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Predictive Artificial Intelligence for Risk-Governed Change Management and Organizational Resilience in Digitally Integrated Enterprises

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Abstract

The accelerating digitization of organizational systems, combined with the proliferation of artificial intelligence across industrial, environmental, and governance domains, has profoundly reshaped how contemporary enterprises conceptualize, manage, and mitigate risk. Change management, once grounded primarily in procedural controls and human judgment, has increasingly become a data driven, algorithmically mediated domain in which predictive systems continuously evaluate the potential consequences of organizational transformation. This article develops a comprehensive theoretical and empirical synthesis of predictive artificial intelligence as a core infrastructure for risk governed change management and organizational resilience. Drawing on a wide range of interdisciplinary scholarship, including disaster resilience theory, intelligent process automation, predictive maintenance, and digital supply chain surveillance, the study situates predictive risk scoring within broader socio technical systems of governance and control. Central to this analysis is the concept of Change Advisory Boards as epistemic and regulatory institutions that must now operate within environments of algorithmic foresight and automated decision support, as demonstrated by recent developments in predictive risk scoring for change management (Varanasi, 2025).

The article advances three interconnected arguments. First, predictive artificial intelligence fundamentally redefines organizational risk from a retrospective assessment of failure to a prospective calculus of probabilistic futures, thereby transforming how change initiatives are authorized, sequenced, and monitored. Second, the integration of predictive risk scoring into governance structures such as Change Advisory Boards generates new forms of institutional rationality that blend human expertise with machine based inference, producing both enhanced resilience and novel forms of opacity and ethical risk. Third, these systems must be understood within a larger ecology of digital infrastructures, including Internet of Things enabled environments, intelligent manufacturing, smart cities, and climate adaptive systems, all of which contribute streams of data that feed algorithmic risk engines.

Methodologically, the study employs a qualitative integrative research design grounded in interpretive synthesis of the provided scholarly corpus. Rather than treating predictive models as purely technical artifacts, the article analyzes them as socio technical constructs embedded in regulatory regimes, organizational cultures, and epistemological assumptions about risk and control. The results demonstrate that predictive artificial intelligence enhances the anticipatory capacity of organizations, allowing them to simulate the cascading effects of change across complex systems, but also introduces challenges related to transparency, accountability, and institutional trust.

The discussion situates these findings within broader debates on the governance of artificial intelligence, the limitations of existing risk management standards, and the future of human centric decision making in algorithmically mediated organizations. By articulating a theoretically grounded framework for predictive AI enabled change management, this article contributes to the emerging field of digital risk governance and provides a foundation for future empirical and normative research on resilient, ethically governed intelligent enterprises.

Keywords: Predictive artificial intelligence, Change Advisory Boards, risk governance, organizational resilience, intelligent decision support, digital transformation

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1. Introduction

The The contemporary organization exists in a state of perpetual transformation. Digital technologies, globalized supply chains, climate related disruptions, and accelerating innovation cycles have collectively produced environments in which stability is no longer the default condition but rather a temporary outcome of continuous adaptation. Within this context, change management has become one of the most critical domains of organizational governance, as even minor modifications to information systems, production processes, or logistical networks can propagate into systemic disruptions. Traditional approaches to change management were developed in relatively stable technological environments and relied heavily on human judgment, procedural checklists, and retrospective analysis of failures. However, the increasing complexity and interdependence of modern systems have rendered such approaches insufficient for anticipating the cascading risks associated with digital transformation, automation, and data driven operations (Brintrup et al., 2023; Brás et al., 2023a).

Artificial intelligence has emerged as a transformative force in this landscape, particularly through its capacity to model uncertainty, detect patterns across vast datasets, and generate probabilistic predictions about future states of complex systems. Within the domain of change management, this has given rise to predictive risk scoring systems that evaluate the potential impact of proposed changes before they are implemented. These systems are increasingly integrated into Change Advisory Boards, which serve as institutional gatekeepers responsible for authorizing and prioritizing changes in mission critical environments. The theoretical and practical significance of this development is captured by recent work on AI driven risk scoring in change governance, which demonstrates how predictive models can shift decision making from reactive control to proactive risk governance (Varanasi, 2025).

The concept of predictive risk scoring must be understood within a broader historical trajectory of risk management. Early risk frameworks in engineering and organizational studies focused on identifying hazards and estimating the likelihood of failure based on past incidents. Over time, these approaches were formalized in standards and regulatory regimes, yet they remained largely backward looking, relying on historical data and human interpretation to guide future decisions. In contrast, contemporary artificial intelligence systems are designed to learn continuously from real time data streams, enabling them to generate dynamic predictions that evolve as conditions change. This shift from static to adaptive risk models represents a fundamental epistemological transformation in how organizations know and govern uncertainty (Biolcheva and Valchev, 2022; Bjornsdottir et al., 2022).

The relevance of this transformation extends beyond corporate governance into domains such as disaster resilience, smart cities, and environmental sustainability. Disaster resilience research has long emphasized the importance of anticipatory capacity and the ability to benchmark baseline conditions in order to prepare for extreme events (Cutter et al., 2008). Similarly, smart city infrastructures and eco city initiatives increasingly rely on artificial intelligence and Internet of Things technologies to monitor environmental conditions, optimize resource use, and anticipate disruptions before they escalate into crises (Bibri et al., 2024; Apanaviciene and Shahrabani, 2023). These developments illustrate that predictive artificial intelligence is not merely a tool for operational efficiency but a foundational technology for resilience in complex socio technical systems.

Within organizational contexts, predictive AI is also deeply intertwined with the evolution of intelligent process automation and business continuity planning. The integration of automated decision support into core processes allows organizations to respond more rapidly to emerging risks, yet it also creates dependencies on algorithmic systems whose inner workings may be opaque to human decision makers (Brás et al., 2023b; Calderonio, 2023). This tension between enhanced foresight and reduced transparency is particularly salient in Change Advisory Boards, where accountability for decisions must be maintained even as algorithms increasingly shape the range of options considered viable.

Despite the growing body of research on artificial intelligence in risk management, predictive maintenance, and smart infrastructures, there remains a significant gap

in the literature regarding the specific role of predictive risk scoring in change governance. Studies of predictive maintenance in electrical systems and manufacturing environments demonstrate the power of machine learning to anticipate equipment failure and optimize maintenance schedules (Arpilleda, 2023; Aldrini et al., 2023), yet they rarely address how similar predictive logics can be applied to organizational change processes. Likewise, research on human centric decision support frameworks has highlighted the importance of integrating AI into managerial judgment, particularly under conditions of crisis and uncertainty (Chen et al., 2021), but has not fully explored the institutional implications for Change Advisory Boards and other governance structures.

This article addresses this gap by developing a comprehensive theoretical and methodological framework for understanding predictive artificial intelligence in risk governed change management. It situates the insights of predictive risk scoring for Change Advisory Boards within a broader ecosystem of digital resilience, drawing on scholarship from disaster studies, smart manufacturing, climate change mitigation, and supply chain analytics. In doing so, it advances a multidisciplinary perspective that recognizes predictive AI as both a technical and institutional innovation, reshaping how organizations conceptualize, evaluate, and enact change (Varanasi, 2025; Cheatham et al., 2019).

The central problem this article confronts is how organizations can harness the anticipatory power of predictive artificial intelligence without undermining the principles of accountability, transparency, and human centered governance. While algorithmic systems can process more data and identify more subtle patterns than any human committee, they also introduce risks of bias, overreliance, and epistemic opacity. These risks are particularly acute in contexts where decisions have far reaching consequences for safety, sustainability, and organizational survival, such as in smart manufacturing, healthcare, and climate adaptive infrastructures (Bozic, 2023; Chen et al., 2023).

The literature on integrated risk management has increasingly recognized that artificial intelligence must be embedded within robust governance frameworks if it is to contribute to resilience rather than fragility. This involves not only technical validation of models but also the development of institutional processes that allow human actors to interrogate, challenge, and contextualize algorithmic recommendations (Biolcheva and Valchev, 2022; Chen et al., 2023). In the context of Change Advisory Boards, this means rethinking how decisions are deliberated, how risk is communicated, and how responsibility is allocated when outcomes diverge from predictions.

By synthesizing insights from the provided references, this article proposes that predictive risk scoring represents a new paradigm of organizational foresight that must be governed through what can be described as algorithmically informed but human accountable change management. This paradigm acknowledges the indispensable role of artificial intelligence in navigating complexity while insisting that ethical, legal, and organizational considerations remain central to decision making. The remainder of this article elaborates this argument through a detailed methodological approach, an interpretive analysis of results grounded in the literature, and an extensive discussion of theoretical and practical implications.

2. Methodology

The methodological foundation of this study is an integrative qualitative research design that draws systematically on the provided corpus of scholarly literature to construct a theoretically coherent and analytically rigorous account of predictive artificial intelligence in risk governed change management. Rather than employing quantitative modeling or empirical data collection, the study adopts a reflective and interpretive approach that is particularly well suited to examining emerging socio technical phenomena whose meanings, implications, and institutional dynamics cannot be captured through numerical abstraction alone. This choice is consistent with contemporary approaches to the study of artificial intelligence in organizational and governance contexts, where the focus is increasingly on understanding how algorithms are embedded within complex systems of human practice, regulation, and culture (Calderonio, 2023; Cheatham et al., 2019).

At the core of this methodology is the principle of theoretical triangulation. The literature provided spans multiple domains, including disaster resilience, smart manufacturing, predictive maintenance, blockchain enabled supply chains, climate change mitigation, and intelligent process automation. Each of these domains offers a distinct but complementary perspective on how artificial intelligence is used to anticipate, evaluate, and

manage risk. By reading these sources against one another, the study seeks to identify convergent themes and divergent assumptions that illuminate the broader role of predictive AI in change governance (Bibri et al., 2024; Brintrup et al., 2023).

The analysis begins with a close reading of the work on predictive risk scoring for Change Advisory Boards, which serves as the conceptual anchor for the entire study. This work articulates a model in which artificial intelligence systems generate probabilistic assessments of change related risk by integrating historical incident data, system dependencies, and real time operational metrics, thereby enabling more informed and timely governance decisions (Varanasi, 2025). This model is not treated as an isolated technical innovation but as a case study of a broader shift toward anticipatory governance across digital enterprises.

To contextualize this model, the study draws on disaster resilience theory, which emphasizes the importance of baseline indicators, adaptive capacity, and the ability to absorb and recover from shocks. The relevance of this perspective lies in its focus on systemic interdependence and the recognition that risks rarely manifest in isolation but propagate through networks of social, technological, and environmental relations (Cutter et al., 2008). By mapping these insights onto organizational change processes, the methodology highlights how predictive AI can be used to simulate the cascading effects of change, thereby enhancing institutional preparedness.

In addition to disaster resilience, the methodology incorporates insights from research on intelligent process automation and business continuity. These studies provide a lens through which to examine how automated systems interact with organizational workflows and how continuity planning must evolve in response to algorithmic mediation (Brás et al., 2023a; Brás et al., 2023b). This is particularly important for understanding the operationalization of predictive risk scores within Change Advisory Boards, where algorithmic outputs must be translated into actionable governance decisions.

The study also integrates perspectives from smart manufacturing and predictive maintenance, which offer concrete examples of how machine learning models are used to anticipate failure and optimize interventions in physical systems. These domains demonstrate the practical feasibility and limitations of predictive AI, including issues of data quality, model drift, and the challenge of aligning technical predictions with human expertise (Aldrini et al., 2023; Arpilleda, 2023). By analogy, these challenges inform the analysis of predictive risk scoring in change management, where organizational data and human judgment must be similarly aligned.

A critical dimension of the methodology involves the examination of ethical, legal, and epistemological concerns associated with artificial intelligence. The literature on the opaque law of AI and the risks of algorithmic governance provides a framework for analyzing how predictive systems can both empower and constrain human decision makers (Calderonio, 2023; Cheatham et al., 2019). This dimension is essential for understanding the implications of embedding predictive risk scoring into Change Advisory Boards, which are accountable to stakeholders, regulators, and the public.

The methodological process proceeds through iterative thematic analysis. Key concepts such as risk, resilience, prediction, governance, and transparency are identified across the literature and then examined in relation to one another. This allows the study to construct a conceptual map that links predictive AI technologies to institutional practices and normative concerns. The findings that emerge from this analysis are not treated as definitive empirical truths but as theoretically grounded interpretations that can guide future research and practice (Chen et al., 2023; Biolcheva and Valchev, 2022).

One limitation of this methodology is its reliance on secondary sources rather than primary data. While this approach enables a broad and integrative perspective, it cannot capture the full complexity of how predictive risk scoring systems are implemented in specific organizational contexts. However, given the exploratory and theoretical aims of this study, the use of an extensive and diverse scholarly corpus provides a robust foundation for conceptual development and critical reflection (Varanasi, 2025; Bjornsdottir et al., 2022).

Another limitation is the rapid evolution of artificial intelligence technologies, which means that any theoretical framework risks becoming outdated as new models, standards, and governance mechanisms emerge. To mitigate this, the study emphasizes underlying principles of risk governance, resilience, and human centered decision making that are likely to remain relevant even as technical details change (Bibri et al., 2024; Chen et al., 2021).

Despite these limitations, the chosen methodology offers a powerful means of synthesizing disparate strands of research into a coherent narrative about the future of change management in algorithmically mediated organizations. By grounding this synthesis in the detailed analysis of predictive risk scoring for Change Advisory Boards, the study provides both conceptual depth and practical relevance.

3. Results

The integrative analysis of the provided literature yields a set of interrelated findings that illuminate how predictive artificial intelligence is reshaping risk governed change management and organizational resilience. These findings are not empirical measurements in the statistical sense but interpretive outcomes grounded in the convergence of scholarly perspectives on risk, automation, and governance. They demonstrate that predictive risk scoring systems fundamentally alter the temporal, epistemic, and institutional dimensions of change management (Varanasi, 2025; Biolcheva and Valchev, 2022).

One of the most significant results is the identification of a temporal shift from retrospective to prospective risk governance. Traditional change management frameworks rely heavily on post incident analysis and historical data to inform future decisions. While such approaches provide valuable lessons, they are inherently limited by their dependence on past events that may not accurately reflect future conditions. Predictive artificial intelligence, by contrast, continuously integrates real time data streams from operational systems, supply chains, and external environments to generate forward looking risk assessments. This enables Change Advisory Boards to evaluate not only what has happened but what is likely to happen if a particular change is implemented (Varanasi, 2025; Brintrup et al., 2023).

This temporal reorientation is closely linked to an epistemic transformation in how risk is understood. In conventional frameworks, risk is often conceptualized as a static probability attached to a discrete event. Predictive AI reframes risk as a dynamic field of probabilistic futures that evolve as new information becomes available. This aligns with disaster resilience theory, which emphasizes the importance of adaptive capacity and the continuous updating of baseline conditions in response to emerging threats (Cutter et al., 2008; Bibri et al., 2024). In the context of change management, this means that risk scores are not fixed verdicts but living indicators that reflect the shifting topology of organizational systems.

A further result of the analysis is the recognition that predictive risk scoring enhances the capacity for systemic awareness within organizations. By modeling the interdependencies among applications, infrastructure, human workflows, and external partners, AI driven systems can reveal how a seemingly localized change might propagate across the enterprise. This mirrors the logic of digital supply chain surveillance, where artificial intelligence is used to monitor complex networks and detect vulnerabilities before they escalate into disruptions (Brintrup et al., 2023; Charles et al., 2023). For Change Advisory Boards, such systemic insight allows for more nuanced deliberation and prioritization of changes, particularly in high risk environments.

The literature also indicates that predictive artificial intelligence contributes to greater consistency and objectivity in change governance. Human decision makers are subject to cognitive biases, organizational politics, and information overload, all of which can distort risk assessment. Predictive models, when properly designed and validated, provide a standardized framework for evaluating changes based on empirical patterns and probabilistic inference. This aligns with research on human centric decision support systems, which demonstrates that AI can augment rather than replace human judgment by providing structured, data driven insights (Chen et al., 2021; Barcaui and Monat, 2023).

However, the results also reveal significant challenges and tensions associated with the use of predictive AI in change management. One of the most prominent is the issue of opacity. Many advanced machine learning models, particularly those based on deep learning architectures, generate predictions through complex internal processes that are not easily interpretable by human users. This creates a potential gap between the output of predictive risk scoring systems and the ability of Change Advisory Boards to understand and justify their decisions. The literature on the opaque law of artificial intelligence underscores the legal and ethical risks of relying on systems whose reasoning cannot be transparently explained (Calderonio, 2023; Cheatham et al., 2019).

Another important finding concerns the risk of overreliance on algorithmic predictions. While

predictive AI can enhance foresight, it can also lead to a form of automation bias in which human decision makers defer excessively to machine generated scores, even when contextual factors suggest caution. This is particularly problematic in environments characterized by novelty and uncertainty, where historical data may not provide an adequate basis for prediction. Studies of predictive maintenance and smart manufacturing highlight the need for continuous human oversight to ensure that models remain aligned with real world conditions (Aldrini et al., 2023; Arpilleda, 2023).

The results further indicate that predictive risk scoring systems must be embedded within broader governance frameworks to be effective. Integrated risk management requires not only technical tools but also organizational processes that define roles, responsibilities, and escalation pathways. Research on risk management standards and hospital governance demonstrates that artificial intelligence can support decision making only when it is aligned with clear institutional structures and ethical guidelines (Bjornsdottir et al., 2022; Bozic, 2023). In the context of Change Advisory Boards, this means that predictive scores should inform deliberation rather than dictate outcomes.

Finally, the analysis reveals that predictive artificial intelligence has implications for organizational resilience that extend beyond change management. By enabling early detection of vulnerabilities and simulation of potential futures, AI driven risk scoring contributes to the capacity of organizations to absorb shocks, adapt to new conditions, and recover from disruptions. This aligns with broader trends in smart cities, climate change mitigation, and eco city development, where artificial intelligence is used to anticipate and manage complex environmental and infrastructural risks (Bibri et al., 2024; Chen et al., 2023).

Together, these results paint a nuanced picture of predictive AI as a powerful but ambivalent force in organizational governance. It offers unprecedented capabilities for anticipatory risk management while simultaneously raising profound questions about transparency, accountability, and the role of human judgment in algorithmically mediated decision making (Varanasi, 2025; Biolcheva and Valchev, 2022).

4. Discussion

The findings of this study invite a deep theoretical reflection on the evolving relationship between artificial intelligence, risk, and organizational governance. Predictive risk scoring, as articulated in the context of Change Advisory Boards, represents not merely a technical enhancement but a reconfiguration of how organizations imagine and enact their futures. At the heart of this reconfiguration lies a shift from reactive to anticipatory rationality, in which decisions are guided less by what has already gone wrong and more by what might go wrong under a range of possible scenarios (Varanasi, 2025; Cutter et al., 2008).

From a theoretical perspective, this shift resonates with broader debates in risk sociology and systems theory. Scholars have long argued that modern societies are increasingly preoccupied with the management of manufactured uncertainties, risks that arise not from natural hazards alone but from the very technologies and organizational forms designed to enhance efficiency and control. Predictive artificial intelligence intensifies this dynamic by producing ever more detailed simulations of potential futures, thereby expanding the horizon of what is considered knowable and governable (Biolcheva and Valchev, 2022; Bibri et al., 2024).

Yet this expansion of foresight also introduces new forms of epistemic vulnerability. The more organizations rely on algorithmic predictions, the more they are exposed to the limitations and biases embedded in data and models. Historical data, no matter how extensive, is always a partial and contingent representation of reality. When predictive risk scores are treated as objective truths rather than probabilistic estimates, there is a danger that they will obscure rather than illuminate the uncertainties inherent in complex systems (Calderonio, 2023; Cheatham et al., 2019).

The role of Change Advisory Boards in this context becomes particularly critical. Traditionally, these bodies have served as forums for deliberation, bringing together diverse stakeholders to weigh the risks and benefits of proposed changes. The integration of predictive AI into their workflows has the potential to enhance this deliberative function by providing a shared evidential basis for discussion. However, it also risks narrowing the space of debate if algorithmic outputs are perceived as authoritative or final. This tension underscores the importance of maintaining a human centric approach to decision support, in which AI augments but does not replace collective judgment (Chen et al., 2021; Barcaui and Monat, 2023).

Comparative analysis with other domains of AI application further illuminates these dynamics. In smart manufacturing and predictive maintenance, machine learning models are used to forecast equipment failure and optimize interventions. These systems have delivered significant gains in efficiency and reliability, yet they also require continuous calibration and human oversight to prevent costly errors (Aldrini et al., 2023; Arpilleda, 2023). The same principle applies to change management: predictive risk scores must be interpreted within a broader context of organizational knowledge and strategic priorities.

The ethical dimension of predictive AI in change governance cannot be overlooked. Decisions about which changes to approve, delay, or reject have real consequences for employees, customers, and communities. If these decisions are heavily influenced by opaque algorithms, questions arise about accountability and fairness. Who is responsible when a change approved by a predictive system leads to unforeseen harm? How can stakeholders challenge or appeal decisions that are justified by complex statistical models? These questions echo concerns raised in the literature on the legal and moral implications of artificial intelligence (Calderonio, 2023; Cheatham et al., 2019).

Another important consideration is the alignment of predictive risk scoring with existing standards and regulatory frameworks. Research on ISO standards and integrated risk management suggests that many current guidelines were not designed with algorithmic decision support in mind. As a result, organizations may struggle to reconcile the outputs of predictive AI with formal compliance requirements and audit processes (Bjornsdottir et al., 2022; Biolcheva and Valchev, 2022). This points to the need for updated governance models that explicitly address the role of artificial intelligence in risk assessment and change control.

The implications of predictive AI extend beyond individual organizations to the level of interconnected digital ecosystems. Supply chains, smart cities, and climate adaptive infrastructures are increasingly interdependent, meaning that changes in one system can reverberate across many others. Predictive risk scoring, by modeling these interdependencies, offers a powerful tool for managing systemic risk. However, it also raises the stakes of error, as inaccurate predictions can propagate through networks and amplify rather than mitigate disruptions (Brintrup et al., 2023; Charles et al., 2023).

Looking to the future, the integration of predictive artificial intelligence into change management presents both an opportunity and a challenge for organizational resilience. On one hand, it enables a level of anticipatory governance that was previously unimaginable, allowing institutions to navigate complexity with greater confidence and agility. On the other hand, it demands a rethinking of governance structures, ethical frameworks, and professional competencies. Managers, engineers, and policymakers must develop the capacity to critically engage with algorithmic systems, understanding not only their outputs but also their assumptions and limitations (Varanasi, 2025; Chen et al., 2023).

Future research should therefore focus on empirical studies of how predictive risk scoring is implemented in real world Change Advisory Boards, exploring how different organizational cultures, regulatory environments, and technological infrastructures shape its use and impact. Comparative studies across sectors such as healthcare, manufacturing, and public administration would be particularly valuable, as they would reveal how context influences the balance between automation and human judgment (Bozic, 2023; Brás et al., 2023a).

In sum, predictive artificial intelligence represents a profound transformation in the governance of organizational change. Its promise lies in its ability to illuminate the uncertain futures that organizations must navigate, but its success depends on the wisdom with which it is integrated into human institutions. By grounding predictive risk scoring within robust frameworks of accountability, transparency, and ethical deliberation, organizations can harness the power of artificial intelligence to build more resilient and responsive systems of change governance (Varanasi, 2025; Biolcheva and Valchev, 2022).

5. Conclusion

The rise of predictive artificial intelligence marks a pivotal moment in the evolution of risk governed change management. As organizations confront ever more complex and volatile environments, the ability to anticipate the consequences of change has become as important as the ability to implement change itself. Predictive risk scoring systems, particularly when embedded within Change Advisory Boards, offer a powerful means of transforming uncertainty into actionable foresight, enabling more informed, timely, and resilient decision making (Varanasi, 2025; Cutter et al., 2008).

This article has shown that predictive AI does more than automate existing practices; it reshapes the very foundations of organizational governance by redefining how risk is known, communicated, and acted upon. By integrating insights from disaster resilience, intelligent automation, and digital governance, the study has articulated a framework for understanding both the potential and the perils of algorithmically mediated change management. While predictive systems can enhance systemic awareness and consistency, they also introduce challenges of opacity, overreliance, and ethical accountability that must be addressed through thoughtful institutional design (Calderonio, 2023; Cheatham et al., 2019).

Ultimately, the future of change management lies not in choosing between human judgment and artificial intelligence but in cultivating a productive partnership between them. Predictive AI can illuminate the pathways of risk and opportunity, but it is human actors who must decide which paths to take, guided by values, experience, and a commitment to the common good. In this sense, the integration of predictive risk scoring into Change Advisory Boards represents not the end of deliberative governance but its transformation for the digital age (Chen et al., 2021; Biolcheva and Valchev, 2022).

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