the rights of stakeholders. Furthermore, this phenomenon could be intensified with the advent of the 'Computational Corporate Governance' model, which envisions a deeper integration of AI into corporate governance and business processes.

Consequently, as observed by Floridi, the primary challenge has shifted from digital innovation to the governance of the digital, which he describes as 'the practice of establishing and implementing policies, procedures, and standards for the proper development, use and management of the infosphere'.[19]

However, within the domain of business and corporate governance, it is crucial to recognize that corporations are bound by their unique regulations, policies, procedures, and standards in pursuing the achievement of their business goals.

Therefore, the uncritical juxtaposition of AI systems alongside established corporate rules is insufficient to ensure a secure, effective, and efficient incorporation of this technology into the business and corporate governance operations. This concept parallels the understanding that simply purchasing and using advanced software does not constitute comprehensive enterprise digitization.

Considering these factors, this paper introduces a framework named 'AI by Corporate Design'. This framework is designed to assist corporations in the effective and ethical integration and management of AI technologies. It focuses on the following key aspects: (i) identifying, assessing, preventing, or mitigating risks associated with AI systems utilization; (ii) maximizing the benefits obtained from AI technologies; (iii) supporting members of the corporate governance structure in executing their strategic, administrative, and oversight responsibilities; (iv) advocating a sustainable and human-centric approach to AI usage.

The 'AI by Corporate Design' framework, as its name suggests, draws significant inspiration from the 'privacy by design' concept, which forms one of its core pillars. Mirroring the approaches used in the privacy field under this concept,[20] the framework advocates (i) a preference for proactive measures over reactive responses; (ii) a strong emphasis on conducting preliminary impact analyses of AI on

[19] L. Floridi, 'Soft Ethics, and the Governance of the Digital' 31 *Philosophy & Technol*ogy, 3 (2018).

[20] '*Privacy by Design*' is a concept developed by Dr. Ann Cavoukian in the 1990s to address the systemic effects of Information and Communication Technologies and of large-scale data systems. This concept advances 'that future of privacy cannot be assured solely by compliance with regulatory frameworks; rather, privacy assurance must ideally become an organization's default mode of operation'. As Cavoukian stated, the objectives of *Privacy by Design* may be accomplished by practicing the following seven foundational principles, extensible to the 'AI by Corporate Governance' framework: 1) Proactive not reactive; Preventive not Remedial; 2) Privacy as the Default Setting; 3) Privacy Embedded into Design; 4) Full Functionality – Positive-Sum, not Zero-Sum; 5) End-to-End Security – Full Lifecycle Protection; 6) Visibility and Transparency – Keep it Open; 7) Respect for User Privacy – Keep it User-Centric. See A. Cavoukian, The 7 Foundational Principles, available at https://tinyurl.com/22y3e2jx (last visited 30 September 2024).

stakeholders' rights; (iii) the integration of AI into the design of both corporate processes and governance structure; (iv) the establishment of clear, phase-specific policies for transparency and accountability across all stages of the AI lifecycle; (v) a commitment to a user-centric approach in the deployment of AI within corporate operations.

Additionally, the 'AI by Corporate Design' framework takes significant insight from various AI-Ethics focused frameworks. These include the '*Ethics Guidelines for Trustworthy AI*' by the European Commission,[21] the '*OECD AI Principles*',[22] the '*Recommendation on the Ethics of Artificial Intelligence*',[23] and the '*Principles for the Ethical Use of Artificial Intelligence in the United Nations System*'.[24] However, the 'AI by Corporate Design' distinguishes itself from such ethics framework by adopting a holistic approach specifically tailored for corporations. This approach distinctively integrates three corporate pivotal dimensions: 1) Corporate Governance and Business Processes, addressing how AI is integrated into a company's core operational processes; 2) Legal Regulation, emphasizing compliance with laws and regulations relevant to AI, such as the Artificial intelligence Act, data privacy laws, anti-discrimination legislation, and intellectual property rights; and 3) Technological Dimension, focusing on the unique characteristics and complexity of the AI technology.

In particular, the 'AI by Corporate Design' framework aims to strategically and ethically integrate AI technologies within two fundamental aspects of corporate structures: 'business processes' and 'corporate governance'.

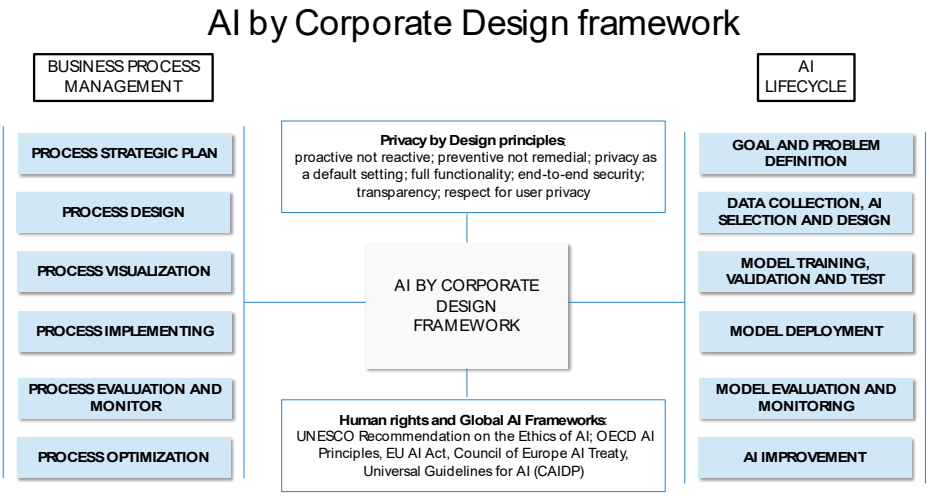
[21] 'Ethics Guidelines for Trustworthy AI' *European Commission*, available at https://tinyurl.com/2cvdrr45 (last visited 30 September 2024).

[22] 'OECD AI Principles', available at https://oecd.ai/en/ai-principles.

[23] 'Recommendation on the Ethics of Artificial Intelligence', available at https://tinyurl.com/bdfu7b7u (last visited 30 September 2024).

[24] 'Principles for the Ethical Use of Artificial Intelligence in the United Nations System', available at https://tinyurl.com/29uhbd6w (last visited 30 September 2024).

*Figure 1.* The 'AI by Corporate Design Framework'




## 1. The Synergy Between Business Process Management Techniques and AI Lifecycle in the 'AI By Corporate Design' Framework

With reference to business processes, the cornerstone of the framework is the 'Business Process Management' ('BPM'). BPM is a field in business that encompasses the identification, visualization, design, execution, monitoring, and optimization of business processes. Traditionally, BPM follows a cycle comprising the following stages: 1) process strategic planning; 2) process design; 3) process visualization; 4) process implementing; 5) process evaluation and monitoring; 6) process optimization.[25]

Within the 'AI by Corporate Design' framework, the six phases of BPM are harmonized with the stages of an AI Lifecycle model, which draws inspiration from the Cross-Industry Standard Process for Data Mining (CRISP-DM).[26] A critical feature of this approach is the fundamental difference between developing AI systems and developing traditional software engineering systems.[27]

[25] ABPMP International, BPM CBOK, Guide to Business Process Management Common Body of Knowledge, 29 (2019). See also, M. Szelagowski, 'Evolution of the BPM Lifecycle' *Communication Papers of the Federated Conference on Computer Science and Information Systems*, 205 (2018).

[26] CRISP-DM aims to offer a comprehensive framework for executing any project employing scientific methods to extract value from data, including Machine Learning. CRISP-DM divides a project into six phases: 1) business understanding; 2) data understanding; 3) data preparation; 4) modeling; 5) evaluation; 6) deployment. See, C. Shearer, 'The CRISP-DM model: the new blueprint for data mining' 5 *Data Warehouse*, 13-22 (2000). The choice of CRISP-DM is due to the broad consideration that, although it is twenty years old, it is still considered the *de facto* standard for developing data mining and knowledge discovery projects (see, M. Haakman et al 'AI lifecycle models need to be revised' 26 *Empire Software Eng*, 95 (2021).

[27] A case study at Microsoft identified the following differences: 1) data discovery, management,

To support the integration of AI into corporate processes in line with BPM stages, an AI lifecycle model comprising the following six phases is considered: 1) AI problem and goal definition; 2) AI data collection/pre-processing and AI selection and design; 3) AI training, validation, and testing; 4) AI model deployment; 5) AI evaluation and monitoring; 6) AI improvement.

A critical consideration involving the distinction between in-house and outsourced AI development should be rigorously taken in account, necessitating distinct strategic approaches when setting-up the six phases of the AI lifecycle within the corporation. In-house AI development has an inherent advantage due to the organic knowledge of existing business and corporate processes, which facilitate alignment with the organization's ethical guidelines, cultural values, and corporate strategy. Conversely, the integration of outsourced AI solutions often requires greater effort to align the AI systems with the company's established structure, potentially complicating the harmonization between AI lifecycle and BPM phases. To mitigate these challenges, it is recommended that corporations opting for outsourced AI development provide dedicated measures and protocols to strictly align the external AI development with the corporation's structure and objectives. These measures and protocols should include detailed specifications and formalizations of the existing corporate and business processes, articulation of the main corporate cultural and ethical values, provision of regular meetings between internal and external teams on AI development, and/or the establishment of joint oversight committees. Such measures will ensure that outsourced AI solutions are developed and adapted in accordance with the organization's features, thus preserving the coherence with the BPM stages.

As a result, whether AI development is in-house or outsourced, in the 'AI by Corporate Design' framework the stages of BPM and the phases of AI Lifecycle converge with the aim of developing a technology-driven corporate architecture designed to manage the complexities of AI. To achieve this, the following roadmap can be pursued:

### a) BPM Process Strategic Planning & AI Lifecycle Goal and Problem Definition

BPM Process Strategic Planning comprises the subsequent sub-stages:

- Process-driven strategy development: this stage enhances the understanding of organizational structure, strategies, and goals, which are designed to fulfill the corporation's purpose.
- Stakeholder Engagement: this stage involves actively engaging key stakeholders, providing valuable insights for ethics improvement.

and versioning are more complex; 2) practitioners ought to have a broader set of skills; and 3) modular design is not trivial since AI components can be entangled in complex ways. See S. Amershi et al, 'Software engineering for machine learning: a case study, in 'Proceedings of the 41st International conference on software engineering, software engineering in practice' *IEEE Press*, 291–300 (2019).

- Goal Definition: this phase involves establishing clear, quantifiable objectives for business processes. Defining these goals allows corporations to establish benchmark for success, ensuring that reengineered processes and AI systems synergistically work towards achieving the desired outcomes.

- Identification of Key Performance Indicators (KPIs): in this stage, KPIs relevant to business processes and AI technologies are identified. These KPIs are crucial not only for evaluating the effectiveness of processes but also for assessing the integration and performance of AI within the organizational structure. The use of KPIs provides quantitative measures to evaluate the alignment between processes reengineering, AI implementation, and overarching corporate objectives.

AI Lifecycle Goal and Problem Definition, encompasses the following sub-stages:

- Feasibility Analysis: on the basis of the BPM's first phase outcomes, this stage involves an initial assessment to determine whether AI solutions can meet their designates objectives, address inefficiencies in processes, and mitigate potential risks concerning stakeholders' rights. For corporation already utilizing AI technologies, an assessment is conducted to determine their compliance with safeguarding stakeholders' rights.

- Scope of AI Application: this phase entails assessing the potential scope of AI solutions, laying down the foundation for selecting suitable algorithm models.

- Goal Specification: this stage is dedicated to defining clear AI objectives to ensure that the proposed AI interventions are in line with the broader business goals and strategic direction established in the initial phase of BPM.

- Data Mapping: this phase is crucial for understanding and visualizing the data flow within an organization. It involves the identification of data origins, touchpoints, and destinations. Comprehensive data mapping facilitates a better understanding of data movement through various systems and processes, and the identification of potential bottlenecks, redundancies, or gaps. In AI integration, such detailed map is indispensable, as it ensures AI systems receive accurate and relevant data, also in compliance with the relevant regulations.

### b) BPM Process Design & AI Lifecycle Data Collection, AI Selection and Design

BPM Process Design, encompasses the following sub-stages:

- Gap Analysis: this phase involves an in-depth review and analysis of existing processes to identifies inefficiencies, redundancies, or bottlenecks. The objective is to gather a comprehensive understanding of areas that might be hindering optimal performance or productivity.

- Processes Reengineering: the goal of this phase is to redesign and refine the processes, leading to the formulation of streamlined, efficient workflows that align with organizational objectives.

AI Lifecycle Data Collection, AI Selection and Design, encompasses the following sub-stages:

- Data Collection: this phase is dedicated to selecting and gathering pertinent data for AI solutions. Emphasis is placed on data quality and volume, ensuring its relevance and suitability for subsequent stages. It's essential that data is acquired and processed ensuring the respect of stakeholder's rights while upholding transparency and accountability, in alignment with best practice and regulatory guidelines. For those corporations which have already adopted AI technologies, an assessment is conducted to verify the data acquisition's compliance with stakeholders' rights. Moreover, at this stage, data is cleansed, normalized, and prepared for model training. Specific techniques, such 'data synthetic', might be chosen to enhance the protection of stakeholder's rights.

- AI Selection and Design: depending on the specific nature of the data available and needed, appropriate algorithms are chosen to best address the identified corporate requirements. Furthermore, frameworks and architectures for the selected AI algorithms are designed, priming them for the training phase.

**c) BPM Process Visualization & AI Lifecycle Model Training, Validation and Testing**

BPM Process Visualization, encompasses the following sub-stages:

- Future State Visioning: this step involves the visualization of the corporate processes, following both reengineering and the incorporation/analysis of AI solutions.

- Simulation: Using advanced tools, this phase simulates the outcomes of prospective process modifications, thereby forecasting the impacts of AI integration both on business operations and on the safeguarding stakeholders' rights.

AI Lifecycle Model Training, Validation and Testing, encompasses the following sub-stages:

- Training: In this phase, the models undergo comprehensive training using the preprocessed data. The model continually refines its internal parameters and weights to reduce prediction errors and enhance performance, ensuring alignment with the foundational corporate objectives and stakeholders' rights.

- Validation: During this phase, a specific set of data is utilized for the validation of the AI system.

- Testing: Once the model has been trained and validated, it undergoes testing using an entirely new dataset that it hasn't encountered before, referred to as the test set. This stage critically evaluates the model's predictive capabilities in real-world-like scenarios, gauging its readiness for deployment.

**d) BPM Process Implementing & AI Lifecycle Model Deployment**

BPM Process Implementing, encompasses the following sub-stages:

- Implementation: reengineered processes are operationalized in the corporate structure, encapsulating the outcomes of previous stages. Throughout this phase, an effort is made to ensure that the redefined processes are in alignment with

and respectful of stakeholders' rights

AI Lifecycle Deployment, encompasses the following sub-stages:

- Deployment: AI models are meticulously incorporated into the restructured business processes. This integration aims to maximize the potential of AI, ensuring congruence with the operational framework and effectively addressing the previously identified corporate requirements. Throughout the integration, consistent attention is given to ensure that the deployment of AI solutions remains compliant with and protective of stakeholder rights.

**e) BPM Process Evaluation and Monitoring & AI Lifecycle Model Evaluation and Monitoring.**

BPM Process Evaluation and Monitoring, encompasses the following sub-stages:

- Real-time Monitoring: advanced tools and specified metrics are deployed to continuously observe and record the performance of the reengineered processes in real-time. This monitoring ensures that the processes remain adaptive and responsive to any discrepancies, while also emphasizing the importance of safeguarding stakeholder rights.
- Performance Analysis: drawing upon the previously defined KPIs, the performance of the processes is periodically scrutinized. This analysis provides a structured feedback loop to assess the effectiveness of the implemented changes, and their alignment with stakeholders' rights.

AI Lifecycle Model Evaluation and Monitoring, encompasses the following sub-stages:

- Model Performance Monitoring: continuous tracking tools evaluate the AI models' performances post-deployment, ensuring their accuracy, efficiency, and compliance with stakeholder rights.
- AI Impact Analysis: periodically, the influence and implications of AI solutions on both the operational and stakeholder dimensions are assessed. This review ensures that the AI implementations remain transparent, ethical, and in line with the broader corporate objectives while respecting stakeholders' rights.

**f) BPM Process Optimization & AI Lifecycle Improvement**

BPM Process Optimization, encompasses the following sub-stages:

- Feedback Loops: instituted continuous improvement mechanisms capture feedback from various process touchpoints, ensuring iterative refinement of processes. Such loops emphasize not only on operational efficiency but also on ensuring that processes are consistently aligned with the safeguarding of stakeholder rights and interests.

AI Lifecycle Improvement, encompasses the following sub-stages:

- Model Optimization: Informed by real-world performance data, iterative adjustments and refinements are made to AI models. These adjustments aim to

bolster accuracy, reduce latency, and enhance other pivotal performance metrics, all while ensuring that the models' functions remain transparent, ethical, and in compliance with stakeholder rights and expectations.

Through the implementation of the 'AI by Corporate Design' framework, corporations can leverage the synergies between business processes and AI technologies. This approach enables them to strike a balance between structural efficiency, technological innovation, and the protection of stakeholders' rights, with a particular focus on the transparency, explainability, safety and accountability instances of AI.

Specifically, as explained below:

(i) BPM facilitates the adoption of standardized practices and processes, enhancing consistency, efficiency, and clarity in corporate operations. The development and/or deployment of AI aligned with a structured corporate environment not only ensures that AI functions are transparent but also increase trust among stakeholders. The reason is that AI-driven operations and decisions can be methodically understood and reviewed within the established processes and policies.

(ii) With BPM's processes, data mapping and visualization in place, decisions made by AI can be traced back to their source data and logic. This traceability ensures transparency and accountability, enabling stakeholders to understand the rationale behind AI decisions.

(iii) Corporations that methodologically assess and manage AI risks within the corporate structure, can proactively identify and rectify potential biases. This approach safeguards against unintended consequences and promotes explainability in the development, implementation, use, and improvement of AI models.

(iv) By focusing primarily on stakeholders' rights, the framework inherently emphasizes the ethical use of AI. Ethical AI, by design, is transparent and accountable, prioritizing fairness.

(v) The synergy between BPM and AI creates an iterative feedback loop. If an AI system operates unexpectedly or undesirably, this mechanism ensures quick resolution, meanwhile holding corporations accountable for any discrepancies.

(vi) Establishing resilient and robust governance structures leads to clear delineations of responsibilities in AI deployment, implementation, and use. When roles and expectations are clearly defined, accountability is naturally enhanced.

(vii) Prioritizing stakeholders' rights shifts their role from passive observers to active contributors. Their involvement ensures that AI systems are conceived, designed, and iteratively refined in a manner that aligns with their expectations for transparency and accountability.

In essence, the harmonization of BPM's systematic rigor with AI's capabilities creates a symbiotic relationship. This partnership champions the causes of transparency, safety, privacy, explainability, and accountability, ensuring that AI, while innovative, remains ethically grounded, accessible, and understandable to

all stakeholders.

### 2. Common Ethical Principles in AI Utilization Considered in the 'AI by Corporate Design' Framework

The 'AI by Corporate Design' integrates core ethical principles from main AI frameworks established by international organizations, regulatory bodies, and policymakers, including the OECD, UNESCO, Council of Europe, and G7. These principles emphasize the ethical and responsible use and deployment of AI.

Drawing inspiration from such frameworks and embracing their shared principles is pivotal for the 'AI by Corporate Design' framework to emerge as an ethic and sustainable model adoptable by corporations.

Paramount among these frameworks is the emphasis on transparency and explainability, ensuring that AI systems and their operations are comprehensible and accessible to verification.

Another key theme in these frameworks is human-centeredness and fairness, which advocate the safeguarding of human rights and privacy, and the prevention of discriminatory practices and biases in AI applications.

Robustness, safety, and security of AI systems are also consistently emphasized, underscoring the necessity for resilience and reliability throughout their lifecycle.

Accountability is considered as another crucial element across these frameworks, requiring clear delineation of responsibility for those involved in AI development and use.

Within the 'AI by Corporate Design' framework, adherence to these principles is ensured through the integration of BPM techniques with the AI Lifecycle, providing comprehensive knowledge and control over business and AI operations. Furthermore, the adherence with the indications offered by the G20/OECD Principles of Corporate Governance with reference to the digital/technology matters and the establishment of a dedicated committee within this framework ensures supervision, human-oversight, and accountability in the deployment and operation of AI technologies.

### 3. The G20/OECD Principles of Corporate Governance and the Ethic, Algorithmic, and Legal Committee in the Context of the 'AI by Corporate Design' Framework

On the corporate governance side, significant insights can be drawn from the G20/OECD Principles of Corporate Governance[28] to enhance the governance of AI-related BPM processes by corporate governance bodies. These principles highlight how digital technologies can improve the efficiency and effectiveness of supervisory and enforcement processes, as well as compliance and risk management

[28] 'Principles of Corporate Governance' *G20/OECD*, 11, available at https://tinyurl.com/4xa59hh3 (last visited 30 September 2024).

within corporate structures. Simultaneously, these principles warn against the challenges and risks posed by digital solutions in regulatory and supervisory processes. Specifically, with reference to artificial intelligence and algorithmic decision-making used in supervisory processes, these principles underscore the importance of maintaining a human element to mitigate the risks of incorporating existing biases in algorithmic models and the risks from an overreliance on models and digital technologies. As such, in accordance with the OECD/G20 Principles of Corporate Governance, respect for human agency (and the related accountability principles) must be strictly considered in the context of the 'AI by Corporate Design' framework in the integration of AI-related BPM processes within the corporate governance rules and structures.

Moreover, given the multi-layered complexities that AI introduces in the corporate architecture – particularly in decision-making algorithms and predictive analytics – the establishment of a dedicated committee is considered crucial. The responsibility of this committee would not be limited to merely ensuring adherence to legal standards. It would also encompass the task of guaranteeing that AI implementations align with the broader processes of the corporation. This includes overseeing AI integration, ensuring that all digital/technological implementations align with the company's strategic goals and regulatory requirements, and addressing ethical considerations to maintain trust within the organization.

Consequently, another main component of the 'AI by Corporate Design' framework is the establishment of an Ethic, Algorithmic, and Legal Committee ('EALC') within the corporate governance structure.

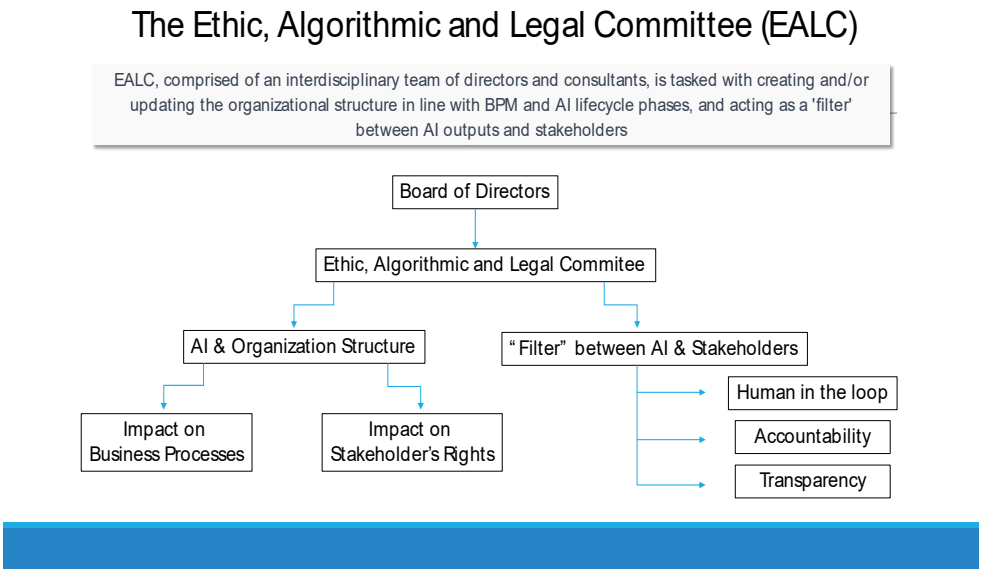
The EALC should be composed of an interdisciplinary team of managers, directors, and consultants. It holds the responsibility and accountability for creating and/or updating the organizational structure to align with both BPM and AI lifecycle phases. The EALC's primary focus is to assess the impact of AI technologies on key business processes and relevant stakeholders' rights.

This committee is also designed to advocate for transparency, safety, and accountability.

Moreover, while acting as a 'filter' between AI outputs and stakeholders, it upholds the 'human in the loop' principle, ensuring human oversight in AI-driven decisions. This approach promotes transparency in the committee's activities, and its accountability for the outcome of AI processes.

Furthermore, adopting this approach has the potential to strengthen the corporation's market position and enhance customers' engagement, due to its emphasis on ethical practices. Additionally, such a framework can also indirectly enable the corporation to better align with European Union and International AI regulations.

Figure 2. The role of EALC.




## IV. *De Iure Condendo*: Technology as a Fourth Dimension of an Adequate Corporate's Structure

While corporations can proactively embrace best practices and frameworks, like the one proposed in this paper, the profound impact of AI on stakeholder's rights highlights the necessity for legislative reform.

Although specific regulations address several kind of technology by setting governance standards that influence both corporate governance and business structures (including the EU AI Act, which establishes unified rules on artificial intelligence and the EU Regulation on distributed ledger technology market infrastructures), the presence of many layers of regulations can lead to a fragmented legal and business landscape, potentially hindering the efficient and effective adaptation of corporate governance and business processes to digital and technological challenges.

Given the rapid and unpredictable pace of technological advancements in AI and other technologies (such as big data, blockchain, smart contracts, metaverse, and crypto-assets), an overarching legal intervention is proposed. This intervention aims to broadly recognize and embed the digital-technological infrastructure within the core framework of corporations.

To this end, the Art 2086, para 2 of the Italian Civil Code, can emerge as a pivotal reference. Specifically, it mandates:

> 'The entrepreneur, whether operating in corporate or collective form, has a duty to set up an organizational, administrative, and accounting structure

appropriate to the nature and size of the enterprise, also with a view to the timely detection of the enterprise's crisis and the loss of business continuity (…)'.

Although these legal provisions promote a shift from a retrospective to a more proactive and forward-looking business approach, they do not specifically address the implications of the ongoing digital and technological revolution on business processes and corporate governance.

Building upon this foundation, it is proposed that the digital-technological dimension should be legislatively recognized as a fourth component within corporate structures, alongside the organizational, administrative, and accounting dimensions outlined in Art 2086, para 2 of the Italian Civil Code.

The proposed legal intervention requires entrepreneurs and managing directors to establish a digital/technological structure that aligns with the corporation's scale and nature, as well as its organizational, administrative, and accounting structures, and the type and degree of advancement of the adopted digital/technological assets.

This legal intervention outlines the roles and responsibilities of governance bodies and fosters the establishment of standardized criteria and practices concerning the digital/technological structure.

Moreover, it specifies the obligations of administrators and outlines the legal remedies available to shareholders and/or third parties in cases of duty violations. For example, within the Italian legal framework,[29] failing to fulfill the duties specified in Art 2086 of the Civil Code by corporate directors can lead to serious consequences. Specifically, under certain conditions, such breaches can (i) enable shareholders to request a judge to replace directors, as provided by Art 2409 of the Civil Code; (ii) induce auditors to convene the directors before the shareholders, in accordance with Art 2406 of the Civil Code; (iii) act as a valid reason for the dismissal of directors under Art 2383 of the Civil Code; (iv) allow shareholders to sue the directors for damages incurred due to the related violation.

Finally, the proposed intervention fosters the corporation's capacity to adapt to rapidly evolving technologies, serving as a protective mechanism in situations where specific regulations might be absent. Accordingly, the prerequisite to establish a robust digital-technological infrastructure prior to adopting any specific technology provides corporations with a 'forward-looking' advantage, potentially enabling them to foresee associated risks and respond effectively.

## V. Conclusion

In this remarkable era, characterized by significant advancements in AI technologies, corporations encounter both extraordinary opportunities and

[29] See Tribunale di Catanzaro, 6 February 2024, available at www.dejure.it; Tribunale di Cagliari, Sez. spec. Impr., 2 March 2022, available at www.dejure.it.

challenges. The promise of growing operational efficacy and strategic advantage through AI integration is counterbalanced by emerging responsibilities related to the corporate field.

As innovative models like the 'Computational Corporate Governance' emerge, these issues are likely to intensify.

The 'AI by Corporate Design' proposes a structured method for ethically embedding AI within corporate governance and business processes. It emphasizes compliance to ethical, legal, and technological matters, thus helping corporations navigate the delicate balance between leveraging AI for strategic benefits and managing associated risks and responsibilities.

Finally, the rapid evolution of technology underscores the urgent need for legislative intervention in corporate law to ensure the incorporation of the technological dimension into corporate structures, and consequently into directors' duties and responsibilities.