Algorithmic Governance and the Boardroom: Empirical and Strategic Perspectives on AI Integration in Corporate and Educational Oversight

James Hutson[1]* [iD], **Gaurango Banerjee[2]**

[1] Department of Art History, AI, and Visual Culture, Lindenwood University, USA

[2] Department of Finance, Lindenwood University, USA

***Corresponding author:** James Hutson

Department of Art History, AI, and Visual Culture, Lindenwood University, USA

Abstract

The accelerating digitization of executive decision-making has prompted critical re-examination of the function and value of traditional boards of directors within corporate and educational institutions. Empirical research consistently reveals that human boards, while ostensibly tasked with strategic insight and fiduciary oversight, are frequently constrained by structural inefficiencies—such as director overcommitment, inflated compensation, and persistent conflicts of interest—that undermine organizational performance. Against this backdrop, the integration of Artificial Intelligence agents, either as analytic adjuncts or autonomous decision-makers, emerges as a plausible avenue for enhancing board effectiveness. This article synthesizes global case studies, peer-reviewed findings, and real-time technological developments to critically evaluate the financial feasibility and governance efficacy of AI-assisted and hybrid boards. It examines the comparative advantages of AI in terms of vigilance, objectivity, cost reduction, and risk management, while also addressing the enduring symbolic and reputational functions uniquely served by human directors. The results underscore that the technology can mitigate well-documented governance failures, streamline decision processes, and elevate financial performance, suggesting that hybrid human-AI boards represent a viable and potentially superior paradigm for future institutional oversight.

Keywords: *artificial intelligence, board governance, corporate oversight, risk management, organizational efficiency*

1. Introduction

Corporate boards of directors, both in commercial and educational settings, are entrusted with the weighty responsibilities of strategic oversight, executive accountability, and fiduciary governance. However, decades of empirical scrutiny reveal systemic inefficiencies and persistent vulnerabilities in how many boards fulfill these roles. Studies consistently highlight the limitations of director availability, susceptibility to groupthink, and an overreliance on prestige-driven appointments that often privilege social capital over analytical rigor (Kindylidi, 2020; Agnese, Arduino, & Di Prisco, 2024). These problems are compounded by the reality that board decisions—though pivotal—frequently occur in episodic, opaque formats with limited recourse to real-time data (Kim, 2020).

Within this context, emergent technologies in computational decision-making have catalyzed discussions around algorithmic governance. Recent proposals advocate for varying degrees of integration between traditional boards and autonomous decision-support systems. These range from advisory assistants to fully augmented hybrid structures capable of strategic forecasting, ethical analysis, and risk modeling at a scale and speed unattainable by human cognition alone (Langenbucher, 2024; Sushkova, 2021). Research suggests that data-driven systems may outperform conventional boards in areas requiring consistency, vigilance, and rapid synthesis of high-volume information (Zhao, 2024; Eroğlu & Kaya, 2022).

Therefore, human boards bring qualitative judgment, reputation, and flexible insight, whereas algorithmic systems contribute unparalleled data processing, objectivity, and procedural consistency (Table 1). The optimal governance model in the near term may be a collaborative one, in which algorithmic "board assistants" augment human directors by providing comprehensive analysis and unbiased recommendations, while directors contribute contextual discernment, creativity, and accountability. Indeed, a growing consensus among executives indicates support for this model: in a recent survey, 94% of CEOs reported confidence that an autonomous advisory agent could offer business decision-making insight equal to or exceeding that of a traditional board member (Maldonado-Canca, Cabrera-Sánchez, & Molinillo, 2025). Nevertheless, achieving such integration requires resolving current technological limitations and overcoming institutional hesitancy related to transparency, explainability, and trust.

Table 1. Comparative Capabilities – Human Boards vs. AI-Based Boards

Aspect	Human Board Directors	AI Board Agents/Systems
Data Processing & Analysis	Limited by human capacity and time; rely on periodic reports from management and third-party consultants. Can miss patterns in large datasets.	High-speed processing of vast data in real time; can continuously ingest financials, market trends, and operational metrics. Uncovers subtle patterns and correlations that humans might overlook.
Availability & Vigilance	Part-time engagement (quarterly meetings or occasional committees). Not active 24/7; oversight gaps between meetings are common.	Always-on monitoring. AI can watch indicators continuously and alert the organization to issues or opportunities immediately. No fatigue or off-days, ensuring constant vigilance.
Biases & Conflicts of Interest	Susceptible to cognitive biases, groupthink, and personal conflicts. Directors may have self-interests (e.g. network favors, insider knowledge) that skew decisions. They may hesitate to challenge management due to social pressures.	Designed to be objective and data-driven. Not influenced by prestige or personal gain – a machine will not seek insider trading opportunities or nepotism in procurement. However, it an inherit biases from training data or algorithms, requiring careful design to maintain objectivity.
Strategic Insight & Creativity	Bring experience, intuition, and industry knowledge. Humans can think creatively and adapt in unprecedented situations (e.g. navigating a pandemic with intuition and out-of-box strategies). However, insight quality varies by individual director and may be limited by information provided.	Excels at logical analysis and scenario modeling with available data. Can forecast outcomes and perform complex simulations (e.g. predicting ROI or risks with specified probabilities). Lacks true intuition or tacit industry wisdom – current models may struggle with entirely novel crises or cultural nuances. Future agents ight improve in creative problem-solving via advanced algorithms, but human-like innovation remains a challenge.
Ethical and Compliance Oversight	Humans can weigh ethical considerations and public sentiment based on values and experience. But directors might overlook issues if blinded by group consensus or personal loyalties. Some may downplay ethical concerns to favor financial gains.	AI can be programmed to monitor compliance and flag ethical risks rigorously. For instance, a board system can cross-check decisions against regulatory requirements and codes of conduct in real time. IHC's Aiden is explicitly tasked with "ethical and compliance monitoring.". However, the tools lack a moral compass beyond its programming – it will

Aspect	Human Directors	AI
		enforce the letter of guidelines, which might need human judgment for grey areas.
Decision Speed & Consistency	Deliberative process can be slow – significant decisions often deferred to scheduled meetings. Human decisions may be inconsistent or ad hoc, influenced by negotiations and emotions in the boardroom.	Rapid decision support. AI can rapidly evaluate options against preset criteria and past data, enabling quicker decisions for time-sensitive issues. It applies consistent rules and criteria every time, eliminating erratic variation (assuming the decision parameters are well-designed). Routine approvals and contract decisions could even be automated via smart algorithms, shortening procurement cycles and removing delays.
Cost	High recurring cost: Directors of large companies often receive six-figure compensation (averaging around $300,000 annually per director), plus expenses for meetings, travel, D&O insurance, and fees for external advisors. There is also an indirect cost if boards make suboptimal decisions or rubber-stamp poor management choices.	Upfront development and implementation cost, but lower ongoing expenses. A smart system entails investment in software, data infrastructure, and maintenance, but does not demand yearly salaries, stock options, or perquisites. Over time, automating tasks can reduce administrative overhead and consulting fees. The marginal cost of scaling to handle more data or additional decisions is low, making it potentially cost-effective for large enterprises and even resource-constrained organizations (once technology is mature and trusted).
Prestige & Stakeholder Trust	Board members often serve as figureheads whose reputations lend credibility. A high-profile director can signal legitimacy, attract investors, or open doors (e.g. prestigious board members have been	AI offers no personal reputation or network. An agent cannot attend industry events, engage in personal mentorship, or enhance a company's public image by its mere presence. In fact, some stakeholders may be wary of or lack confidence in a faceless
	linked to better IPO performance via enhanced investor confidence). Stakeholders take comfort knowing experienced humans are accountable for decisions.	model making major decisions. Gaining trust in governance might require a track record of success. Until then, the technology likely serves best as an analytical adjunct, with humans providing the public-facing legitimacy and final accountability.
Accountability & Legal Status	Legally recognized fiduciaries. Human directors can be held accountable for negligence or malfeasance (subject to duties and liabilities). They exercise judgment under the business judgment rule and can be removed or replaced by shareholders if performance falters.	Currently not recognized as legal directors in most jurisdictions. AI systems cannot be sued or held liable in the same way; any liability would fall to the organization or developers. This lack of legal personhood means presently machines can only serve as advisors or tools under board supervision, not as standalone directors with fiduciary duty. This is a key constraint on fully replacing boards at present, affecting operational viability.

2. Global Case Studies of AI in Board Decision-Making

Artificial intelligence has already made incremental, but symbolically significant, inroads into the domain of high-level institutional governance. Although these implementations remain limited and largely experimental, they provide critical insights into the financial, operational, and organizational ramifications of incorporating autonomous systems into board-level roles. In a pioneering move, the Hong Kong-based venture capital firm Deep Knowledge Ventures appointed an algorithm, *VITAL* (Validating Investment Tool for Advancing Life Sciences), as an honorary member of its board of directors. VITAL's primary function was to analyze investment opportunities in biotechnology startups. While it held no legal voting rights—since only natural persons qualify as directors under Hong Kong law—the board pledged not to approve any investment without VITAL's concurrence. As stated by the firm, they agreed not to make positive investment decisions without corroboration by VITAL (Möslein, 2018). This informal veto power effectively gave the algorithm strategic influence equivalent to human directors. Although critics suggested the move carried promotional overtones—given that big data was already integral to financial due diligence —the experiment demonstrated the plausibility of embedding algorithmic systems directly into governance workflows. VITAL's tenure was both ahead of its time and emblematic of broader questions surrounding the legitimacy and capability of machine-led oversight.

Abu Dhabi's International Holding Company (IHC), one of the region's most capitalized firms, offers a more recent and institutionally integrated case. In 2024, IHC introduced a system known as *Aiden Insight* as a non-voting board observer. Co-developed with Group 42 and Microsoft, Aiden was tasked with supporting governance through real-time analytics and scenario modeling. According to IHC, Aiden is capable of continuously processing and instantly analyziin decades of business data, financial information, market trends, and global economic indicators, producing unparalleled data analysis and strategic insights. Its designated responsibilities encompass "continuous data analysis, risk assessment, strategic planning support, innovation tracking, and ethical and compliance monitoring" (ADMO, 2024). By including Aiden as a boardroom presence without violating legal statutes requiring human directorship, IHC pioneered a hybrid governance model. Analysts have described this initiative as signaling a "tidal wave" of algorithmic integration in the boardroom (Kamat, 2025), as it institutionalizes machine-generated insight within the highest echelon of decision-making. The financial motivations are equally compelling—agents educe the burden on human directors while providing more granular oversight, arguably enhancing both efficiency and accountability.

Another noteworthy development occurred in 2022 when NetDragon Websoft, a Chinese gaming and education technology firm, appointed *Tang Yu*, a virtual humanoid, as CEO of one of its subsidiaries. Although technically not a board member, Tang Yu's elevation to chief executive status demonstrates the feasibility in executing leadership responsibilities. Following this appointment, NetDragon's stock appreciated by approximately 10%, raising its valuation above $1 billion (Skubis & Wodarski, 2023). The company attributed the gains to increased operational efficiency and data-accelerated decision-making. Indeed, early reports indicated a 15% reduction in operational delays under Tang Yu's stewardship. Although some commentators characterized the market reaction as reflective of "AI narrative" enthusiasm rather than sustainable growth (Li et al., 2024), NetDragon's use of an AI CEO set a precedent for other corporations contemplating algorithmic leadership. Crucially, Tang Yu's role remained confined to optimized operations, with human oversight retained for strategic and emergent issues. This delineation highlights the current threshold of machine authority—agents ay perform logistical execution competently, but it has yet to be entrusted with ethical or imaginative responsibilities.

Further afield, the European spirits company Dictador appointed a robot named *Mika* as honorary CEO in 2023. While largely symbolic, the decision signaled rising public acceptance of artificial personas in positions of visibility. More structurally innovative are decentralized autonomous organizations (DAOs), particularly in the blockchain and cryptocurrency sectors. These entities replace traditional boards with algorithmic governance protocols, allocating decision rights to token-holders and executing resolutions via smart contracts. Unlike corporate AI advisors such as Aiden, DAOs are less reliant on intelligent agents and more dependent on code-based automation. Nonetheless, they represent a competing model of non-human oversight that prioritizes decentralization and community consensus over hierarchical governance.

In the educational sector, no institution has yet replaced a university board with an autonomous system. However, speculative frameworks are emerging. Han et al.(2024)

conceptualizes an "AI college trustee" capable of analyzing admissions data, budgetary trends, and academic performance indicators to guide board deliberations. Such a system would offer on-demand assessments of program ROI, enrollment forecasts, and risk exposure across departments. While still hypothetical, these scenarios underscore a growing appetite for algorithmic governance in complex, resource-constrained environments like higher education. Taken together, these global cases chart a continuum of adoption—from symbolic appointment (Mika) to analytical augmentation (Aiden) to operational authority (Tang Yu). Each instance illuminates both the possibilities and limitations of algorithmic governance. While legal and cultural constraints remain, the empirical pattern suggests a slow but accelerating trend: large institutions are increasingly willing to experiment with non-human agents in strategic roles, driven by the promise of data-enhanced precision, cost efficiency, and risk reduction.

3. What Is the Board's Real Role? Strategic Insight vs. Prestige

To determine the feasibility of substituting or augmenting boards of directors with algorithmic agents, one must first delineate the actual functions boards perform. In principle, boards are tasked with the formulation of strategic objectives, supervision of executive leadership, assurance of fiscal integrity, and representation of stakeholder interests. In educational institutions, the equivalent governing bodies—boards of trustees or regents—authorize strategic plans, oversee budgets, and appoint senior leadership, serving as custodians of institutional mission and public accountability. These are the functional responsibilities where informed deliberation and oversight are presumed critical. However, boards also perform symbolic roles that center on legitimacy, social capital, and organizational prestige. The distinction between these functional and relational dimensions is essential in evaluating whether artificial intelligence can serve as a viable substitute or enhancement to existing governance structures.

Strategically effective boards distinguish themselves by challenging managerial assumptions, offering multidisciplinary expertise, and identifying latent risks. Whether in approving capital projects, launching academic programs, or hiring a university president, boards are expected to act as a discerning filter, enhancing plans or forestalling flawed initiatives. They are also meant to evaluate ongoing performance, enforce accountability, and intervene if executive behavior diverges from institutional goals. In theory, these duties demand the intellectual capital and moral courage of experienced directors. In practice, however, the performance of many boards falls short of this ideal. As Seru, Tayan, and Larcker (2025) observe, numerous high-profile corporate collapses stemmed not from information scarcity per se, but from board passivity and "being woefully uninformed." VS (2025) echoes this critique, emphasizing how structural opacity and irregular engagement hinder strategic oversight. Because management typically controls the information flow to the board and meetings are infrequent, members may operate with insufficient situational awareness, reducing their capacity to serve as effective stewards.

Algorithmic systems offer a plausible corrective to this structural information asymmetry. With access to integrated enterprise data, autonomous systems can furnish directors—or serve in their place—with real-time dashboards detailing operational, financial, and strategic indicators. These systems can run continuous

diagnostics, generate predictive scenarios, and flag anomalies that may not be apparent from static reports. As Seru, Tayan, and Larcker (2025) suggest, agents could narrow or eliminate the visibility gap between board and management by providing direct, unfiltered access to critical data. This enhancement of situational awareness could allow boards to move from reactive to proactive oversight. In fact, the studies have found that nearly 90% of CEOs believed autonomous systems could produce better strategic plans than their executive teams, further reinforcing the argument that analytical and forecasting tasks are ripe for automation (Asundi, 2025). The capacity to synthesize large volumes of unstructured data also positions these agents as a natural complement—or replacement—for human directors in routine strategy formation, market trend analysis, and financial modeling.

By contrast, the prestige and symbolic dimensions of board membership remain largely intractable to automation. Boards frequently include individuals whose social standing, political capital, or public reputation enhances institutional legitimacy. This is especially pronounced in the nonprofit and higher education sectors, where trustees may double as benefactors or ambassadors. In the corporate realm, high-profile board members can serve as signals of credibility to investors and regulators. Empirical evidence supports this view: Chahine, Filatotchev, and Zahra (2011) demonstrated that companies with well-known external directors experienced less underpricing during initial public offerings, suggesting that market actors value the reputational assurance such figures provide. In accordance with resource dependence theory, directors also serve as conduits to external entities—grant agencies, regulators, donors, or commercial partners. A smart system, however sophisticated, cannot engage in relationship-building, exert interpersonal influence, or symbolically validate the organization through its presence at events. It cannot pick up the phone and broker a key alliance, nor can it elicit donor loyalty through shared identity or social prestige.

Furthermore, this reliance on prestige introduces a well-documented vulnerability: the risk that boards devolve into ceremonial or self-serving entities. VS (2025) captures this dysfunction succinctly, asserting that "board seats have become status symbols, prestigious badges of honor that inflate personal brands rather than serve organizational interests." Directors appointed primarily for their cachet often display limited engagement, using meetings as networking venues rather than forums for substantive governance. Evidence of this malaise includes excessive cross-board memberships (a phenomenon known as "overboarding"), reluctance to challenge management, and a superficial approach to strategy. In such cases, the functional value of the board is compromised, and its symbolic value becomes its sole justification.

This pathology is supported by empirical literature on director busyness. Alhaddad et al. (2022) affirm the "Busyness Hypothesis," finding a negative correlation between the number of board seats held and firm performance. Directors who sit on multiple boards frequently exhibit diminished oversight effectiveness due to time constraints and divided attention. López and Rodríguez (2014) offer a nuanced view: while some reputational benefit may accrue from multiple appointments, this advantage disappears beyond a threshold—typically four concurrent board seats. Saleh et al. (2020) further show that executive officers with excessive external obligations also compromise firm outcomes. These findings underscore a

fundamental contrast with algorithmic governance: autonomous systems do not suffer from cognitive overload or prioritization dilemmas. An agent can serve multiple organizations simultaneously, without degradation in vigilance or analytical output.

These dynamics yield a bifurcated conclusion. Boards ideally serve as loci of judgment, foresight, and accountability. In these cognitive domains, algorithmic agents not only match but may well exceed human performance, especially in tasks demanding pattern recognition, consistency, and data integration. However, in symbolic domains—where legitimacy, social capital, and external signaling are paramount—models offers no credible substitute. Organizations that derive critical reputational benefits from high-profile board members are likely to resist full automation. By contrast, those encumbered by legacy boards marked by inertia or ceremonialism may find significant value in integrating machine-based governance. As we turn to the financial implications of such transformations, this distinction remains pivotal: to the extent that a board's value lies in substantive oversight, artificial intelligence holds considerable promise; where value is derived from prestige and affiliation, human presence remains indispensable.

4. Financial Benefits and Feasibility of AI-Governance

The substitution or augmentation of boards of directors with autonomous decision systems presents a compelling proposition from a financial perspective. Enhanced governance models promise to reduce operational costs, improve decision quality, and streamline execution pathways, particularly in organizations where current board structures introduce inefficiencies or impede responsiveness. The core financial rationale centers on board size, compensation dynamics, decision-making speed, and the automation of policy enforcement.

Board size remains a key structural variable influencing cost and coordination. Guest (2009), in a longitudinal study of over 2,700 UK firms, found that larger boards correlate negatively with firm profitability, attributing the decline to communication lags and diluted accountability. Dey and Sharma (2020) corroborated this pattern within Indian public sector banks, observing that increased board size and frequency of meetings were inversely related to financial performance. While Ali (2020) notes contextual variation—larger boards may benefit manufacturing firms—these findings generally support the idea that leaner, more agile governance bodies are financially preferable. An agent can mitigate the inefficiencies of large boards by functioning as a constant analytical layer, reducing the necessity for numerous human directors and cutting down the logistical complexity of consensus building.

Perhaps the most immediate financial incentive lies in cost savings on director compensation. In Fortune 500 companies, the average annual compensation per director approaches $300,000, with full board expenditures running into the millions (Bussin & Christos, 2024). Educational institutions, although often more restrained, still incur substantial indirect costs associated with board retreats, policy consultants, administrative support, and event-related expenditures. By contrast, a system requires a one-time investment in development or customization, along with recurring but scalable maintenance expenses. These costs resemble capital expenditures more than operational ones—meaning they can be amortized over time and potentially applied across multiple subsidiaries or

functions. Once installed, the marginal cost of analyzing additional decisions is negligible. It can also eliminate the need for routine tasks—such as generating board packets, drafting minutes, or monitoring compliance deadlines—that require dedicated staff. As Koyande et al. (2021) note, while upfront costs may be high, the ongoing cost savings can be significant. For small and mid-sized organizations, such savings could be transformative, democratizing access to high-quality governance tools otherwise reserved for well-capitalized entities.

The financial implications of eliminating director compensation extend beyond mere economization. Compensation models themselves are often misaligned with performance. Núñez et al. (2022) show that pay-performance correlations are inconsistent, heavily influenced by director characteristics and firm-specific governance dynamics. Khatib et al. (2023) demonstrate that block-holder oversight can temper compensation excesses, but only under specific governance frameworks. Recent work by Fang and Huang (2024) further indicates that legislative reforms curbing director pay volatility yielded positive stock returns, implying investor endorsement of leaner compensation structures. By removing financial incentives entirely—given machines do not seek remuneration—autonomous systems address both excess cost and misaligned motivation.

Yet cost reduction is only part of the calculus. More significant, in many cases, is the potential for performance enhancement through data-driven objectivity. Human boards are vulnerable to cognitive limitations, confirmation biases, and dependence on incomplete or curated information. When critical decisions—such as mergers, divestitures, or product expansions—are made based on intuition rather than systematic analysis, the financial consequences can be devastating. Smart governance tools, by contrast, can synthesize internal financials, market data, consumer sentiment, and operational metrics in real time. They can flag deviations from trendlines, identify value-destroying patterns, and offer counterfactual scenario simulations before decisions are finalized. Such tools may also uncover emergent opportunities. For instance, an agent might detect rising interest in a niche product across regional markets, prompting strategic reallocation of capital that human directors would have overlooked. Although not immune to data quality or modeling flaws, these systems can be updated continuously, tested for robustness, and designed to account for uncertainty via Monte Carlo simulations or other probabilistic models.

The real-time nature of algorithmic governance also shortens the feedback loop between problem detection and resolution. Traditional board structures require multi-week or multi-month cycles to act on emerging risks. Even when a red flag is noticed, implementation depends on executive action, policy updates, and procedural ratification. With algorithmic systems, particularly when integrated into enterprise resource planning (ERP) frameworks, execution can be immediate. Consider a monitoring supplier contracts: upon identifying repeated cost overruns or missed deadlines, it could initiate a rebidding process automatically—subject to predefined thresholds and governance protocols. In blockchain-enabled settings such as Decentralized Autonomous Organizations (DAOs), this principle is already being enacted: smart contracts encode governance logic that triggers action (e.g., fund disbursement, pricing adjustments) when specific conditions are met. While few corporations are prepared to cede full execution power to algorithms, targeted automation—such as

automatic budget reallocation below a certain threshold or contract renewals conditional on performance—can reduce friction and preserve managerial bandwidth for complex, strategic challenges.

This principle of "contract-decision convergence" is especially valuable in domains where human governance delays create cumulative inefficiencies. For example, NetDragon's AI CEO initiative reportedly reduced operational delays by 15%, with share price gains reflecting market optimism about AI-driven responsiveness (Cicu, 2024). In education, where budget cycles are often static and disconnected from real-time needs, algorithmic monitoring of tuition revenue, grant timelines, or enrollment patterns could lead to dynamic budget adjustments, improving fiscal resilience (Skubis & Wodarski, 2023). Over time, the compounding value of such efficiencies can materially enhance organizational health.

Naturally, no implementation is frictionless. A governance AI depends on an interoperable data infrastructure and clearly defined decision protocols. If the inputs are incomplete or outdated, the recommendations will be flawed. Additionally, legal regimes in most jurisdictions do not currently permit machines o act as directors of record—meaning that any binding action still requires human ratification. Nonetheless, hybrid models—where models generate decisions and human directors sign off—are legally viable and operationally advantageous. Such arrangements preserve formal compliance while dramatically reducing the analytical burden on human board members. This configuration allows for downsizing boards without compromising performance: a ten-member board could be reduced to five, supported by a robust system, with human directors focusing on mission-oriented deliberation and external representation.

Survey data indicate broad executive support for this trajectory. In 2025, 89% of CEOs surveyed by Dataiku stated that autonomous agents could develop better strategic plans than their own leadership teams (Ghorfi, Laraqui, & Nachit, 2025). Companies like IHC have demonstrated the feasibility of integrating such agents into live board environments, showing that regulatory constraints need not preclude innovation (ADMO, 2024). As off-the-shelf solutions for smartgovernance mature and organizations build confidence in these tools, adoption costs will decline, accelerating diffusion across sectors. Therefore, the financial case for AI-assisted governance rests on three pillars: cost reduction, performance enhancement, and implementation efficiency. Direct compensation savings are nontrivial; better decisions compound over time into superior returns; and automation eliminates procedural drag. Feasibility is no longer primarily a technological issue but an organizational one, hinging on data readiness and leadership receptivity. Where institutions prioritize fiduciary efficacy over symbolic tradition, the business case for AI-enabled boards is increasingly difficult to ignore.

5. Transparency, Accountability, and Self-Interest: Can AI Curb Boardroom Dysfunction?

Among the most compelling arguments for integrating algorithmic agents into institutional governance is their potential to counteract the persistent issues of self-interest, opacity, and inertia that afflict many traditional boards. While many human directors carry out their fiduciary responsibilities with integrity, the structural configuration of most boards generates conditions conducive to

agency problems. These include conflicts of interest, insufficient independence, and an insular culture that can inhibit critical scrutiny. Artificial intelligence systems, by design, offer a radically different framework—one rooted in traceability, objectivity, and procedural consistency—that could rectify several of these longstanding dysfunctions.

Board composition often brings together part-time directors who hold multiple roles and maintain collegial relationships with the executives they are tasked to oversee. This duality—of proximity and oversight—invites conflicts of interest. Directors may defer to strong CEOs to preserve professional ties, avoid reputational risk, or maintain their eligibility for future board seats. Such deference can manifest as "rubber-stamping" strategic decisions, reluctance to challenge questionable accounting practices, or tacit approval of insider transactions. These dynamics, though subtle, erode the very oversight boards are supposed to provide. As noted by VS (2025), directors frequently treat their appointments as "trophies" and engage in "passive compliance rather than proactive governance." Even where conflict-of-interest policies exist, enforcement is limited; subtle forms of reciprocity and influence often escape regulatory scrutiny.

Empirical studies affirm that board entanglement fosters self-dealing. Goldman, Rocholl, and So (2013) found that interlocking directorships and political connections increased the likelihood of favoritism in corporate dealings, including procurement advantages and government contracts. These patterns emerge not from overt fraud, but from subtle alignments of interest that undermine meritocratic decision-making. Compounding the issue is the opacity of board proceedings. Votes, discussions, and dissenting views are rarely disclosed, and individual accountability is often diffused. As a result, when governance failures occur—whether financial improprieties in corporations or resource misallocation in universities—directors rarely face sanctions beyond reputational damage or removal. The technology offers a fundamentally different model. Every output generated by a decision-support system is loggable, auditable, and reproducible. When a recommendation is made—such as closing an underperforming facility—the system can articulate the data-driven rationale: declining revenue forecasts, poor capacity utilization, or unfavorable cost structures. This explicit reasoning introduces a culture of evidence to the boardroom, replacing intuition and consensus heuristics with traceable logic. In contrast to human boards, where justification may be vague or selectively recorded, AI provides full transparency into the evaluative process.

Moreover, these ystems are inherently free from personal agendas. They do not seek influence, status, or favors. If designed to optimize for organizational metrics—such as shareholder returns, student retention, or carbon neutrality—they will consistently pursue these goals, even if doing so disrupts entrenched interests. Consider procurement: an augmented oard assistant could detect that a vendor favored by a director is delivering services at a 15% premium with no performance benefit. Whereas human directors might ignore or rationalize such a discrepancy, the tool ould surface it unequivocally. In doing so, algorithmic agents can act as ethical spotlights, illuminating areas vulnerable to favoritism, inefficiency, or ethical compromise.

The approach also strengthens accountability by enabling rigorous task tracking. Governance often falters in the implementation phase: resolutions are passed, but follow-through is weak or undocumented. Tools—such as those piloted in AI-assisted board platforms—can monitor action items, flag delays, and generate real-time progress reports (Adjmal et al., 2025). This continual monitoring exerts subtle but powerful pressure on executives and directors alike to meet their commitments. It also allows stakeholders—investors, regulators, accreditors—to assess governance performance with greater fidelity.

Crucially, machine integrity is a function of its configuration. If developed under the influence of dominant corporate factions, its impartiality may be compromised. However, when governance objectives are transparently encoded and model performance is audited regularly, the system becomes a uniquely incorruptible agent: it cannot be bribed, distracted, or socially manipulated. Its outputs are based solely on its data inputs and optimization criteria. Over time, organizations could mandate the publication of generated governance reports, providing shareholders or public stakeholders with clearer insight into board rationale than redacted minutes or proxy statements ever could.

Furthermore, the presence of a governance system may exert a purifying effect on board composition. Directors who seek board seats for symbolic reasons—networking, prestige, inside access—may self-select out of AI-heavy governance environments, where contributions are measurable and decisions are data-driven. This dynamic could leave behind a core of more mission-aligned directors whose roles are complementary: providing values-based judgment, representing external constituencies, or serving as legal signatories. In this sense, it acts not only as a governance tool, but as a selection mechanism for board integrity.

There are, of course, caveats. Continuous monitoring and documentation raise concerns about over-transparency. Boards occasionally need to entertain speculative, politically sensitive, or experimental ideas. If machines record all discourse, directors may feel inhibited or constrained, fearing that a poorly phrased concern might later be surfaced inappropriately. Thus, integration must be accompanied by robust data governance protocols: defining what is recorded, who has access, and under what conditions that data is retained or disclosed. Nonetheless, empirical research supports the idea that transparency—within reason—correlates with better governance outcomes. In the educational context, for instance, tools could track how board decisions on tenure, capital planning, or admissions policy correlate with student outcomes or financial performance, revealing long-term efficacy patterns that are often overlooked.

Independent directors remain essential to effective governance, particularly in times of crisis or strategic inflection. Studies by Hu et al. (2022) and Bezawada and Adavelli (2020) confirm that board independence enhances resilience and profitability. However, true independence can be difficult to sustain in practice, particularly when directors rely on mutual board appointments or social ties. Agents, by contrast, embodies structural independence—free from social dependencies, political affiliations, or career incentives. It could serve as a permanent *independent voice*, consistently highlighting misalignments and ethical risks without fear of reprisal.

Thus, the introduction of AI into governance holds considerable promise as a countermeasure to entrenched dysfunctions in the boardroom. By generating auditable rationales, surfacing performance deviations, and enforcing task follow-through, smart systems can elevate transparency and accountability far beyond what is typical in current practice. They do not eliminate the need

for ethical human governance—after all, the technology ust be designed and overseen by humans—but they *recalibrate* the incentive landscape, making it more difficult for passive or self-interested behavior to persist unnoticed. If explainability and ethical alignment are prioritized in development, the tools could serve as a bulwark against the very failings that continue to erode public trust in institutional governance.

6. Future Prospects: AI Agents Exceeding Human Boards?

As intelligent systems evolve, their capacity to not only support but potentially exceed human decision-making at the board level is becoming increasingly plausible. This section explores the near-future trajectory of smart governance, emphasizing tangible performance outcomes in strategic foresight, ethical evaluation, and systemic risk oversight. It also examines the structural and regulatory adaptations necessary for agents to assume more autonomous roles, while recognizing the enduring domains where human judgment will likely remain essential. Advanced systems, leveraging big data and next-generation learning algorithms, are already beginning to demonstrate strategic capabilities that outpace traditional board functions. Rather than responding to static quarterly reports, future "board agents" could integrate a constant stream of market intelligence—industry news, social sentiment, economic indicators, and internal operational data—to detect emerging threats and opportunities. As Han et al. (2024) envisioned in a higher education setting, an automated trustee could assess a new academic program's potential by computing enrollment projections, ROI estimates, and alignment with institutional goals in real time—quantifying uncertainty and optimizing allocation decisions. A forecast such as "a 68% chance of hitting enrollment targets" becomes a data-grounded strategic signal rather than a gut-based gamble (VS, 2025). Similar systems are already at work in firms like IHC, where Aiden Insight is tasked with "strategic future-proofing against emerging trends and technologies" (ADMO, 2024). With reinforcement learning models simulating and refining long-term strategies, generated options could rival, and perhaps exceed, even the most experienced human directors—particularly in fast-changing or highly complex markets.

In parallel, intelligent systems are well-positioned to advance ethical governance. With increased public scrutiny on corporate social responsibility, boards are expected to weigh financial imperatives against long-term stakeholder impact. An agent equipped with an embedded ethics module—aligned to global frameworks such as the UN Global Compact—could evaluate decisions across financial, social, and reputational metrics simultaneously. For instance, before approving a plant closure, the model could assess not only cost savings, but job losses, community backlash, and brand erosion. Sentiment analysis on media and social platforms could be integrated into the risk calculation. Aiden's existing charge to perform "ethical and compliance monitoring" indicates this integration is already underway (ADMO, 2024). Unlike human directors, whose ethical consistency can be influenced by external pressures or personal bias, agents can uniformly apply codified values and flag discrepancies with past precedents. This consistency does not replace human ethics, but it ensures that ethical trade-offs are highlighted early—potentially averting scandals or reputational damage caused by tone-deaf decision-making.

Perhaps the greatest unrealized potential lies in the ability to oversee systemic risk. In complex institutions, risks may germinate in obscure corners—across subsidiaries, geographies, or departments—and propagate silently. Algorithms excel at identifying such risks by correlating disparate datasets. A board-integrated agent could simultaneously monitor financial ledgers, customer feedback, supply chain disruptions, and sensor data to flag vulnerabilities. For example, if a product line exhibits increased customer complaints, declining warehouse efficiency, and mounting warranty costs, the tool an synthesize these indicators into a coherent risk alert—far earlier than a human director poring over isolated reports. Financially, such foresight allows firms to intervene before losses compound. Agents could also continuously stress-test balance sheets under volatile macroeconomic conditions, a function that banks currently perform intermittently through manual models. Brogi and Lagasio (2022) highlight how board size and independence shape financial risk oversight; a scalable board system, impervious to interpersonal influence or overload, could deliver superior risk governance with consistent methodology. Moreover, demographic variability—such as the findings by Berger et al. (2014) linking gender diversity and age to portfolio risk—would be rendered moot by demographic neutrality, reducing the randomness of human-driven variance in risk assessments.

As well, the technology also holds promise in crisis response. Human boards, particularly those that convene infrequently, may be ill-prepared for real-time disruptions—be they cyberattacks, supply chain collapses, or public relations crises. The model, operating continuously, could detect anomalies, simulate impact scenarios, and recommend mitigation strategies within minutes. Although current systems struggle with unprecedented "black swan" events, training models on historical crisis data could improve adaptive responses. Unlike human directors, who may experience decision paralysis or internal conflict in crisis settings, intelligent systems can act swiftly and consistently. As noted in Cicu (2024), the technology may not intuitively respond to crises it has not been trained on, but it also does not panic, politicize, or delay—a major advantage during time-sensitive threats. Despite these advantages, there are limits to autonomy. Areas such as vision-setting, employee inspiration, or managing cultural transformation remain firmly in the human domain. Boards also serve an external function: engaging with regulators, representing the organization at public events, and signaling legitimacy through personal gravitas. While these tools can generate evidence-based recommendations and even craft public statements, it lacks the charisma, empathy, and reputational capital of esteemed human directors. These attributes are difficult to encode and unlikely to be replicated at scale. Creative strategy generation is another frontier where humans still excel. While they can model options and simulate outcomes, the imaginative leap—conceiving a brand reinvention or audacious market pivot—remains the province of human insight.

Nonetheless, the divide is narrowing. Co-pilots are already being used to draft strategic options for human refinement. With advancements in affective computing and natural language generation, the technologymay soon analyze not only market trends but also interpersonal dynamics, executive tone in interviews, and organizational psychology. Unlike human boards, which sometimes repeat errors out of habit or deference, these systems learn iteratively. A flawed decision, once recognized, can be encoded as a negative example—reducing the likelihood of

recurrence. Over time, this feedback loop could yield decision systems with superior calibration and recall. We are likely to see a gradual shift toward this augmented model. Within 5–10 years, institutions may appoint autonomous co-directors to subcommittees, particularly in audit, risk, or compliance functions. These agents could vote on issues alongside humans, providing a baseline of data-driven integrity. As Kamat (2025) notes, discourse is already emerging about creating legal frameworks for fiduciary roles. Although initial forecasts—such as the World Economic Forum's projection of machine directors by 2025—proved optimistic, we are now witnessing a delayed but unmistakable move toward algorithmic governance. A credible intermediate state may be a hybrid structure: AI handles operations, monitoring, and scenario planning; human directors validate values-driven decisions and serve as institutional stewards. For instance, models could draft and monitor a university's strategic plan, assess program-level ROI, and recommend faculty appointments based on performance analytics. The human board would retain control over mission statements, diversity priorities, and public engagement. Such a model preserves the symbolic and relational functions of the board while elevating its analytical core. Financially, this hybrid could outperform most current governance systems, yielding better decisions at lower cost.

Longer-term, legal adaptations may permit deeper automation. If regulators allow generated decisions to carry legal authority—either through formal appointment or under structured oversight—a firm could function with minimal human board participation. A private university or decentralized corporation might rely on a supervisory algorithmns, audited annually, to govern most functions. Success in this model—measured in operational savings, innovation velocity, and stakeholder confidence—would mark a true paradigm shift: not simply aiding boards, but replacing them in practice. Still, a fully human-free board is improbable. Institutions exist within human societies, and legitimacy remains anchored in human representation. Even the most efficient system may be seen as illegitimate if it lacks a human face. Thus, the future is not one of replacement, but recomposition. Boards will likely evolve into cognitive symphonies: machines ensuring rigor, humans providing purpose.

7. Conclusion

The viability of replacing or augmenting traditional boards of directors with artificial intelligence systems is transitioning from speculative theory to emergent practice. As demonstrated by pioneering cases—from the algorithmic participation of VITAL in Hong Kong to the strategic integration of Aiden Insight in Abu Dhabi—systems are increasingly capable of performing substantive governance functions with measurable success. These agents can analyze vast datasets in real time, detect patterns imperceptible to human cognition, and offer actionable, unbiased recommendations at speeds and scales unmatched by part-time human directors. This capability situates AI as a potent instrument for the "strategic brain" of organizational governance, particularly in domains where data complexity and decision latency have historically impaired board performance.

Nonetheless, boards are not solely decision engines. They also function as symbols of institutional credibility, repositories of social capital, and relational bridges to external stakeholders. In this capacity, human directors wield influence that cannot be replicated—whether through high-profile affiliations, philanthropic leadership, or representational legitimacy. As such, while AI can

enhance analytic rigor, it cannot (yet) substitute the reputational signaling and relational navigation provided by human governance actors. Institutions that rely on these symbolic functions will likely continue to privilege human participation, even as they incorporate the tools for analytic augmentation.

From a financial perspective, the incentives to adopt machine governance are compelling. Organizations stand to reduce directorial compensation costs, streamline operational oversight, and improve decision-making consistency. Smart sstems also offer structural advantages in transparency and impartiality, which can mitigate common governance failures such as self-dealing, inertia, and informational asymmetry. As boards face increased scrutiny over their efficacy and ethical integrity, tools may serve as both performance enhancers and accountability mechanisms. However, full automation remains constrained by legal regimes that recognize only natural persons as fiduciaries, as well as by the ethical and symbolic expectations that attach to governance leadership. These constraints suggest that, for the foreseeable future, a hybrid model—combining algorithmic precision with human judgment—offers the most pragmatic path forward.

Crucially, the boundary between support and substitution is not fixed. As these systems improve in explainability, contextual modeling, and the simulation of ethical dilemmas, the functions they can assume will broaden. It is foreseeable that, within a decade, agents will handle the majority of boardroom analytics, monitoring, and procedural recommendations, allowing human directors to concentrate on mission coherence, community relations, and cultural stewardship. Institutions that begin this transition early—by piloting co-directors, automating committee analytics, or integrating theminto strategic planning—will serve as vital testbeds for best practices and regulatory evolution. Their experiences will inform how governance frameworks adapt to accommodate or constrain machine agents within fiduciary roles.

For policymakers, investors, and academic leaders, the implications are profound. AI in the boardroom is not merely a technological upgrade but a reconfiguration of governance architecture. When implemented with care—anchored to institutional values, transparent in its logic, and overseen by committed human stewards—enhanced governance can deliver measurable gains in efficiency, accountability, and strategic foresight. This study has focused deliberately on those tangible benefits: cost containment, decision quality, and risk management. While ethical and legal issues remain pertinent, the financial and operational case for AI-driven governance is already strong. The open question is no longer whether models will influence boardrooms, but to what extent—and how fast. As digital systems continue to reshape the contours of business and education, governance may well emerge as the next frontier of intelligent automation. In that evolution, boards that embrace the technology not as a threat, but as a strategic collaborator, are poised to lead the transition to leaner, smarter, and more accountable oversight for the organizations of the future.

References

1. Abu Dhabi Media Office (ADMO) (2024). Artificial Intelligence board observer appointed by International Holding Company. *Abu Dhabi Media Office*. February 27, 2024:

https://www.mediaoffice.abudhabi/en/economy/artificial-intelligence-board-observer-appointed-by-international-holding-board-of-directors/

2. Agnese, P., Arduino, F. R., & Di Prisco, D. (2025). The era of artificial intelligence: what implications for the board of directors?. *Corporate Governance: The International Journal of Business in Society*, *25*(2), 272-287.

3. Ajmal, C. S., Yerram, S., Abishek, V., Nizam, V. M., Aglave, G., Patnam, J. D., & Srivastava, S. (2025). Innovative Approaches in Regulatory Affairs: Leveraging Artificial Intelligence and Machine Learning for Efficient Compliance and Decision-Making. *The AAPS Journal*, *27*(1), 22.

4. Alhaddad, L., Gerged, A.M., Saidat, Z., Ali Al-Qudah, A. and Aziz, T. (2022), "Do multiple directorships stimulate or inhibit firm value? Evidence from an emerging economy", *International Journal of Accounting & Information Management*, Vol. 30 No. 4, pp. 546-562. https://doi.org/10.1108/IJAIM-05-2022-0094

5. Ali, M. (2020), "Determinants and consequences of board size: conditional indirect effects", *Corporate Governance*, Vol. 18 No. 1, pp. 165-184. https://doi.org/10.1108/CG-01-2016-0011

6. Asundi, S. (2025). Microsoft Co-Pilot's Role in Augmenting Decision Intelligence for Executives. *International Journal of Advanced Research in Computer Science*, *14*(2278), 10-17148.

7. Berger, Allen N, Kick, Thomas, & Schaeck, Klaus (2014) Executive board composition and bank risk taking. *Journal of Corporate Finance*, Volume 28, ISSN 0929-1199, Pages 48-65. https://doi.org/10.1016/j.jcorpfin.2013.11.006.

8. Bezawada, B. & Adavelli, R. (2020) Corporate Governance, Board Characteristics and Performance of Indian Banks: An Empirical Study *International Journal of Economics and Financial Issues*, 10(3), 83-87.

9. Brogi, M.,Lagasio.V. (2022) Better safe than sorry. Bank corporate governance, risk-taking, and performance *Finance Research Letters* 44: 102039.

10. Bussin, M., & Christos, D. (2024). Board and executive remuneration around the world. *HR Future*, *2024*(3), 46-51.

11. Chahine, S., Filatotchev, I., & Zahra, S. A. (2011). Building perceived quality of founder–involved IPO firms: Founders' effects on board selection and stock market performance. *Entrepreneurship Theory and Practice*, *35*(2), 319-335.

12. Cicu, G. C. (2024). Bridging Traditional Corporate Governance and Technology: The" AI Corporate Design" Framework to Computational Corporate Governance Model. *Italian LJ*, *10*, 345.

13. Dey, S., Sharma,D. (2020) Nexus between Corporate Governance and Financial Performance: Corroboration from Indian Banks, *Universal Journal of Accounting and Finance*, 8(4), 140-147.

14. Eroğlu, M., & Karatepe Kaya, M. (2022). Impact of artificial intelligence on corporate board diversity policies and regulations. *European Business Organization Law Review*, *23*(3), 541-572.

15. Ghorfi, T., Laraqui, S., & Nachit, H. (2025). AI for Energy Management: Driving Efficiency and Sustainability in the MENA Region. In *AI in the Middle East for Growth and Business: A Transformative Force* (pp. 145-175). Cham: Springer Nature Switzerland.

16. Goldman, E., Rocholl, J., & So, J. (2013). Politically connected boards of directors and the allocation of procurement contracts. *Review of Finance*, *17*(5), 1617-1648.

17. Guest, P. M. (2009). The impact of board size on firm performance: evidence from the UK. *The European Journal of Finance*, *15*(4), 385–404. https://doi.org/10.1080/13518470802466121

18. Han, X., Xiao, S., Sheng, J., & Zhang, G. (2024). Enhancing efficiency and decision-making in higher education through intelligent commercial integration: Leveraging artificial intelligence. *Journal of the Knowledge Economy*, 1-37.

19. Hu, X., Lin, D., & Tosun, O. K. (2022). The effect of board independence on firm performance – new evidence from product market conditions. *The European Journal of Finance*, *29*(4), 363–392. https://doi.org/10.1080/1351847X.2022.2049448

20. Kamat, P. (2025). *Practical Applications of Business AI*. Educohack Press.

21. Khatib, S. F. A., Al Amosh, H., & Ananzeh, H. (2023). Board Compensation in Financial Sectors: A Systematic Review of Twenty-Four Years of Research. International Journal of Financial Studies, 11(3), 92. https://doi.org/10.3390/ijfs11030092

22. Kim, S. (2015). Directors' Decision-Making Involvement on Corporate Boards. *Available at SSRN 1528596*.

23. Kindylidi, I. (2020). Smart Companies: Company & board members liability in the age of AI. *UNIO–EU Law Journal*, *6*(1), 115-141.

24. Koyande, A. K., Vardhan, V., Devadas, K. W. C., & Show, P. L. (2021). 5.0 Industrial Perspective of Industry 5.0. *The Prospect of Industry 5.0 in Biomanufacturing*, 305.

25. Langenbucher, K. C. (2024). Ownership and Trust-A corporate law framework for board decision-making in the age of AI. *European Corporate Governance Institute-Law Working Paper*, (758).

26. Li, Y., Zhao, R., Li, X., & Choi, T. M. (2024). Fine-tuning of artificial intelligence managers' logic in a supply chain with competing retailers. *Decision Sciences*, *55*(6), 639-652.

27. Lily Fang, Sterling Huang (2024), "The governance of director compensation", Journal of Financial Economics, Volume 155, 103813 , https://doi.org/10.1016/j.jfineco.2024.

28. López Iturriaga, F. J., & Morrós Rodríguez, I. (2014). Boards of directors and firm performance: the effect of multiple directorships. Spanish Journal of Finance and Accounting / Revista Española de Financiación y Contabilidad, 43(2), 177–192. https://doi.org/10.1080/02102412.2014.913909

29. Maldonado-Canca, L. A., Cabrera-Sánchez, J. P., & Molinillo, S. (2025). Deciphering the Mind of the CEO: Is Artificial Intelligence a Valuable Investment in Customer Acquisition?. *International Journal of Human–Computer Interaction*, 1-18.

30. Möslein, F. (2018). Robots in the boardroom: artificial intelligence and corporate law. In *Research handbook on*

the law of artificial intelligence (pp. 649-670). Edward Elgar Publishing.

31. Núñez, F., Arcos-Vargas, Á., Usabiaga, C. *et al.* (2022). On directors' compensation: a multilevel analysis of Spanish listed companies. *Empir Econ* **63**, 2173–2207 https://doi.org/10.1007/s00181-021-02183-4

32. Saleh, M.W.A., Shurafa, R., Shukeri, S.N., Nour, A.I. and Maigosh, Z.S. (2020), "The effect of board multiple directorships and CEO characteristics on firm performance: evidence from Palestine", *Journal of Accounting in Emerging Economies*, Vol. 10 No. 4, pp. 637-654. https://doi.org/10.1108/JAEE-12-2019-0231

33. Seru, A., Tayan, B., & Larcker, D. (2025). The Artificially Intelligent Boardroom. *Harvard Law School Forum*. April 8, 2025: https://corpgov.law.harvard.edu/2025/04/08/the-artificially-intelligent-boardroom/#:~:text=meeting,more%20proactive%20and%20less%20reactive

34. Skubis, I., & Wodarski, K. (2023). Humanoid robots in manigerial positions-decision-making process and human oversight. *Scientific Papers of Silesian University of Technology. Organization & Management/Zeszyty Naukowe Politechniki Slaskiej. Seria Organizacji i Zarzadzanie*, (189).

35. Sushkova, O. (2021). Legal forms and ways of application of artificial intelligence technology in making corporate decisions by the board of directors: problems and prospects. In *SHS Web of Conferences* (Vol. 106, p. 02012). EDP Sciences.

36. VS, R. (2025). The Boardroom Illusion: When Directors Chase Prestige Over Purpose. *LinkedIn*. February 21, 2025: https://www.linkedin.com/pulse/boardroom-illusion-when-directors-chase-prestige-over-ravi-vs-tmt2c/

37. Zhao, J. (2024). Promoting more accountable AI in the boardroom through smart regulation. *Computer Law & Security Review*, *52*, 105939.